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NOTES OF SOME OBSERVATIONS ON NITRIFICATION.*

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A good deal of attention on the part of chemists has of late been given to the subject of nitrification, or the formation of nitrites and nitrates under different circumstances. This has arisen, in a great measure, from the observations of MM. Schlœsing and Müntz,† which were laid before the Academy of France about two years ago. From the researches of those gentlemen, they arrived at the conclusion, that nitrification was due to an organized ferment, and that it was probably the office of some of the low forms of vegetable life, to produce those oxides of nitrogen under different circumstances. And the subsequent investigations of Warrington, Storer and of other chemists, would appear to go far to confirm the correctness of their theory of nitrification, at least, under the conditions in which their experiments were made.

Though there exists, no doubt in many cases, an intimate relation between the formation of nitrites and nitrates, and the development of certain organized germs, still, as far as my observations go, I do not think that there is sufficient proof to show that their development in such instances is the cause of nitrification, and not, rather, one of the circumstances attendant on that process.

My experiments, however, were made not with a view to determine that question, but in reference to the detection of animal impurities in potable waters, and to ascertain the circumstances which were favourable or otherwise, to the formation of nitrites and nitrates in waters which were so polluted, as the presence of such salts is generally regarded as indicating previous sewage contamination; and the drinking of water with such pollution is not only injurious to the health of those who thus employ it, but there exist strong grounds for the opinion which is now very generally entertained, that such water frequently becomes the means of conveying the germs of certain formidable diseases, especially those of typhoid fever and cholera, from its containing the fecal and other emanations of individuals suffering under those maladies, and thus disease and death are often insidiously brought into many homes, when such diseases are prevalent in different localities. Besides, as the formation or production of nitrates is one of great industrial and agricultural importance, any facts which might directly or indirectly enable us to facilitate or hasten that process, would be of much practical value.

As human urine and feculent matters may justly be regarded as the most offensive and dangerous ingredients of sewage in general, my experiments have been confined to those matters, and were principally made on urine, which from its containing different nitrogenous substances readily susceptible of decomposition, is peculiarly suited for the study of the nitrification of animal matters. By mixing this liquid with various proportions of water, and placing the mixtures under different circumstances, I have endeavoured to ascertain those that were favourable or otherwise to their nitrification, and to determine some points connected with that process which required further investigation.

I should here observe, that in detecting the occurrence of nitrification, I have principally used the well known test of Price for nitrites, which consists in adding to the water or mixture, a thin solution of starch containing a little iodide of potassium and acidifying with diluted sulphuric acid, when a blue reaction from the liberated iodine will be immediately produced, should a very minute quantity even, of a nitrite be present. And as there is every reason to suppose that the production of nitrites precedes that of nitrates in the nitrification of organic matters in solution, and the detection of the former is much more easily effected than the latter, at least under the conditions existing in my experiments, I was satisfied in most cases to obtain the evidence of the formation of nitrites by the employment of the test to which I have just referred.

The experiments of Warrington* have led him to conclude, that darkness is an essential condition to the development of those low forms of vegetable life, which are supposed in many instances to give rise to nitrification. This is a question which it is difficult to determine decisively, one way or the other, owing to the impossibility of having with us continuous daylight to operate with. Still I think we may arrive at an approximate conclusion on this point, by making comparative experiments on similar mixtures kept altogether excluded from the light, and on those exposed to its full influence, and then determining the amount of nitrification which had taken place in each after a given time; and if darkness be so essential to that process, we should naturally expect that in the mixtures exposed to its continuous influence, there would be an earlier and a greater development of nitrification, than in those which had been placed under it, for about one-third or one-half

* Read before the Royal Irish Academy, May 12, 1879.
† *Comptes Rendus*, lxxxiv., 301.

* *Journal of the Chemical Society*, January, 1878.

the time each day of twenty-four hours. From the results of several comparative experiments made in this way, I have come to the conclusion, that the conditions of light or darkness exercise but little influence one way or the other in this process, at least under the circumstances existing in my experiments, which consisted in placing different portions of the same mixture in similar bottles, some of which were surrounded with black cloth or velvet to exclude light, whilst others were left uncovered, and all of them were suffered to remain open or uncorked. On examination after a few days, there was but little difference as to the amount* of nitrification that had taken place in each—indeed in some of my experiments, it had progressed to a greater extent in the uncovered than in the covered bottles; and in all made on this subject (except those to determine this point as to the necessity or not of darkness) the mixtures were left exposed to the light, and some to the full influence of strong sunshine, yet still a considerable amount of nitrification took place in each; besides in nature much of the nitrates which occur in the surface soils of different localities, must have been formed under the influence of more or less daylight, all of which facts, I conceive, are more or less opposed to the necessity of darkness in this process.

Another point which has not, I believe, been clearly established, at least as regards nitrification occurring in water containing organic matters, is the necessity of having a certain amount of air or of free oxygen to carry on the process; this I have proved in the following very simple manner:—To water which had been kept boiling for some time to expel its contained air, I added a small quantity of freshly voided urine (the proportion employed being about one part of urine to sixteen parts of water, such a mixture having been found to be very suitable for nitrification), and then repeated the boiling to ensure the removal as far as possible of any dissolved air. Several bottles which had been kept immersed in the boiling mixture, were then filled completely with it, corked and sealed with sealing wax to prevent the access of air. Some, however, of them containing this mixture were left open for comparison. After leaving the bottles for a day or two in the same place, I first examined the open ones for nitrites, and when the test indicated the abundant formation of those salts, I opened one of those sealed, when not a trace of nitrites was discoverable in its contents; the remaining sealed ones were opened at different periods subsequently with the same results. Other comparative experiments were made, where the temperature of the mixtures was artificially kept at a heat very favourable to nitrification, but in every instance where the access of air had been excluded no trace of nitrites could be detected, clearly proving the necessity of more or less air or free oxygen for their formation. But the amount necessary to commence at least, the process is small, for I found that where the mixture had not been boiled previous to the complete filling, corking and sealing of the bottle, that the air dissolved in the liquid was sufficient to cause the production of nitrites to some extent.

The quantity of animal matter which is held in solution in the water, I find exercises a considerable influence over nitrification, for where it occurs in very large proportion, there the process either does not take place at all, or is carried on much slower than in the more dilute solutions. This I have proved by comparative experiments with water mixed with different proportions of the same sample of urine, or of solution of excrementitious matter, where I found that nitrification occurred first in the more dilute mixtures; and that where there was much organic matter present, that the nitrites which might ultimately be formed soon afterwards disappeared again, by their subsequent change or decomposition; whereas those that had been produced in more dilute solutions, have remained unchanged for a considerable time.

But the circumstance which I have found to exercise the greatest influence over nitrification is that of temperature, for I have observed that in cold weather it is very slow in taking place, whilst in warm it is much quicker, and that by the application of artificial heat the process can be greatly accelerated. The correctness of this observation is borne out by the well-known fact, that it is from the soils of different hot climates that we obtain our chief supply of nitrates. As to what may be the most favourable temperature for this process, I have not yet been able to determine, owing to the difficulty, as I am circumstanced, in maintaining continuously the same degree of artificial heat; but I have found that where the mixtures were placed where they were kept at a temperature which varied from about 70° to 80° F., that there the process was carried on very quickly and that nitrites were soon abundantly formed, whereas in similar mixtures maintained at lower degrees of heat or at the ordinary temperature not a trace of those salts could be detected in the same time, and that their presence was not discoverable till after a much longer period.

The foregoing observations have, I conceive, some important bearings as regards the contamination of water with sewage, and the evidence of such derivable from the occurrence in it of nitrites and nitrates. For though the presence of those salts is undoubtedly, in many instances, an indication of previous sewage pollution, still their absence, taken by itself, cannot be relied on as a sure indication of the freedom of the water from such contamination. For the circumstances present may have either been unfavourable to the formation of nitrites and nitrates, or have produced their subsequent rapid disappearance: thus, for instance, the lowness of the temperature of the water may have prevented their formation, or the quantity of organic matter present may have interfered with their development, or have led to their subsequent change and disappearance. Such, amongst other circumstances influencing the presence of those salts in water containing animal matters, it will at once be evident, that their absence, unless accompanied by other indications of purity, cannot be relied on as a proof of the freedom from such contamination.

Before I conclude, I wish to call attention to another fact which I have noticed in connection with this subject, viz., the rapidity with which nitrites are sometimes formed in waters contaminated with sewage impurities. This is a subject of considerable importance in an analytical point of

* In ascertaining the amount of nitrification, the indigo process, as described by Sutton in his 'Volumetric Analysis,' was employed, which served for the determination of the nitrites and nitrates collectively, and though it may not be quite so accurate as some other methods, was sufficiently so for this purpose, as it was only the comparative amount of nitrites and nitrates formed under the different circumstances of the experiments that I wanted to determine.

view, as I shall endeavour briefly to explain. It is well known by those who have analysed potable waters, that the method which chemists now principally employ, to ascertain their purity or otherwise, is to determine the quantity of ammonia a given amount of the water will yield on distillation, both before and after the addition of a strongly alkaline solution of permanganate of potash. The first obtained is termed the free, and the second the albuminoid ammonia. The former is regarded as the representative of the nitrogenous organic matters previously existing in the water, which have undergone more or less decomposition; whilst the latter is produced by the action of the alkaline permanganate or those substances still present in the water. Consequently, the less of each that is furnished by a sample of water when so treated, the purer organically is it regarded, and the safer, other circumstances being similar, would it be for potable purposes.

When lately analysing a sample of water that had been contaminated with sewage, to ascertain the amount of such pollution, which was afterwards the subject of an important legal inquiry, in my first trial, I found that the water yielded a quantity of free ammonia, which was equivalent to 0·970 parts of a grain per gallon, but on repeating the determination a few days afterwards, it was discovered that it had fallen to 0·186 parts of a grain for the same quantity of water, or to less than one-fifth of the former amount; whereas the quantity of albuminoid ammonia yielded had slightly increased. This result as to the great decrease of free ammonia, which at first rather surprised me, I ascertained was due to the formation of nitrites, which had been developed to a large extent, in so short a time, at the expense of the free ammonia.

Such being the case, if the water had not been examined till the date of the second analysis, and if the nitrites had not been taken into account, this water would have been regarded as containing much less free ammonia than it did, and consequently that the previous sewage contamination was less than it really was; this point, is therefore, one of some analytical importance.

It is right for me to observe in connection with this latter fact of the decrease of free ammonia in waters by keeping, that long after I had made that observation, I came across in the *Chemical News* for March 2, 1877, a letter written by Professor Pattison Muir, of Owens College, in which he calls the attention of chemists to some observations his brother had just made in the laboratory of the University at Sydney, in which he had noticed that the amount of free and of albuminoid ammonia, as determined by Wanklyn's process, varied very considerably with the time the sample of water had been kept; but neither of those gentlemen have offered (in the letter referred to) any explanation of the fact further than that Professor P. Muir throws out the suggestion, in the case of the increase by keeping of the albuminoid ammonia, that possibly it might have been owing to the "germs" which have escaped decomposition by the permanganate, undergoing a gradual decomposition in the water, and that ammonia is one of the products of this process. Be this as it may, I have satisfied myself that the loss of free ammonia is often due to the formation of nitrites or nitrates, which are very rapidly formed from it under different circumstances. And as regards albuminoid ammonia, the very slight increase which I observed in my experiment, was, I thought, very easily accounted for by my having in the second determination, carried on the process of distillation somewhat further than in the first trial, and in this way the amount might be very naturally increased.

Finally, my observations that nitrification is greatly promoted by warmth might, I conceive, admit of some practical application in the manufacture of the nitrate of potash in the artificial nitre beds, especially in those of cold countries, and I am not aware that heat has hitherto been anywhere artificially applied to hasten or promote that important manufacture.

NOTES ON SOME JAPANESE DRUGS.

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society.

The Japanese are perhaps the most enterprising and progressive of Eastern nations, and have already made vast strides in the science and education of the West. In Japanese medicine a similar improvement seems to have taken place, for it was remarked at the Centennial Exhibition at Philadelphia, that although 300 specimens representing the advanced materia medica of Japan were exhibited, none of the specimens belonged to the animal kingdom, the various disgusting remedies of that class still used by the Chinese being conspicuous by their absence.

Yet comparatively little is known in English-speaking countries of the drugs used by the Japanese. Beyond an enumeration of thirty well-known drugs used in other countries, no description that I can discover has been published in the English language of the 300 specimens above mentioned.

In *New Remedies* for January, 1877, a short account is given of Japanese medicine,* and the names and uses of a few drugs, and some analyses of a few others have been published in the *American Journal of Pharmacy*, January, 1879, p. 25.

The large quantity of Japanese aconite that has during the last few years been imported into this country, has in some measure drawn attention to the drugs of Japan. Messrs. Wright and Luff have recently obtained from this aconite an alkaloid which they call Japaconitine. Another alkaloid has been discovered in an unnamed Japanese plant by M. A. Petit. These results have led me to examine the collection which was recently presented to the museum, with a view to ascertain whether any of them appeared to merit chemical examination or could be turned to any practical account in this country. Among those which seem most promising may be mentioned the root of *Coptis anemonæfolia*, containing a quantity of berberine; the fruits of *Gardenia radicans* and *G. florida*, in which a colouring matter supposed to be identical with that of saffron has been found; kuhsing root, containing the very bitter alkaloid discovered by M. Petit, and a valerian root, which seems to be more powerful than the English drug.

The thoroughness with which the drugs have been dried, their freedom from admixture and their excellent quality, seem to indicate that it may be possible in the future for drugs from Japan to compete successfully with less carefully prepared products nearer home.

The specimens hereafter described were all met with in the London market, where for some months

* *Pharm. Journ.*, vol. vii., p. 674.

they found no purchaser, nothing being known of their names or uses, all the names being in Japanese characters. In the following notes the drugs have been arranged for convenience of reference under the heads of Roots, Herbs and Leaves, Flowers, Fruits and Seeds, and the Japanese names have been placed in alphabetical order, as being those in which Japanese drugs are most likely to be met with in English commerce on future occasions.

The Japanese names *kung, soh, yoh, kah, she, ning*, which are of frequent occurrence in the following list of drugs mean respectively, root, herb, leaves, flowers, seeds and kernels, and must therefore not be looked upon as part of the name of the plant which yields them.

When presented to the museum of the Pharmaceutical Society by Mr. Christy, the specimens had merely numbers and the names in Japanese characters attached to each parcel; these numbers are here placed in parentheses after each Japanese name, to enable others to whom similar specimens have been distributed to easily identify them by this means.

I have to acknowledge the great assistance kindly afforded me by Mr. K. Takemura, a Japanese gentleman studying in the Society's laboratory, in translating the Japanese labels of the specimens, and also portions of the Sô mokou Zoussetz, a valuable Japanese work recently presented to the North British Branch of the Society. Without Mr. Takemura's assistance the botanical sources of many of the specimens could not probably have been so satisfactorily determined.

The works to which abbreviated reference is made, and from which the synonyms for the various drugs have been taken, are as follows:—

Kœmpfer, 'Amœnitates Exoticæ,' 1712.
Thunberg, 'Flora Japonica,' 1786.
Siebold and Zuccarini, 'Flora Japonica,' 1835.
Smith, Dr. F. Porter, 'Chinese Materia Medica,' 1871.
Miquel, 'Prolusio Floræ Japonicæ,' 1866–7.
Franchet and Savatier, 'Enumeratio Plantarum Japonicarum,' 1875.
Hanbury 'Science Papers,' 1876.

ROOTS.

BAI-MO (30): —*Fritillaria Thunbergii*, Miq. Prol. p. 321; Fr. et Sav. vol. ii. pt. 1, p. 61; Sô mokou Zoussetz, vol. v. fig. 79; *Uvularia cirrhosa*, Thunb. Fl. Jap. p. 136.

Syn. FARU JURI, AMISA JURI, Fr. et Sav.

The drug consists of a white starchy corm varying in size from a hazel nut to a filbert, and consisting of two halves which seem to be respectively the old and young corm, and which enclose between them very young flower buds. They have a bitter taste but no odour, and appear to correspond with the description of the bitter hermodactyle mentioned in the 'Pharmacopœia of India,' p. 246.

This plant is often found cultivated in gardens in Japan, and flowers in June. The corm is the part used in medicine. The corms have some resemblance to those of the hermodactyle formerly used in medicine in this country, and, indeed, closely resemble in appearance the hermodactyle described by Dr. Porter Smith in his work on 'The Materia Medica of China.' The Chinese character is also identical with the Japanese one, but in Chinese is pronounced Pei-mu instead of Bai-mo.

Pei-mu is used in China for rheumatism and aching joints. Whether it is used similarly in Japan I have no certain knowledge.

BIAKOO-BOO KUNG (34):—*Roxburghia sessilifolia* Miq. Prol. p. 143; *Stemone sessilifolia*, Fr. et Sav. vol. ii. pt. 1, p. 92.

Syn. HIYAKUBU, Sô mokou Zoussetz, vol. ii. fig. 55; SHIA-KOU-BOU, Phonzou Zoufou, vol. xxviii. p. 6.

The roots occur in the form of pale shrunken pieces from two to five inches long and internally present a horny appearance. They are tough and flexible. The taste is sweetish at first and afterwards slightly bitter.

In China it is credited with expectorant, antiphlogistic and vulnerary properties.

This liliaceous plant grows in the islant of Kiusiu, and has ovate leaves in whorls of four, flowering in May. It is furnished with numerous tubercular roots, which form the drug used in medicine. The Japanese name is probably given in allusion to the number of these tubercules, *Biakoo* meaning a hundred, *boo*, parts, and *kung*, root. The Japanese character for the name is the same as the Chinese character translated Peh-pu by Dr. Porter Smith in his 'Chinese Materia Medica,' and referred by him to Melanthium (?). The specimen in his collection is also identical in appearance with the Japanese drug.

BIAK-YITZ (12): —*Atractylis ovata*, Thunb. Fl. Jap. p. 306.

Syn. BIYAKU JUTSU, Sô mokou Zoussetz, vol. xv. fig. 49; BIAKOU SITSOU, Phonzou Zoufou, vol. iv. p. 25, 26; IKERA, Fr. et Sav., vol. i. p. 256.

The root of Biak-yitz occurs in pale brown knotty pieces, irregular in shape and slightly bent or twisted, about one inch long and half an inch in diameter. Internally it is whitish and speckled with yellowish brown dots, which under a lens are seen to contain an oily and resinous looking matter, which in another species (*A. lancea*, Thunb.), according to Hanbury ('Science Papers,' p. 255), is not removed by water, alcohol or ether.

According to a writer in *New Remedies*, January 1877, and quoted in the *Pharmaceutical Journal*,* "Biaku juszu" is much used, as well as the root of Sad juzu or So jutsu (*Atractylis lancea*), as an antifebrile remedy in Japan. In China it is used as a tonic, stimulant, diaphoretic and diuretic.

The Japanese name signifies, *biak*, white, *yitz* or *jutsu*, atractylis, and is possibly given in allusion to the pale under-surface of the leaves, since the flowers are red. The plant appears to have somewhat the habit of the *Serratula tinctoria* of this country. It grows in damp places by waysides, and flowers in October. The root is the part used in medicine. The drug mentioned under *Atractylodes alba*, in Dr. Porter Smith's 'Chinese Materia Medica' has the same written character for which Peh-shuh (white shuh) is given as the equivalent sound. His specimens of the root are evidently those of a nearly allied, but different species, being almost globular, and of a more fragrant and slightly different odour. Several species of this genus appear to be used in China under the name of "Shuh."

BOO KUNG (42):—*Eulalia Japonica*, Trin.; TO KIWA, ITO KAJA, KAJA, Miq. Prol. p. 177; OBANNA, SUSSUKI, Thunb. Fl. Jap. p. 42; FUKU, TSIKUSITS, TSIKUBE, SASADSITZ, *Sasa*.

Syn. MEGURI, Kœmpf. Amœn. p. 899, Fr. et Sav. vol. ii. p. 182.

Boo kung consists of very small pieces, much re-

* Vol. vii., [3], p. 675.

sembling in general appearance the *Triticum repens* of English pharmacies, but the pieces rarely exceed a quarter of an inch in length. The taste is slightly sweet; the odour scarcely any.

According to Dr. Porter Smith, Boo kung, or as the Chinese pronounce it Mau-ken—for the written character is the same in both languages—is a generic name for the roots of grasses and sedges. He refers the Chinese drug to *Saccharum spicatum*, which is also known in Japan under the name of Boo and Tsubanna according to Thunberg.

This grass is not unfrequent in damp copses in various parts of Japan, and flowers in August.

BIAK-MONG-DAU (28):—(*Ophiopogon Japonicus*, Ker.).

Syn. JANO-HIGE, Sô mokou Zoussetz, vol. vi. fig. 45, under *Fluggea Japonica*, Kunth., JAMMA SOB, JAWRANG; Thunb. Fl. Jap. p. 139; under *Convallaria Japonica*, L.; MONDO, BIAKFMONDO, RIUNO FIGE, Kœmpf. Amœn. Exot. p. 823 and fig. p. 824; MIH-MUN-TUNG, Hanbury 'Science Papers,' p. 256, with fig. of tubercules; DJIANO-SHIGE, Fr. et Sav. vol. ii. pt. 1, p. 85.

The tubercules which form the drug are about two-thirds of an inch in length and one-eighth of an inch in diameter, of a yellowish-white colour and have a central thread running through them. They evidently consist of dilatations of the cortical portion of the rootlets, the central thread being the meditullium. The taste is sweetish.

In China the drug is considered to be a pectoral and probably answers the same purpose in Japan.

The plant yielding these tubercules is common in uncultivated places in Japan, flowering in October or November. There are several varieties of the plant, var. *genuinus* being small, and vars. *umbrosus* and *Wallichianus* larger plants. Kœmpfer also alludes to another species growing near Satsuma, which has larger roots and is called Temondo. In the Sô mokou Zoussetz, both *Ophiopogon spicatus* and *O. Japonicus*, (*Fluggea Japonica*) are described as "Mong dau" according to Mr. Takemura, but *O. spicatus* is called large and *O. Japonicus* small "Mong-dau." The Chinese character for Men-tung is exactly the same as the Japanese for Mong-dau. The Japanese specimens are, however, smaller than those from China. The name mong-dau means literally *mong*, gate, *dau*, winter, probably on account of the plant flowering at the commencement of winter, and *biak*, white, in allusion to the white flowers.

TSIKU-SETZ NIN-JIN (27):—*Aralia edulis*, Sieb.(?)

Syn. UDO, DO-TOOKI, Sieb. et Zucc. p. 57; DOKU QUATZ, DOSJEN, Kœmpf. Amœn. p. 826; *Aralia cordata*, Thunb. (p. 127) F. et Sav. vol. i. p. 191.

In external appearance and size this drug bears a strong resemblance to the rhizome of *Polygonatum officinale* (Solomon's Seal); the disc-like scars left by the aerial stems are, however, arranged in a somewhat spiral manner, and are rarely more than half an inch apart. The transverse section of the root is of a dirty white colour, horny consistence, and is marked near the circumference with a ring of linear, loosely packed, radiating, vascular bundles. The taste is bitter. The rhizome has no distinctive odour.

The Japanese name, according to Mr. Takemura, means bamboo-knotted-ginseng, *tsiku* meaning bamboo, *setz* a knot or joint, and *nin-jin* ginseng, or in other words a root similar to ginseng, but having scars like those of the bamboo rhizome.

The above identification is given with uncertainty, as I have not been able to obtain either authenticated specimens of the root of *Aralia edulis* or a description of it. It is said to be often cultivated in Japan, and is also found wild, flowering in October. When young it is called sika, when older udo, and when mature dosjen, according to Kœmpfer.

(*To be continued*).

COPAIBIC ACID.*

BY WARREN B. RUSH, PH. G.

In preparing copaibic acid the volatile oil must first be removed, which is usually done by distillation with steam. The oil is, however, much more readily separated on a small scale by one of the following processes: First, by dissolving ten parts of copaiba in ten parts of benzin, adding an equal part of caustic soda solution, sp. gr. 1·30, and agitating well; or, secondly, by mixing ten parts of copaiba, ten parts of alcohol and four parts of soda solution, when the mixture will separate into three layers. A third and most economical way for separating the volatile oil is to shake together three parts of the soda solution with one of the copaiba. After separation, pour off the volatile oil, decant the alkali solution, pass a stream of water over the resin, to wash off adhering particles of alkali, and let it dry. Next, dissolve the resins in benzin, and agitate the solution with very diluted hydrochloric acid until the aqueous liquid remains slightly acid to litmus. Let the mixture rest until the resin and water have separated, decant the water and evaporate the benzin solution to a thick syrupy mass, and let cool. The same resins are thus obtained which are left on the distillation of the volatile oil.

I have observed that if the percentage of oil is below 55 then the oil does not separate, there being sufficient resin to hold the volatile oil combined, and in this condition some of the later is oxidized or altered. It may be separated from the resin by dissolving in benzin or alcohol and treating as above.

The resinous residue left after the separation of the oil contains an acid, a neutral and a soft resin. The following are among the processes for the isolation of the different resins of copaiba: Liquefy the resins by the heat of a water-bath, pour into about twice the weight of petroleum benzin, stir until dissolved, filter, and let evaporate spontaneously. A few particles will remain on the filter, consisting of the usual impurities. Warm the residue left by evaporation over a water-bath and pour it into three times its quantity of alcohol; or heat the alcohol to boiling, mix thoroughly, and while hot filter. The portion left on the filter is the neutral resin. Set the filtrate aside for several days to crystallize. Treat a portion of the neutral resin with hot alcohol, and if it colours the alcohol there is left behind some of the acid resin, and this may be obtained by treatment with hot alcohol and adding the filtrate to the first.

The neutral resin is a yellowish powder, without taste or odour, neutral to test paper; it softens in alcohol and is soluble in ten times its weight of hot chloroform.

After crystals have formed in the alcoholic liquid, filter, and dry on the filter paper under glass. On distilling off the alcohol from the filtrate, the soft resin is left behind. Copaibic acid may also be obtained from the resin by dissolving it in benzin, filtering and evaporating. The residue is heated to 200° F., dissolved in pure naphtha, filtered while warm and set asid to crystallize, after which the crystals are dried under glass.

Of the other processes which have been tried, the following deserve to be briefly mentioned.

Dissolve the oleo-resin in caustic ammonia (sp. gr. 95),

* From the *American Journal of Pharmacy*, June, 1879.

and expose this in a shallow dish at a temperature below 60° F., until hardened; then dissolve in wood naphtha, crystallize and filter. Expose copaiba to the air in shallow dishes until it has become hard and brittle, dissolve it in ammonia water and leave to evaporate in a cool place; then dissolve in hot alcohol, filter and set aside to crystallize. Dissolve the resins left after the distillation of volatile oil in caustic ammonia, let evaporate, disssolve in hot alcohol, filter and set aside to crystallize. The alcohol may be partly recovered in these different processes by distillation.

The crystals cannot be easily obtained without the previous separation of the volatile oil, the acid being soluble in fixed and volatile oils. Doubtless the copaba yielding the largest amount of resins will produce the most acid.

Copaibic acid forms soft prismatic crystals, which are soluble in strong alcohol, ether, fixed and volatile oils. Its alcoholic solution reddens litmus, is not precipitated by potassa or soda, yields with an alcoholic solution of acetate of lead a crystalline precipitate; but, on adding it to an alcoholic solution of nitrate of silver, no precipitate is occasioned until a little ammonia is added. A white crystalline powder falls, which is with difficulty soluble in alcohol but readily soluble in ammonia.

THE ALKALOID OF MIO-MIO (BACCHARIS CORIDIFOLIA).*

BY PEDRO N. ARATA.

The Mio-Mio (*Baccharis coridifolia*, Lam.) is a Composite plant abundant in the Banda Oriental del Uruguay, the Argentine Republic and Brazil. The notoriety which this plant has acquired in these countries is due to the toxic action which it exercises upon the animal organism, it being the cause of considerable losses of sheep and cattle to the farmers, and it is the more dreaded because the animals confound it with the healthy pasture among which it grows. The author reports that he has obtained from this plant an alkaloid in sufficient quantity to allow of the following description.

The dry powdered plant was boiled with distilled water in a porcelain capsule and the water separated by decantation, the operation being repeated until the material was completely exhausted. The united liquors were filtered and evaporated, at first over a fire, and afterwards in a water-bath, to the consistence of an extract, which was mixed with double its weight of a mixture of caustic lime and magnesia and the evaporation was then continued to dryness. The product was pulverized and digested for forty-eight hours with amylic alcohol in a closed vessel with frequent agitation, then thrown on a filter; the filtrate of amylic alcohol upon evaporation left the alkaloid in a crystalline form.

Amylic alcohol is preferable to ether in this operation as it dissolves the alkaloid very readily, especially with heat, and a saturated solution deposits a very voluminous crystalline mass. Under the microscope the crystals appear as long delicate needles, sometimes united and radiating from a common centre so as to form stars.

Water dissolves the alkaloid sparingly; ether and alcohol dissolve it with more facility, but it is not very soluble in them; the best solvent is amylic alcohol.

Dissolved in water the alkaloid gives neither an alkaline nor an acid reaction, it showing no change of colour with vegetable reagents. It dissolves with greater facility in boiling water to which some drops of acetic acid have been added. The acetate that results is fairly soluble in boiling water, but upon cooling the liquid becomes turbid as if concentrated, the turbidity disappearing upon the addition of more water.

The solution of the acetate gave the following reactions:—With sodium phosphomolybdate or phosphomolybdic acid a greenish yellow precipitate, disappearing when heated and reappearing on cooling; with potassium iodohydrargyrate, a yellowish white precipitate; with the double iodide of cadmium and potassium, a light crystalline precipitate; with potassium platinocyanide, a very marked turbidity; with platinum chloride, a light yellow precipitate, disappearing when heated and reappearing on cooling; with gold chloride or picric acid, a yellowish precipitate; with potassium iodoiodide or sodium phosphoantimoniate, a reddish yellow precipitate; with phosphotungstic acid or mercury bichloride, a white precipitate; with potassium ferrocyanide, an abundant white precipitate; with potassium ferricyanide, a dark green coloration when heated; with sodium nitroprussiate, a coloration, and with sodium phosphoantimoniate, potassium sulphocyanide or potassium bichromate, no change. The author considers that the foregoing reactions demonstrate that this substance is an alkaloid and he has named it "baccarina."

Some physiological experiments made upon a sparrow have proved that baccarina exercises a toxic action, and further investigation in this direction has been undertaken by Professor Pirovano. Senor Arato promises to study the elementary composition of the alkaloid and its salts with a fresh quantity of material.

* Abstract of a paper in the 'Annales de la Sociedad Cientifica Argentina,' vol. iv., p. 34.

THE DISCOVERY OF MINERAL WAX, OZOCERITE, IN UTAH.*

BY PROFESSOR J. S. NEWBERRY.

I have obtained some of the recently-discovered ozocerite in Salt Lake City from Professor J. E. Clayton, to whom also I am chiefly indebted for such information as I have in regard to its place and manner of occurrence. He writes me as follows:—"The geographical position of the ozocerite deposits is in the Wahsatch Range, on the head waters of the Spanish Fork, east from the South End of Utah Lake. The material has been found saturating beds of brown and bluish shales, probably of Tertiary age, and in masses of various dimensions, more or less mingled with clay. These shales extend from the San Pete valley in a north-north-east direction for a distance of fifty or sixty miles, and the width of the area or basin which they occupy is at the middle point about twenty miles. The shale beds richest in paraffin vary in thickness from twenty to sixty feet, but there is no considerable accumulation of that substance on the surface, nor would this be possible, as it would be destroyed by the autumnal fires which sweep the country. I examined portions of this region two years ago for coal, and found in the oil shales a few thin seams, and saw the wax-like exudation in several places, but only in small quantity."

Other parties in Salt Lake informed me that the paraffin itself is sometimes twenty feet thick, and that the quantity is enormous; but Professor Clayton says that such statements are not authorized by any facts which have come under his observation.

In the above remarks I have called the earth wax of Utah ozocerite. As it has been stated to be zietrisikite, I may say that on my return from the West, my son and assistant, Spencer B. Newberry, made a series of careful experiments in my laboratory of these hydrocarbons, and with authentic specimens which I have received directly from Gallicia. He found that it had a melting point of 61·5° C., that it was completely soluble in a large volume of boiling ether, and that boiling alcohol extracted from it twenty per cent. of a white wax-like substance. It seems, therefore, to be certainly ozocerite and not zietrisikite, the latter melting at 90° C., and being insoluble in ether.

* From the *American Journal of Science and Art*, April, 1879, p. 340. Reprinted from the *American Journal of Pharmacy*, June, 1879.

The Pharmaceutical Journal.

SATURDAY, JULY 5, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE CONFERENCE MEETING.

WITHIN a few weeks the British Pharmaceutical Conference—guided as usual by the British Association in the selection of a locality for the annual gathering—will again visit Yorkshire, as our readers will be reminded by the report which appears in the present number of the Journal of the proceedings of the Executive Committee last Wednesday. Those who have experience of the cordial reception the members of the Conference met with in Bradford will not need to be assured an equally hearty welcome probably awaits them in Sheffield, and those who have not had the experience will have heard quite enough of the agreeable nature of the first meeting in Yorkshire to make them anxious to participate in the enjoyment of the one now about to be held.

For these reasons we anticipate that the desire to attend the Conference will be very general, and considering the central situation of Sheffield, as well as the marked prominence of Yorkshire pharmacists in the endeavour to advance the interests of the body to which they belong, we venture to think these combined inducements and the prospect of being able to combine benefit with pleasure, will outweigh even the depressing influence of "bad times" and "bad weather" with such effect as to make the meeting at Sheffield one the most largely attended that has been known since the Conference has been in existence.

There is one circumstance of no small moment to the attendants at such a gathering as the Pharmamaceutical Conference which seemed, up to within the last few days, to furnish ground for apprehension. It is a somewhat exasperating thing to find, after having responded to the kindly invitation of friends to pay a visit to their town, that the local Boniface, in the shape either of an over keen individual, or of an imposing Board of limited liability organization, intervenes between host and guest, holding out his cap with exorbitant demands for the payment of black mail as the sole condition upon which opportunity for friendly intercourse will be allowed. But such things do happen sometimes, and we regret having to remember that a notable instance of the kind was furnished when the Conference last met in Yorkshire. Hotel charges multiplied fourfold to those known to be visitors, and kept at the ordinary rate for chance comers, is a form of purse-cutting that under any conditions would require more than ordinary meekness and pecuniosity to be endured, and that is, we think, especially impolitic at a time when the hotelkeepers have no reason to complain of lack of business.

There was some reason to apprehend that this eminently vicious system of taking undue advantage of a full demand for hotel accommodation would be put in practice at Sheffield and that it would have had the effect of deterring many from going there. But we are glad to learn that arrangements have been made to prevent the rapacity of hotelkeepers being an obstacle to intending visitors. According to a communication just received from Mr. MALEHAM, the local secretary of the Committee for the Sheffield meeting, a reasonable scale of charges has been fixed at one or two of the hotels where a number of rooms have already been secured, and where Mr. MALEHAM offers to secure accommodation for members of the Conference if they will only make early application to him stating what they require.

We think, therefore, this notification holds out the certainty of being able to secure a comfortable *pied à terre* and that we can without any risk urge upon those who are already *habitués* of the Conference gatherings not to omit taking advantage of this opportunity for scientific and social intercourse, while at the same time we recommend those who have not hitherto done so to make the experiment under the favourable auspices now presented and with such fair prospect of realizing the pleasurable as well as profitable results which the President of the Sheffield Pharmaceutical and Chemical Association spoke of at the last annual meeting of that Association as having been experienced by himself on the occasion of his visit to Dublin last year.

Sheffield is a town which is of interest in various ways in a pharmaceutical point of view. It has always taken a prominent position in pharmaceutical as well as in general politics. For some years it sent a member to the Council of the Pharmaceutical Society who, though less aggressive than one of the members of Parliament who represents the borough, on a subsequent occasion led the van of the band of malcontents that came down with a stern front upon the Council to remonstrate against its supposed disregard of trade interests. It cannot, however, be said that even in that position he excited any less kindly feeling towards himself than he did while holding the position of member of the Council. But at the British Pharmaceutical Conference discussion of political questions is not permitted, and whatever may be the individual differences of opinion on such subjects between those who meet at Sheffield, we feel sure they will in no way interfere on that occasion with that friendly intercourse amongst the followers of pharmacy which it is the object of the Conference to promote. On the contrary we anticipate that political war paint of all colours will be washed off for the time and that even timid conservatives and uncompromising Tories will have no occasion to fear being subjected to the vengeance of the peculiar institution for which Sheffield is famous.

Sheffield itself has but little claim to beauty, though occupying a very fine situation upon a natural amphitheatre of hills; but it is surrounded by some of the most lovely scenery in the Kingdom, partly in Derbyshire and partly in Nottinghamshire. The town is the centre of the steel trade, formerly the cutlery ware was the chief article of manufacture; but since the introduction of the Bessemer method of producing steel, this material has been applied for armour plating of ships and other heavy purposes, and the manufacture of these products has been carried out extensively in Sheffield.

In other respects the situation of Sheffield is one calculated to induce every one who can spare the time to spend a few days in visiting the immediate neighbourhood. On the east lies the district of Sherwood Forest formerly the resort

"Of Robin Hood and Little John;
Of Scarlet, George à Green and Much the Miller's Son,
Of Tuck the merry Friar, which many a sermon made
In praise of Robin Hood, his outlaws and their trade."

Here, between Mansfield and Worksop, is the famous "Dukery," including Clumber and Welbeck Abbey, the seats of the Dukes of Newcastle and Portland, where interesting traces of the ancient forest are still preserved. Close by is Newstead Abbey, one of the most beautiful buildings of the kind in the country. On the west, within a few miles of Sheffield, is Chatsworth, "the palace of the Peak," and seat of the Duke of Devonshire, surrounded by scenery which in its way is quite unrivalled. Somewhat further west is Buxton, near the rise of the Derbyshire Wye, with the famous mineral springs that have made it a celebrated watering place, one yielding water having a temperature of 82° F., and the other yielding cold water at a distance of not more than a foot apart.

"Unto St. Anne the fountain sacred is;
With waters hot and cold its sources rise,
And in its sulphur veins there medicine lies.
This cures the palsied members of the old,
And cherishes the nerves grown stiff and cold.
Crutches the lame unto to its brink convey,
Returning, the ingrates fling them away."

This water is in both instances remarkable for its purity, clearness and transparency, and it is used both for drinking and for baths. The use of it for these purposes dates back to a very remote period. Remains of a Roman bath have been discovered, and in the middle ages the chapel of St. Anne was the resort of numerous devotees in search of health. This practice was interfered with at the time of the Reformation, but in the reign of Elizabeth the Buxton waters again came into repute and caused the place to be the resort of great numbers of nobility and gentry, who were crowded into low wooden sheds and regaled with oat cake and a viand which the hosts called mutton, but the guests suspected to be dog. The accommodation for visitors has improved since then, however, and it may be ventured upon without fear of the dog.

Matlock Bath further south has in its neighbourhood some of the most striking scenery in Derbyshire, which was described by Lord Byron as equal to anything in Greece or Switzerland. The limestone caverns and the several tors near Matlock are objects of considerable interest. The mineral springs of Matlock are less celebrated than those of Buxton and the water is chiefly used for bathing; it is highly impregnated with carbonic acid and carbonate of lime, which is deposited when the gas escapes. Owing to this circumstance any object over which the water passes continuously in a thin layer becomes coated or incrusted with the deposited calcareous materials which are locally called petrifactions.

The limestone districts of Derbyshire abound in ferns and fossil remains, as well as minerals, that afford scope for the exercise of botanical and mineralogical skill, and to the geologist the country presents numerous features of interest.

FLOWER FARMING IN SOUTH AUSTRALIA.

In a report on the Botanic Garden and Government Plantations of Adelaide, South Australia, for the year 1878, Dr. Schomburgk speaks favourably of the introduction of flower farming for the purposes of perfumery, but he thinks the further application of the produce in the manufacture of perfumes would be better done elsewhere than in the colony. Dr Schomburgk illustrates the importance of the matter by reference to the quantities of perfume consumed. According to him, British India and Europe consume about 150,000 gallons of handkerchief perfume yearly, and the English revenue from eau de Cologne alone is about £8000 a year, while the total revenue from imported perfumes is estimated at about £40,000 a year. One great perfume distillery at Cannes is said to use annually some 100,000 lbs. of acacia flowers, *Acacia farnesiana*, 140,000 lbs. of rose flower leaves, 32,000 lbs. of jasmine blossoms, 20,000 lbs. of tuberose, besides a great many other sweet herbs. These data will serve to show that the quantity of material used as perfume is immense, and that in the genial climate of South Australia the production of the raw material for extracting the fragrant essential oils is likely to be a successful enterprise.

A MARK OF BARBARISM.

According to a writer in the Chicago *Pharmacist*, the United States Government having recently applied to the German Government for information as to the number of patent medicines and the extent to which they were sold in Germany, a polite reply was sent that as that country was now civilized patent medicines had no existence in it.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, July 2, 1879.

MR. GEORGE WEBB SANDFORD, PRESIDENT.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT.

Present—Messrs. Atkins, Bottle, Churchill, Frazer, Gostling, Greenish, Hampson, Hills, Richardson, Rimmington, Robbins, Savage, Shaw, Symes, Williams and Woolley.

The minutes of the previous meeting were read and confirmed.

Weights and Measures Act.

The President in reference to the Weights and Measures Act, said it had occurred to him whether the half-scruple had not been intended to be recognized under the half-drachm. Looking at the table adopted, it would be found that the words used were $1\frac{1}{2}$ scruple or half-drachm and he thought probably the half-scruple was intended to be authorized.

The Inaugural Address in October.

The President read a letter from Dr. Tilden, agreeing to deliver the Inaugural Address to the students in October next, in accordance with a resolution of Council passed last month.

The name of Mr. Rimmington was added to the Benevolent Fund Committee, having been accidentally omitted.

The Sale of Food and Drugs Bill.

The President drew attention to this Bill now before the House of Lords, where it had been read a first time. He said there was nothing in it specially affecting chemists and druggists, but he found a provision that prosecutions should in all cases be instituted within a reasonable time, in the cases of perishable articles not exceeding twenty-eight days. Who was to be the judge of what was a reasonable time, he did not know.

Mr. Woolley asked if it would not be possible to introduce a clause providing that a reasonable time should be allowed for the return of summonses under this Act. He had known of a case where a summons was served on Saturday and heard in court on the Monday. If assistance had not been at hand, and great efforts used to get evidence, the defendant would probably have been convicted.

The President said if it was considered desirable, an effort might be made to insert some provision of the kind referred to.

Mr. Rimmington said it would be easy in such cases to obtain an adjournment.

Mr. Robbins said it must be the fault of the summoning officer.

Mr. Savage said no doubt in such a case an adjournment would be obtained on asking, but it might entail expense on the defendant.

After some further conversation it was unanimously resolved, on the motion of Mr. Woolley, that an endeavour be made to obtain the insertion of a clause providing that no summons under the Act should be returnable in less than three days.

At a subsequent stage of the proceedings—

The President said he found that the discussion on this point might have been saved if the Bill had been looked at more carefully, for the last line stated that no summons should be returnable in less than seven days.

The New Bye-Laws.

A communication was read from the Privy Council signifying that the Privy Council had approved the new bye-laws recently passed by the Society.

The following being duly registered as Pharmaceutical Chemists were respectively granted a diploma stamped with the seal of the Society:—

Gibbs, Robert Darton.
Howard, George William.
Hoyle, Richard Ashworth.
Mann, George Frederick.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year were elected "Members" of the Society:—

Gibbs, Robert Darton ....Wednesbury.
Howard, George William ...Tunbridge Wells.
Hoyle, Richard Ashworth ...Rawtenstall.
Mann, George Frederick......Wells, Norfolk.

Chemists and Druggists.

Butterfield, William............Blackburn.
Fox, Alfred Russell ....Sheffield.

ASSOCIATES IN BUSINESS.

The following, having passed the respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Rouse, Frederick William ...Clapham.

Modified.

Evelyn, William Francis......Truro.

ASSOCIATES.

The following, having passed the Minor examination and tendered their subscriptions for the current year, or paid as Apprentices or Students, were elected "Associates" of the Society:—

Bucher, William Henry ......Crediton.
Cherrington, Geo. WiddowsonLondon.
Dobson, George Turner ......Holsworthy.
Gamble, Arthur Gompertz...Grantham.
Gordelier, Frank Heward ...Sittingbourne.
Holmes, William Albert......Kendal.
Hugill, Arthur Major ....London.
Isaac, John Percy ....London.
Jelley, George William ......Coventry.
Jenner, William Edward ...Sandgate.
Kirk, William Peele ....Retford.
Milner, Thomas ....Thirsk.
Richardson, William Henry..Boston Spa.
Scammell, Luther Robert ...Adelaide.
Smith, Frederick Adolphus...Macclesfield.
Thomas, John ....Aberystwith.
Williams, James Edward ...Louth.
Williams, Thomas Henry ...Plymouth.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Barber, William ....Shefford.
Barton, Francis ....Guernsey.
Cooper, William Ecklee ......Upton-on-Severn.
Cox, Frederick John ....Newark.
Harrison, Peter Webster ...St. Helens.
Hope, Arthur Peach ....Uppingham.
Lewis, Jonas Henry ....London.
Mackenzie, Donald ....Dingwall.
Pope, Albert Harry ....Southport.
Robinson, George Duncan R.York.
Taylor, James ....Bayswater.
Watson, William Malcolm...Southport.
Willis, Joseph Danington ...Northampton.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea were restored to the Register of Chemists and Druggists:

William Henry Fisher, 37, Beresford Road, London, N.

Alexander Scott Hill, 68, Devonshire Road, Holloway, London, N.

Charles Edward Mitchell, 31, Cottenham Road, Holloway, London, N.

Charles Wilkinson, 4, Raglan Street, Coventry.

Additions to the Register.

The Secretary reported that

Charles Robert Fenn, 83, Regency Street, London, S.W.

and

Augustus Thomas Isaac, Orange, New South Wales, having made statutory declarations that they were in business before the passing of the Pharmacy Act, 1868, and these declarations having been duly supported by medical practitioners, their names had been placed on the Register.

Payment of Subscriptions.

Mr. Greenish drew attention to the case of a member who had handed his subscription to a traveller in April last, but the latter forgot to tender it to the Secretary until May 1, when the Secretary said he was unable to receive it, as the gentleman's name had been struck off the list of members.

The President said such cases sometimes occurred in the country, where the subscriptions were paid to the local secretaries in time, but were not forwarded to the office. In such cases he apprehended, the local secretaries being representatives of the Society, the members were entitled to be retained on the list.

Mr. Bottle said in the case before the Council the traveller was not its agent and he could not see how the bye-law could be departed from. The only thing that could be done would be to restore the member on payment of the minimum fine.

Mr. Greenish said he believed the traveller through whose forgetfulness the difficulty arose was willing to pay the fine himself, but the member would not allow it.

Mr. Symes suggested that in the case of country members it would be much better that they should forward their subscriptions direct to the office, and be entitled to deduct the cost of the post office order.

Mr. Atkins thought the gentleman in question had a grievance. He had complied in spirit, if not in letter, with the regulations.

Mr. Schacht asked if a post office order received on May 1 would be taken.

The Secretary said if the envelope bore the post mark of April 30, it would be received, being taken as a payment in April. It was stated continually in the Journal that April 30 was the last day on which subscriptions could be received.

Mr. Hampson thought the Secretary had cut the ground from under his own feet. If he received a post office order on May 1, why should not he receive cash, which was better?

Mr. Churchill thought the office was made for the convenience of subscribers, not the subscribers for the convenience of the office. He would move that the gentleman's name be restored without a fine.

The Secretary said he would rather pay the fine himself.

Mr. Robbins thought this case should be dealt with the same as that of a person who sent a post office order.

The Secretary read the resolution under which he had acted for several years past, under which all subscriptions not paid in March were applied for directly by himself, notice thereof being sent to the local secretaries.

Mr. Richardson thought the Council must support the authority of its officers. The line must be drawn somewhere.

Mr. Williams said the officers must act according to the bye-laws.

The Assistant Secretary explained that subscriptions that came to hand after the office was opened on the 1st of May were not received. Remittances found in the letter-box before the office opened on that day were received.

Mr. Frazer said as soon as a post office order was issued, the money became virtually the property of the Society. There was a wide difference between that and paying money to an outsider who might do anything he liked with it.

Mr. Bottle suggested that a half-guinea, which the gentlemen in question had sent at the same time as a subscription to the Benvolent Fund, be received as the fine. The bye-laws did not say to what the fine should be applied.

This recommendation did not meet with any approval.

Mr. Greenish said the gentleman felt he had a grievance, and he himself did think it was a pity that, under the circumstances, the money had not been received.

The Vice-President also thought the rules had been carried out with greater strictness than necessary. He understood that cheques were received and he did not see that the agency of a banker was different to that of any other person.

The President said there was no doubt that this case was clearly within the rules, but he did not think the good of the Society was promoted by over strictness in such a matter. With regard to the question of local secretaries receiving subscriptions he hoped the Council would agree to a resolution proposed by Mr. Greenish:—

"That the regulations regarding the closing of the Registrar's accounts with local secretaries, so far as regards annual subscriptions being paid before the 1st of May, be referred to the Finance Committee for consideration and report."

Mr. Williams suggested that the resolution should be enlarged, and that the Committee should consider the whole question of local secretaries collecting subscriptions at all.

Mr. Rimmington thought it would be a great inconvenience to country members if local secretaries were not empowered to collect subscriptions.

Mr. Savage said he should not object to the scope of the inquiry being enlarged, but he agreed with Mr. Rimmington that it would be a disadvantage to the Society to alter the regulation.

The President said the mover had consented to the addition of the words "and to consider the desirability of relieving local secretaries from the duty of receiving subscriptions."

The motion was carried unanimously.

Reports of Committees.

Finance.

The report of this Committee was received and adopted, and various accounts ordered to be paid.

The Vice-President drew attention to the increase in the gas account as compared with the same quarter last year. The Committee was unable to explain how it occurred, and he should like to know if any experiment had been made with a view to test if any leak existed; for instance, if the state of the meter had been carefully taken at night and in the morning, all burners having been carefully turned out in the meantime.

The Secretary said that Professor Redwood, himself, and the gasfitter were now carefully investigating the matter, and he hoped to be able to place some statistics before the next meeting of the Committee.

Several other suggestions were made with regard to the mode of examining and checking the accounts.

BENEVOLENT FUND.

The report of this Committee included recommendations of the following grants :—

£15 to a member of the Society, in business for fifteen years, but latterly suffering from sickness.

£10 to a member of the Society, aged 69, having failed in business and being unable to obtain a situation.

£5 to a registered chemist and druggist (female), who has had three previous grants of £10 each.

£10 to the widow of a late member. Applicant has had five previous grants.

£15 to the widow of a registered chemist and druggist, having three children dependent on her.

£10 to the widow of a registered chemist and druggist.

£10 to a former associate of the Society suffering from ill-health.

£10 to the orphan boys of a registered chemist and druggist.

£5 to the widow of a registered chemist and druggist.

£5 to the widow of a late member who had £10 in October last.

In two other cases the Committee made no recommendations, in one instance a grant having been made very recently. Another grant had also been recommended, but the Secretary stated that he had that morning received information of the death of applicant.

An application had been received from the managers of the establishment in Belgium, where an orphan child had been placed, for some years past, asking if the annual payment would be renewed, as otherwise the child must be returned to her mother. The Secretary was desired to make further inquiries.

Mr. ROBBINS moved that in the case of the applicant who had died, the amount of the grant should be handed over to the widow.

The PRESIDENT thought the Council should wait and see if application were made. It was not competent to the Council to make a grant to persons on whose behalf no application had been made.

The report and recommendations of the Committee were received and adopted.

LIBRARY, MUSEUM AND LABORATORY.

The report of this Committee included the usual report from the Librarian, to the following effect :—

Attendance during the day: highest, 29, lowest, 9, average, 21; Evening, highest, 19, lowest, 8, average, 12. Circulation of books: town, 150; country, 66; carriage paid, £1 7*s.* 7½*d.* He had also reported the following donations to the Library :—

Analytical Index to the Records known as the Remembrancia, 1579–1664; London, 1878. From the Corporation of the City of London.

Institute of Chemistry of Great Britain and Ireland, Register of Fellows and Associates, 1879. From the Institute.

Berzelius (I. J.), Traité de Chimie, trad. par A. J. L. Jourdan [et M. Esslinger], 1829–33, 8 vols.

Whitlaw (C.), New Medical Discoveries, with a Defence of the Linnean Doctrine, and a Translation of his Vegetable Materia Medica, 1829, 2 vols.

New London Dispensatory, containing a translation of the Pharmacopœia Londinensis, etc., 2 ed.; also a translation of Magendie's Formulary, by T. Cox and C. W. Gregory, 1835, 2 vols.

Liebig (J. v.), Organic Chemistry in its Applications to Agriculture and Physiology, edited by L. Playfair, 1840.

Journal de Pharmacie, 1835-6, sundry numbers. From the Rev. C. E. Drew.

Muter (J.), Introduction to Pharmaceutical and Medical Chemistry, 2 ed., 1879; Introduction to Analytical Chemistry, 2 ed., 1878. From the Author.

Tommasi (D.), Riduzione del Cloruro di Argento e del Cloruro Ferrico, 1878; Riduzione del Cloralio, 1878; Azione dei Raggi Solari sui Composti Aloidi d'Argento, 1878. From the Author.

Victorian Chemists' Assistants' Association, Sixth Annual Report, Rules, Catalogue of Library and Museum, etc., 1879. From the Association.

Squibb (E. R.), Notes on the Estimation of Urea, and on the Revision of the United States Pharmacopœia in 1880, 1879; Fluid Extracts by Repercolation, 1879; Proposed Legislation on the Adulteration of Food and Medicine, etc., 1879. From the Author.

The Committee recommended that the usual letters of thanks be forwarded.

The Committee recommended the purchase of the following books for the library :—

General Fund :—

Wurtz (Ad.), Dictionnaire de Chimie, latest ed.

Buchoz (P.), Herbier de la Chine, 1788–9.

Hanbury Fund :—

Bentham (G.), Flora Hongkongensis, 1861.

Griesbach (A.), Flora of the British West India Islands, 1864.

The Curator had reported the attendance in the Museum to have been as follows :—During the day, average, 10; evening, average, 6. He had also reported the following donations to the Museum :—

Fresh Specimens of Biennial Henbane, from Mr. A. P. Balkwill.

Specimens of the Seed of *Psoralea corylifolia*, from India, from Messrs. Corbyn, Stacey and Co.

A dried Ostrich Stomach, as used by the South American Indians for indigestion, from Dr. Symes.

Specimens of Queensland Sassafras Bark, Queensland Sandal Wood (*Eremophila Mitchelli*), the Stem of *Piper Novæ-Hollandiæ*, the bark of a species of *Achras*, known as sweet bark from Queensland, and a fine Fruit of the Trinidad Cocoa Tree, from Mr. Thomas Christy.

Three remarkably fine crystals of Codeia, from Messrs. T. and H. Smith and Co.

A new variety of Salep, the root of West Indian Ipecacuanha (*Asclepias Curassavica*), false Sarsaparilla from St. Vincent, and specimens of naturally crystallized Realgar, from Mons. C. Chantre. The last specimen was obtained from a crack in the earth which served as a vent to a burning coal mine called Ricamarie, near St. Etienne.

The Curator had also reported that he had received from Dr. O. Hesse, specimens of the alkaloids to illustrate his recent paper in the *Pharmaceutical Journal*.

The Committee recommended that the usual letters of thanks be forwarded.

The Curator had reported that he had forwarded nine duplicate specimens to the Society's Museum in Edinburgh.

He had also reported that nineteen duplicate specimens had been forwarded to the Leeds Chemists' Association.

Professors Redwood, Bentley and Attfield had reported that the progress of their respective classses was satisfactory.

Professor Bentley had reported that his class had increased 25 per cent. over 1878.

The Committee recommended the purchase of the collection of Malayan specimens of materia medica offered by Mr. Collins.

The report and recommendations of the Committee were received and adopted.

Mr. SHAW said the Association at Liverpool was now re-arranging the museum, and would be very much obliged by the Council granting a set of labels, which he understood were in possession of the Society.

The PRESIDENT said he had no doubt that if Mr. Shaw would specify what was wanted, and send an application to the Committee, which met next week, it would be acceded to.

HOUSE.

This Committee recommended that a memorial be addressed to the Board of Works with a view to getting the roadway in Great Russell Street relaid with wood. Also some other minor matters in connection with the house.

Mr. HILLS asked if any reply had been received to the memorial.

The PRESIDENT said it had been ascertained that it would be useless to make any application of the sort before Michaelmas; but if one were sent in then, there might be a chance of its being acceded to.

The report and recommendations were received and adopted.

GENERAL PURPOSES.

The report of this Committee included the usual letter from the Solicitor giving information as to the progress of cases which had been placed in his hands. In one case, the defendant, Mr. Mumby, had paid the penalty of £5 and costs. The appeal in the case of the Society *v.* The London and Provincial Supply Association, Limited, was not likely to come on before November.

A communication was read from Mr. James Galloway, Great Horton, authorizing the erasure of his name from the register. In two cases it was recommended that the Solicitor be instructed to commence proceedings, one of the cases having been a long time under consideration, and with regard to which a great deal of correspondence has taken place.

The PRESIDENT moved

"That the Council go into Committee to consider the various items in the report."

Mr. SYMES had no objection, but thought it would be well if some reference were made in the report to the subjects on which the Council went into Committee, so that members might see that the matters referred to were being considered.

After some further conversation on this subject, it was unanimously resolved to go into Committee to consider certain cases of alleged breaches of the Pharmacy Act.

The various cases having been discussed in detail, the Council resumed, and the report and recommendations of the Committee were adopted unanimously.

It was moved by Mr. WILLIAMS, seconded by Mr. GOSTLING, and carried unanimously, that a certain firm of solicitors, who had made inquiry as to the form of appeal from a decision of the Registrar, be informed that any such appeal must be made in writing.

APPOINTMENT OF PROFESSORS AND CURATOR FOR THE ENSUING YEAR.

Professor REDWOOD was reappointed Professor of Chemistry and Pharmacy for the ensuing year.

Professor BENTLEY was reappointed Professor of Botany and Materia Medica for the ensuing year.

Professor ATTFIELD was reappointed Professor of Practical Chemistry for the ensuing year.

Mr. HOLMES was reappointed Curator of the Society's Museum for the ensuing year.

LIST OF LOCAL SECRETARIES, 1879–80.*

The following were proposed as Local Secretaries for the ensuing year:—

Towns eligible.	Names of persons appointed.
Aberdare	Thomas, Watkin Jones.
Aberdeen	Davidson, Charles.
Abergele	Hannah, John.
Aberystwith	Davies, John Hugh.
Abingdon	Smith, William.
Accrington	Sprake, David Lewis.
Altrincham	Hughes, Edward.
Andover	Gould, Robert George.
Arbroath	Shield, George.
Ashbourne	Bradley, Edwin Silvester.
Ashby-de-la-Zouch	Johnson, Edwin Eli.
Ashton-under-Lyne	Bostock, William.
Aylesbury	Turner, John.
Ayr	
Banbury	Ball, George Vincent.
Banff	Ellis, Bartlett.
Bangor	Baker, Henry Villars.
Barnsley	Badger, Alfred.
Barnstaple	Goss, Samuel.
Barrow-in-Furness	Steel, Thomas.
Bath	Commans, Robert Dyer.
Beaumaris	
Bedford	Cuthbert, John M.
Belper	Ashton, John.
Berwick	Carr, William Graham.
Beverley	Hobson, Charles.
Bewdley	
Birkenhead	Nicholson, Henry.
Birmingham	Southall, William.
Bishop Auckland	Leigh, John James.
Blackburn	Pickup, Thomas Hartley.
Blackpool	Harrison, John.
Blandford	Bird, Matthew Mitchell.
Bodmin	Williams, Joel Drew.
Bolton	Dutton, George.
Boston	
Bournemouth	Duncan, Alexander.
Bradford (Yorkshire)	Rimmington, Felix W. E.
Brecon	Meredith, John.
Bridgnorth	Deighton, Thomas Milner
Bridlington	Forge, Christopher.
Bridport	Tucker, Charles.
Brighton	Gwatkin, James Thomas.
Bristol	Stroud, John.
Buckingham	Sirett, George.
Burnley	Thomas, Richard.
Burslem	Blackshaw, Thomas.
Bury	
Bury St. Edmunds	Youngman, Edward.
Buxton	Barnett, Alexander.
Calne	
Cambridge	Deck, Arthur.
Canterbury	Bing, Edwin.
Cardiff	Hollway, Alfred Brown.
Cardigan	Jones, John Edward.
Carlisle	Thompson, Andrew.
Carmarthen	Davies, Richard M.
Carnarvon	Lloyd, William.
Chatham	Crofts, Holmes Cheney.
Chelmsford	Baker, Charles Patrick.
Cheltenham	Smith, Nathaniel.
Chester	Baxter, George.
Chesterfield	Greaves, Abraham.
Chichester	Long, William Elliott.
Chippenham	Coles, John Coles.
Christchurch	Green, John.
Cirencester	Mason, Joseph Wright.
Clitheroe	
Cockermouth	Bowerbank, Joseph.
Colchester	Cordley, William Bains.
Congleton	Goode, Charles.
Coventry	Wyley, John.
Crewe	McNeil, James Norton.
Cricklade	
Croydon	Barritt, George.
Darlington	Robinson, James.
Deal	Green, John.
Denbigh	Edwards, William.
Derby	Stevenson, Richard.
Devizes	Evans, John.

* Local Secretaries are appointed in all towns in Great Britain which return a Member or Members to Parliament, and in such other towns as contain not less than three Members of the Society or Associates in Business.

Towns eligible.	Names of persons appointed.
Devonport	Codd, Francis.
Dewsbury	Matterson, Edward H.
Diss	Gostling, Thomas Preston.
Doncaster	Howorth, James.
Dorchester	Evans, Alfred John.
Dorking	Clift, Joseph.
Dover	Bottle, Alexander.
Droitwich	Taylor, Edmund.
Dudley	Gare, Charles Hazard.
Dumfries	Allan, William.
Dundee	Hardie, James.
Dunfermline	Stiell, Gavin.
Durham	Sarsfield, William.
Eastbourne	Gibbs, Joseph.
Edinburgh	Mackay, John.
Elgin	Robertson, William.
Ely	Pate, Henry Thomas.
Evesham	Dingley, Richard Loxley.
Exeter	Delves, George.
Eye	Bishop, Robert.
Falkirk	Murdoch, David.
Falmouth	Newman, Walter Francis.
Fareham	Batchelor, Charles.
Faversham	Underdown, Fredk. W.
Flint	Jones, Michael.
Folkestone	Goodliffe, George.
Forfar	Ranken, James A.
Frome	
Gainsborough	Spouncer, Henry Thomas.
Gateshead	Elliott, Robert.
Glasgow	Kinninmont, Alexander.
Gloucester	Meadows, Henry.
Gosport	Hunter, John.
Grantham	Cox, John.
Gravesend	Clarke, Richard Feaver.
Greenock	Fraser, Charles.
Grimsby, Great	Botterill, George Thomas.
Guernsey	Arnold, Adolphus.
Guildford	Martin, Edward W.
Haddington	Watt, James.
Halifax	Dyer, William.
Harrogate	Davis, R. Hayton.
Hartlepool	Jackson, William G.
Harwich	Bevan, Charles F.
Hastings and St. Leonards	Jameson, William E.
Haverfordwest	Williams, William.
Hawick	
Helensburgh	Harvie, George.
Helston	Troake, Marler H.
Hereford	Jennings, Reginald.
Hertford	Lines, George.
Hexham	Gibson, John Pattison.
Heywood	Beckett, William.
Hitchin	Ransom, William.
Horncastle	Kemp, William.
Horsham	Williams, Philip.
Huddersfield	King, William.
Hull	Bell, Charles Bains.
Huntingdon	Provost, John Pullen.
Huntly	Chalmers, George.
Hyde	Wild, Joseph.
Hythe	Lemmon, Robert Alce.
Inverness	Galloway, George Ross.
Ipswich	Anness, Samuel Richard.
Jersey	Ereaut, John, jun.
Kendal	Severs, Joseph.
Kidderminster	Hewitt, George.
Kilmarnock	Borland, John.
King's Lynn	Palmer, Wm. Jos.
Kingston-on-Thames	Walmsley, Samuel.
Kirkcaldy	Storrar, David.
Knaresborough	Potter, Charles.
Knutsford	Silvester, Henry Thomas.
Lancaster	Bagnall, Wm. Henry.
Launceston	Eyre, Jonathan Symes.

Towns eligible.	Names of persons appointed.
Leamington	Davis, Henry.
Leeds	Reynolds, Richard.
Leek	Johnson, William.
Leicester	Clark, Walter Beales.
Leighton Buzzard	Readman, William.
Leith	Finlayson, Thomas.
Leominster	Davis, David Frederick.
Lewes	Martin, Thomas.
Lichfield	Perkins, John Jaquest.
Lincoln	Maltby, Joseph.
Liskeard	Young, Richard.
Liverpool	Abraham, Thomas Fell.
Llandudno	Williams, Thomas.
Longton	Prince, Arthur G.
Loughborough	Paget, John.
Louth	Hurst, John B.
Lowestoft	Sale, Thomas J.
Ludlow	Woodhouse, George.
Lyme Regis	Thornton, Edward.
Lymington	Allen, Adam U.
Macclesfield	Bates, William Isaac.
Macduff	Henry, James Hay.
Maidenhead	Walton, Ralph.
Maidstone	Rowcroft, Albert Edward.
Maldon	Wallworth, David.
Malmesbury	Brown, Francis James.
Malton	Hardy, George.
Malvern	Metcalfe, Edmund Henry.
Manchester, etc.	Wilkinson, William.
March	Davies, Peter Hughes.
Margate	Candler, Joseph Thomas.
Marlborough	
Marlow	
Merthyr Tydvil	Smyth, Walter.
Middlesborough	Robson, James Crosby.
Midhurst	
Monmouth	Key, Hobson.
Montgomery	
Montrose	Burrell, George.
Morecambe	Birkett, John.
Morpeth	Marshall, George T.
Neath	Hibbert, Walter.
Newark	March, William.
Newbury	Hickman, Frederick.
Newcastle-under-Lyme	Cartwright, William.
Newcastle-on-Tyne	Martin, Nicholas H.
Newport (I. of Wight)	Orchard, Herbert Joseph.
Newport (Mon.)	Seys, James Ancas.
New Radnor	
Newton Abbot	Poulton, John.
Newtown	Owen, Edward.
Northallerton	Warrior, William.
Northampton	Bingley, John.
Norwich	Sutton, Francis.
Nottingham	Fitzhugh, Richard.
Nuneaton	Iliffe, George.
Oldham	Hargraves, H. Lister.
Oswestry	Saunders, George James.
Over Darwen	Hargreaves, Wm. Henry.
Oxford	Prior, George Thomas.
Paisley	Hatrick, William.
Pembroke	
Pembroke Dock	John, David W.
Penrith	Kirkbride, William.
Penzance	Cornish, Henry Robert.
Perth	
Peterborough	Heanley, Marshall.
Petersfield	Edgeler, William B.
Plymouth	Balkwill, Alfred P.
Pontefract	Bratley, William.
Poole	Penney, William.
Portsmouth, etc.	Rastrick, Joseph L.
Preston	Barnes, James.
Ramsgate	Morton, Henry.
Reading	Hayward, Wm. Griffith.

Towns eligible.	Names of persons appointed.
Redditch	Mousley, William.
Retford	Clater, Francis.
Richmond (Yorks)	Thompson, John Thomas.
Ripon	Judson, Thomas.
Rochdale	Taylor, Edward.
Rochester	Harris, Henry William.
Rothesay	Duncan, William.
Runcorn	Whittaker, William.
Rugby	Chamberlain, Arthur G.
Ruthin	Bancroft, John James.
Ryde (Isle of Wight)	Pollard, Henry Hindes.
Rye	Waters, William Allen.
St. Albans	Ekins, Arthur Edward.
St. Andrews	Govan, Alexander.
St. Austell	Hern, William Henry.
St. Ives (Cornwall)	Young, Tonkin.
Salisbury	Atkins, Samuel Ralph.
Sandwich	Baker, Frank.
Scarborough	Whitfield, John.
Seacombe	Walker, John Henry.
Selby	Cutting, Thomas John.
Shaftesbury	Powell, John.
Sheerness	Bray, John.
Sheffield	Ward, William.
Shields, South	Mays, Robert J. J.
Shipley	Dunn, Henry.
Shoreham	
Shrewsbury	Cross, William Gowen.
Slough	Griffith, Richard.
Southampton	Dawson, Oliver R.
Southport	Ashton, William.
Spalding	Shadford, Major.
Stafford	Averill, John.
Stalybridge	Brierley, Richard.
Stamford	
Stirling	Duncanson, William.
Stockport	Kay, Samuel.
Stockton-on-Tees	Brayshay, Thomas.
Stoke-on-Trent	Adams, Jonathan Henry.
Stourbridge	Bland, Thomas Frederick.
Stratford-on-Avon	Hawkes, Richard.
Stroud	Blake, William F.
Sudbury	Harding, James John.
Sunderland	Nicholson, John Joseph.
Sutton-in-Ashfield	Buckland, E.
Swansea	Griffiths, William.
Tamworth	Allkins, Thomas Boulton.
Taunton	Prince, Henry.
Tavistock	Gill, William.
Teignmouth	Cornelius, Joseph.
Tenby	Davies, Moses Prosser.
Tewkesbury	Allis, Francis.
Thirsk	Thompson, John.
Tiverton	Havill, Paul.
Torquay	Smith, Edward.
Totnes	Keen, Benjamin.
Truro	Percy, Thomas Bickle.
Tunbridge Wells	Howard, Richard.
Tynemouth	
Uttoxeter	Johnson, John Borwell.
Wakefield	Wice, Jonathan H.
Wallingford	Payne, Sidney.
Walsall	Elliott, George.
Wareham	Randall, Thomas.
Warrington	Woods, Joseph Henry.
Warwick	Pratt, Henry.
Watford	Chater, Edward Mitchell.
Wednesbury	Gittoes, Samuel James.
Wellington (Somerset)	Langford, John Brown.
Wenlock	
Westbury	Taylor, Stephen.
West Bromwich	
Weston-super-Mare	Gibbons, George.
Weymouth	Groves, Thomas Bennett.
Whitby	Stevenson, John.
Whitehaven	Kitchin, Archibald.
Wick	Miller, Kenneth.
Wigan	Phillips, Jonathan.
Wigton	
Wilton	
Winchester	Hunt, Richard.
Windsor	Russell, Charles J. L.
Wolverhampton	Brevitt, William Yates.
Woodbridge	Betts, John.
Woodstock	Griffits, John Alonza.
Worcester	Virgo, Charles.
Worthing	Cortis, Arthur Brownhill.
Wrexham	Edisbury, James Fisher.
Wycombe	Furmston, Samuel C.
Yarmouth, Great	Poll, Wm. Sheppard.
Yeovil	Maggs, Thomas Charles.
York	Davison, Ralph.

Previous to the vote being taken,

Mr. WILLIAMS said he wished to make a few observations on the appointment of one of these local secretaries, but it being a personal matter, he must ask the Council to go into Committee.

This having been done, and the Council having resumed, the list was put to the vote and adopted unanimously.

SUPERINTENDENTS OF WRITTEN EXAMINATIONS.

It was unanimously resolved that the superintendence of the written examinations be offered to the local secretaries at the centres where those examinations are held.

Mr. CHURCHILL asked how the new plan worked. There had been complaints of the number of centres not being sufficient.

The PRESIDENT said there was a feeling in some quarters to reduce the number still further.

The VICE-PRESIDENT said there was also a feeling in many quarters that the number should be enlarged.

Mr. SHAW asked why Worcester had been continued as a local centre, when the Committee had recommended that it should be omitted?

The PRESIDENT presumed the Council must have ordered it. At any rate that was not the question before the Council then.

Mr. ATKINS said he still believed that individual cases of hardship had occurred from the present scheme of local centres, though on the whole the reduction in number might have been an advantage. He hoped that another year the Committee would take careful account of geographical considerations and railway facilities in deciding on these centres. He also hoped that the Preliminary examinations were still in a transition state. He should not be satisfied until this examination, which was purely a scholastic one, was removed from the Society altogether. Nothing in the world could be easier than to demand a certificate from the College of Preceptors or from a university local examination.

COUNCIL EXAMINATION PRIZES.

Messrs. Southall and Moss were appointed to conduct the examinations in the present month for the Council prizes.

Mr. GREENISH proposed an alteration in the regulations providing that candidates should be required to give five days' notice of their intention to compete for these prizes, instead of ten as at present.

The ASSISTANT SECRETARY explained that five days would be sufficient, and, in fact, more convenient than ten.

The motion was carried unanimously.

Mr. CHURCHILL asked who fixed the dates for the Major examination.

Mr. Williams said the Council fixed the months. The exact days were fixed by the office, according to the number of candidates. He had proposed formerly that the examinations should take place every month instead of every alternate month, a change which, he thought, would have proved more convenient; this suggested alteration, however, did not meet with the approval of the Board of Examiners. This month there were 172 candidates coming up.

Report of Examinations.

June, 1879.

ENGLAND AND WALES.

	Candidates. Examined.		Passed.		Failed.	
Major, 18th		7		4		3
Minor, 18th	16		8		8	
,, 19th	25—41		15—23		10—18	
Modified		2		1		1
		—		—		—
		50		28		22

Preliminary Examination.

Seven certificates were received in lieu of the Society's examination:—

3 College of Preceptors.
4 University of Cambridge.

Sales of Poisons by Co-operative Stores.

Mr. Williams was next called upon by the President to move a resolution of which he had given notice with regard to co-operative societies selling or dispensing poisons.

The President asked if the question should be discussed in Committee.

Mr. Williams said he had no objection to what he had to say being published.

Mr. Shaw thought it was not desirable to show their hand, and on the question being put to the vote it was resolved to go into Committee.

The motion was discussed at considerable length, but on being put to the vote it was not carried.

Sale of Patent Medicines.

Mr. Hampson then moved the following resolution, of which he had given notice:—

"That the General Purposes Committee take into consideration the largely increasing sale of 'patent medicines' containing scheduled poisons, by grocers, general dealers, and other unregistered persons, and report thereon, more especially with regard to the advisability of endeavouring to restrict the sale of such 'patent medicines' to persons registered under the Pharmacy Act of 1868."

He said he was very desirous that this Committee should take this subject into earnest consideration. It was evident to all that the sale of poisons under the cover of the patent medicine stamp was a growing evil. He heard the other day that a grocer's assistant was asked what was the dose of chlorodyne, and replied a tea-spoonful. When the Pharmacy Act of 1868 was obtained, it was to all intents and purposes an Act for regulating the sale of poisons, but if anyone were able to sell poison upon affixing a patent medicine stamp to it, evidently the Act was of little or no use. He was told that in the country wholesale houses sent out two-ounce bottles of laudanum by the gross with a stamp on, and that opium itself was also sold in this way. Tincture of aconite was sold by grocers under a stamp, and in fact if any adventurous quack chose to put up the dilute hydrocyanic acid of the Pharmacopœia, under a stamp, and say that 2 or 3 drops were to be taken in water in case of sickness, it might be done with impunity. The time had come when this matter should be considered, for it was never intended that grocers, tailors and others should become the vendors of poisons. If the spirit of the Act were to be carried out, those who knew something about medicines should alone sell these things. The very fact that a person had to go into a special shop in order to purchase a poison was to a certain extent a safeguard; but if people were able to get it at any ordinary shop, the use of poisons would become so indiscriminate that a parliamentary commisssion or inquiry would be the probable result. He did not ask the Council to come to any decision at present, but simply to refer the matter to the Committee.

Mr. Savage seconded the motion.

Mr. Hills asked if it would not be better to refer the subject to the Committee for considering amendments to the Pharmacy Act.

Mr. Hampson thought not; that was a special Committee for a particular purpose.

Mr. Williams said that Committee had considered that any change of the law in this direction was unnecessary.

The President said the great point of the motion was patent medicines. He did not recognize a bottle of laudanum as a patent medicine simply because it had a stamp affixed to it, and he believed that if a prosecution were instituted in such a case it would be found that the law did not protect it. With regard to patent medicines he did not see that it mattered who sold them. If any one came to him for a bottle of chlorodyne, and asked him what was the nature of it, he said he did not know what it contained. In fact, he never recommended patent medicines at all, but rather discouraged the sale of them.

Mr. Greenish suggested an alteration of the wording of the motion to the effect that the Committee take into consideration the largely increasing sale of scheduled poisons by grocers and others under the guise of patent medicines.

Mr. Frazer said if patent medicines were within the law this motion was not required, and if they were not he did not think it was desirable to bring them within it for reasons which he had frequently stated. It was contrary to his notions of trade, and he did not think it would be wise, because it was very doubtful, if chemists would obtain what they asked, whilst they might most probably lose some of the privileges they at present possessed.

Mr. Rimmington thought Mr. Greenish's suggestion would be an improvement.

The Vice-President, on the contrary, thought Mr. Hampson's original form was better.

Mr. Hampson also said he preferred the original wording. He demurred to the statement of the President that it did not matter who sold a bottle of chlorodyne, because it contained several scheduled poisons, and in the interest of the public as well as in justice to themselves, it was desirable that only registered persons should be allowed to sell patent medicines containing poisons. He equally demurred to Mr. Frazer's view that a change was not necessary or desirable. Putting aside the interest of the public, which was of course paramount, it was the privilege of registered persons to deal in poisons.

The President remarked that Parliament fully considered the question when the Pharmacy Act was passed, and said that nothing in the Act should interfere with the making or selling of patent medicines.

Mr. Frazer said his point was that if patent medicines were included in the Act there was no need of further legislation.

Mr. Hampson said he did not assume that the Council had the power to restrict the sale of patent medicines, he simply asked that the Committee should consider the matter.

Mr. Williams thought the Council was now doing the work of the Committee in discussing the merits of the question. The motion was simply that the Committee consider it and report.

The resolution was then put and carried *nem. con.*

PRELIMINARY EXAMINATION.

List of Centres and Table of Attendances of Candidates at each Centre.

	1878. Oct.	1879. Jan.	1879. April.	1879. July.	Total number of attendances at each Centre.
ENGLAND AND WALES.					
Birmingham	12	20	23	21	76
Brighton	3	5	4	1	13
Bristol	6	6	9	12	33
Cambridge	5	9	7	4	25
Canterbury	—	1	4	2	7
Cardiff	3	5	7	7	22
Carlisle	6	7	2	10	25
Carmarthen	7	10	11	8	36
Carnarvon	2	1	9	9	21
Cheltenham	2	2	—	3	7
Darlington	3	7	6	6	22
Exeter	2	8	8	8	26
Hull	—	16	13	5	34
Lancaster	1	5	2	6	14
Leeds	7	14	16	17	54
Lincoln	3	10	8	7	28
Liverpool	7	16	24	13	60
London	33	59	46	52	190
Manchester	18	26	32	20	96
Newcastle	5	9	5	10	29
Northampton	—	8	9	6	23
Norwich	2	14	7	14	37
Nottingham	8	14	11	12	45
Oxford	1	3	2	1	7
Peterborough	2	3	5	15	25
Sheffield	8	12	8	7	35
Shrewsbury	2	5	7	4	18
Southampton	5	4	19	15	43
Truro	1	4	4	4	13
Worcester	2	5	2	2	11
York	2	9	12	11	34
SCOTLAND.					
Aberdeen	13	8	11	16	48
Dundee	7	6	2	7	22
Edinburgh	11	14	14	16	55
Glasgow	3	12	11	12	38
Inverness	2	3	2	—	7
Douglas, I. of Man	—	—	—	2	2
Guernsey	1	—	—	1	2
Jersey	—	—	—	—	0

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

Meeting of Executive Committee.

Wednesday, July 2, 1879.

Present—G. F. Schacht, President, in the chair; Messrs. Greenish, Ellinor, Carteighe, Symes, Williams and Attfield.

The minutes of the previous meeting were read and confirmed.

Professor Attfield, Honorary General Secretary, reported the work done since the previous meeting of Committee, including matters relating to the editing, printing, publishing and delivery to members of the Year-Book; the grants in aid of research; correspondence respecting improper use of the membership of the Conference; correspondence respecting the Bell and Hills Fund books; compilation and distribution of the list of subjects for research; collection of subscriptions; organization of the approaching meeting at Sheffield; correspondence with members likely to work on the Executive Committee in 1879-80; and, arrangements for inviting all registered chemists and druggists not already members to join the Conference.

A letter was read from Mr. Siebold, editor of the Year-Book, reporting that the manuscript of the volume for 1879 would be completed a fortnight before the annual meeting. A meeting of the Committee of Publication was ordered to be convened as soon as the manuscript was received, with power to make all arrangements for the issue of the volume.

Mr. Ellinor, from Sheffield, stated that he was authorized by the Vice-President, Mr. Ward, the Local Secretary, Mr. Maleham, and the members of the Local Committee in Sheffield, to explain that rooms for the general meetings of the Conference on August 19 and 20 had been secured, that a considerable amount of interest and enthusiasm existed locally respecting the meetings, that permission had been obtained for members after the meeting to inspect some of the interesting factories of Sheffield, and that on Thursday, the 21st of August, the local members would invite their visitors to accompany them on a drive through some of the scenery of Derbyshire, visiting "Chatsworth" and "Haddon" *en route.* He ventured to think that their friends would not be disappointed with the welcome they would receive, even although in accordance with annually stated requests, strongly renewed this year, the idea of holding a formal banquet in honour of their guests would not be carried out.

SOCIETY OF ARTS.

The History of Alizarin and Allied Colouring Matters, and their Production from Coal Tar.*

BY W. H. PERKIN, F.R.S.

Lecture I.—Delivered May 8.

In December, 1868, I had the honour of delivering three lectures before this society on the "Aniline or Coal Tar Colours." In these I commenced with mauveine, or the mauve dye, the first discovered of this remarkable series of compounds, and then gave briefly the history of all the other important colouring matters which had been discovered up to that date.

Last year, Mr. Wills, who always arranged the business of this Section so assiduously, wished me to give a further account of these colouring matters, but I was unable to do so then. He, however, asked me again this year, and I was glad to be able to accede to this request, little thinking then, and still less only a few weeks since when I met him full of activity and enthusiasm, that he would so soon be called from our midst, and his career here, so full of promise, ended.

When I promised to bring a paper before you, I thought that I would continue the history of the coal tar colours, from the time I gave the lectures just referred to up to the present time. However, on considering the subject in detail, I found the amount of matter far too large, owing to the great number of discoveries which had been made in this field since then; I therefore thought it best to confine myself to the consideration of the most important of the products which have been obtained, and selected alizarin and allied colouring matters.

In giving you a somewhat brief account of this subject, I think it best first to refer to madder, the dye-stuff which, until 1869, was the only source of alizarin. Up to the date just mentioned madder root was one of the most important dye-stuffs known, the annual value of the imports into the United Kingdom being about £1,000,000 sterling.

* From the *Journal of the Society of Arts.*

The plant that gives this root belongs to the natural order *Rubiaceæ*. It is nearly allied botanically, and in appearance, to the ordinary Galiums, or bedstraws. It is a perennial, with herbaceous stem, which dies down every year, the stalk is square and jointed, and this and the leaves are rough with prickles. The flower is very small, and of a greenish yellow colour. The root is cylindrical and fleshy, and of a reddish yellow colour; this, when dried, constitutes madder. It is one of the oldest known dye-stuffs, and is referred to by Pliny. The principal varieties in cultivation are—*Rubia tinctorum*, *Rubia peregrina*, and *Rubia cardifolia*. It is grown in Holland, South of Germany, France, Italy, Turkey and India. It has been cultivated also in this country, but not with permanent success. It is propagated from suckers, and the time from planting until the roots are drawn is from eighteen to thirty months, and sometimes longer. When dried the roots lose their reddish yellow colour and become of a pale red shade. The process of drying is conducted in the air, or in kilns. When dry the roots are beaten to remove sand, clay and loose skin. They are sent into the market either in this condition or in a ground state. There are also various preparations of madder made, the principal ones being *Fleur de garance*, or flowers of madder, and *garancine*. Their preparation is briefly as follows:—

Fleur de garance is made by soaking ground madder in water, with the addition of a small quantity of sulphuric acid; it is then drained in a filter and well washed. The washings contain a considerable amount of glucose, besides other products, and when fermented yield alcohol, which is suitable for a variety of purposes, but is not fit for drinking unless purified. The washed madder is then pressed and dried, and constitutes *fleur de garance*. On account of the products which have been removed this substance is considerably richer in colouring matter than madder.

Garancine is prepared by first washing ground madder much in the same way as for the preparation of *fleur de garance*, and after being pressed it is mixed with concentrated sulphuric acid, in quantity equal to about half the weight of the madder originally taken. After being thoroughly incorporated with this it is heated with steam for three or four hours, placed on filters, and thoroughly washed, pressed and dried. Tinctorially it is about three and a half times as strong as madder.

Madder will not dye unprepared fabrics; they require to be what is called mordanted. In this case the mordants consist of metallic oxides, those of aluminum and iron being the chief ones. With alumina mordants it produces shades of red and pink, with iron mordants shades of black and purple. These mordants may likewise be mixed, and then produce various kinds of chocolate colour. The value of madder and its preparations is determined by taking weighed quantities and dyeing pieces of mordanted cloth with them, the size of the cloth being always the same; after dyeing the patterns are cleared by treatment with soap, and are then dried; and, of course, according to the depth of the colour, so is the value. Standard specimens are used at the same time for the sake of comparison.

In mordanting cotton goods, the mordants, which are chiefly the acetates of iron and aluminum, are thickened and printed on, either with a machine or blocks. They are "aged," as it is called. This used to be performed by hanging the goods in a moist atmosphere for some days, but now they are passed through properly constructed rooms, kept at the requisite temperature and degree of moisture by steam, and then laid in bundles for a time.

The next process is called "dunging." Its object is to remove the thickening which has been used with the mordants, and also to thoroughly neutralize them, at the same time removing any that has not combined with the fibre. This is accomplished by passing the goods through warm water containing cow dung, but now more commonly containing certain salts, as phosphates, arseniates, etc.; these are called dung substitutes. When this operation has been finished the goods are washed, and are then ready for dyeing.

Dyeing with madder is an operation requiring considerable care, especially as the temperature of the dye-bath must be raised only very slowly, otherwise a loss of colouring matter occurs. This makes the operation take some considerable time, often two hours. If garancin is used the dyeing can be conducted more quickly. In this operation the ground madder, or the garancin, is mixed with the water in the dye-bath. A little chalk is also sometimes added. As the colouring matter of the dye-stuff gradually dissolves in the water, the mordants on the goods take it up. It is important in this process that the mordants should be thoroughly saturated with colouring matter, otherwise they do not resist the after-clearing process so well. When dyed the goods are washed with water and then cleared, as most of the colours are very impure, especially the reds, which have a rusty look. The methods of clearing vary according to the class of goods, madder pinks receiving the greatest amount of treatment and care. In this process soap is largely used, but it will not be necessary to enter into further details, as it would occupy too much time, and I only wish to convey to you a general impression of the application of madder to calico printing.

Before leaving this subject I must refer to another most important application of madder, namely, Turkey red dyeing. This mode of dyeing was introduced into Europe from the East, and is undoubtedly of Indian origin; from India it came to the Levant, and was afterwards introduced into France about 1747. The first Turkey red works in the United Kingdom were established about the end of the last century. Turkey red is remarkable for its brilliancy of colour and permanence, and also for the peculiar nature of the processes employed in its production.

For dyeing Turkey red the cotton is first prepared by treatment with olive oil, which is afterwards oxidized by exposure to the air. The oil is usually employed in the form of an emulsion, made by agitating the oil with a solution of carbonate of soda or potash. The goods are passed through this and then exposed to the air, after which they are treated several times in the same manner. When sufficiently charged with oxidized olive oil they are mordanted with an alumina salt, galls, shumach, or other tannin matter. Cotton thus prepared for dyeing is of a buff or yellowish shade.

In the next operation the dye-bath is charged with madder or garancin, a little shumach, and a quantity of blood. The prepared goods are entered into this bath, and heat gradually applied, until it reaches the boiling point, at which temperature it is kept until the dyeing is complete. The goods are then washed in water, and present a dark, heavy, dull red colour. They are next subjected to the clearing processes, which are two in number. These are performed in large copper boilers, with moveable covers, as the clearing has to be done under pressure. The dyed goods are placed in these, with a mixture of common soda crystals and soap, and boiled under pressure for about six hours. They are then removed, washed in hot water, and again placed in boilers, with a solution of soap, to which chloride of tin (tin crystals) has been added. They are boiled in this, under pressure, for about four hours, and then removed, washed and finished. The first clearing considerably improves the colour, but the last one gives that remarkable brilliancy peculiar to good Turkey red. After all this treatment with soap, we can understand that Turkey red is a very fast colour.

No satisfactory process for printing Turkey red has yet been found. Some time since I made a few experiments on the subject. The cloth prepared ready for dyeing was used, and then printed with the colouring matter; it was then steamed, washed and cleared as above. The colours were very good indeed, but the parts which should be white were still of the yellowish colour of the prepared cloth.

When a Turkey red is wanted in a pattern the cloth is first dyed all over with this colour. If white is required in the pattern, those parts are printed with thickened tartaric acid; if yellow, with tartaric acid and a lead salt; if blue, with tartaric acid and Prussian blue. On passing cloth printed in this manner into a solution of chloride of lime, the parts printed with acid, as they come in contact with this solution, cause chlorine to be evolved and the Turkey red destroyed, thus white is produced. If blue has been printed on with the acid, the red being discharged, blue remains. If a lead salt has been printed on, white is obtained; but when passed through a solution of bichromate of potash, yellow chromate of lead is formed. Of course green can be obtained by combining the last two processes. Black is printed on direct. Most beautiful results are obtained in this manner.

Madder is also employed for woollen goods. It is generally used in combination with other dye-stuffs for the purpose of producing brown, buff, or chocolate colours. But I must pass on, the application of madder being a subject on which books have been written, my remarks are therefore necessarily of only a very general character, though I hope sufficient to give some idea of the processes.

Having seen the importance of madder as a dye-stuff and the methods of applying it to fabrics, it will next be desirable to consider the colouring matters it contains, which render it so valuable.

Scarcely anything was know of these until 1827. At this date, two chemists, Colin and Robiquet, obtained the principal colouring matter in a state of tolerable purity. They extracted ground madder with hot water, and, after treating this extract in various ways, obtained a product which, when heated carefully in a glass tube, gave off a yellowish vapour, condensing into brilliant bright red needles. They named this substance *Alizarin*, from the Levant name of madder, *Alizari*.

But the method they adopted for its preparation, viz., sublimation, rendered it a matter of uncertainty whether alizarin pre-existed in madder or was a product of decomposition of some other body. Dr. Schunck, however, afterwards succeeded in obtaining it without having recourse to sublimation. If further proof were needed it was found in the fact that this colouring matter was capable of dyeing mordanted cloth just in the same way as madder. It exists in madder in only very small quantities, not more than to the extent of one per cent.

Alizarin is nearly insoluble in cold water, and 1000 parts of boiling water dissolve only about three parts of the colouring matter. It is more soluble in alcohol, and from high boiling naphtha it may be crystallized in red needles. When crystallized from alcohol it is obtained in orange-coloured needles.

One of the characteristic properties of alizarin is the beautiful blue violet solution it produces on being dissolved in caustic alkalies. This solution, when viewed by the spectroscope, shows two strong absorption bands, one near to C, and the other at D, and a very faint one near to E. Alizarin also dissolves in ammonia with a purple colour. It forms a red lake with alumina, and a black one with oxide of iron.

Curiously, alizarin is not found in the growing madder root. This is easily seen by expressing some of its juice and treating it with caustic potash. In this way a red-coloured solution is produced, and not a violet one, as would be the case if alizarin were present. This coloration is due to the presence of a substance called *rubianic acid*. This body is a glucoside of alizarin, and when decomposed yields alizarin and glucose. This can be easily effected by boiling it with hydrochloric acid, when alizarin separates as a yellow precipitate. Rubianic acid does not possess dyeing properties.

The decomposition of this glucoside in the madder root occurs partly during the process of drying, but not entirely until it is gently heated with water in the dye-bath. This decomposition is caused by a peculiar ferment called *Erythrozyme*, a product which is destroyed if heated with water to 100° C. This is one reason why the madder dyers have to gently raise the temperature of their dye-bath so that this glucoside may entirely decompose, and all the alizarin be liberated and rendered useful. The importance of this may be easily seen by taking two equal parts of growing madder root, and, after bruising them in a mortar, to throw one into boiling water and the other into cold water. On placing a piece of mordanted cloth in each, keeping the one with boiling water still boiling, and gradually raising the temperature of the other, it will be found that the one in boiling water will have scarcely coloured the mordants, whilst the one in cold water and gently warmed up will have dyed them thoroughly.

There is only one other colouring matter in madder that I need refer to, and that is purpurin. This substance was discovered by Colin and Robiquet, and called by them *Matière colorante rose*. It was afterwards obtained in a somewhat purer state by Debus, and by Wolff and Strecker. This substance is separated from madder by boiling it with a solution of alum; munjeet, however, is its best source. It is precipitated from the alum solution with hydrochloric acid and then further purified. When pure purpurin crystallizes in red or orange-red needles, it differs from alizarin in the way it behaves with alkalies; solutions of these yielding with it beautiful cherry-red colours. It also dissolves in alumina salts with formation of pink solutions, which are fluorescent. The spectrum is also very different from that of alizarin.

It dyes mordanted cloth, forming with alumina mordants a yellowish scarlet. The colours it produces with iron mordants, however, are not at all good. The purpurin colours do not resist soaping well, so that madder prints, in the process of clearing, lose all the purpurin taken on in the dye-bath. It is retained, however, to some extent in the cheaper class, such as garancine styles. From this it will be seen that it is a substance of but little value. It exists in the growing madder-root as a glucoside.

A great deal of controversy has taken place respecting the chemical formula of alizarin. Dr. Schunck proposed $C_{14}H_5O_4$, which, according to the present notation, would be $C_7H_5O_2$, whilst Strecker believed it to be $C_{10}H_6O_3$, and related to chloroxynaphthalic acid, a derivative of naphthalene, so that it has long been supposed that it was possible to obtain alizarin from a coal-tar product, though not from the right one. Still there was a good deal of reason to believe that it was a naphthalene derivative, from the fact that, when oxidized it yields the same acid as naphthalene, namely, phthalic acid. Strecker's formula was the one generally believed in. It is right to mention that Strecker changed his views of this subject afterwards.

The chloroxynaphthalic acid above referred to was supposed to be a chlorine derivative of alizarin, the two bodies being thus related:—

$C_{10}H_6O_3$	$C_{10}H_5Cl\ O_3$
Alizarin.	Chlorinated Alizarin.

And many attempts were made to remove this chlorine and replace it by hydrogen, so as to form alizarin; and eventually Martius and Greiss obtained the substance, $C_{10}H_6O_3$, when investigating some amido derivatives of naphthal, but it was not alizarin. They assumed it, however, to be an isomer of that body.

Some time after the experiments of Martius and Greiss, Graebe commenced some researches on quinone (a body related to benzene). At that time no analogous substance to quinone, related to any other hydrocarbon than benzene, was recognized. However, he was induced to consider chloroxynaphthalic acid as a derivative of a naphthalene quinone, which has since been obtained, and also discovered a chlorinated derivative of a quinone of toluene.

(*To be continued.*)

Obituary.

JOHN THOMPSON.

On Friday, June 20, John Thompson, one of the Founders of the Pharmaceutical Society, and one of its earliest local secretaries, died in the seventy-seventh year of his age.

John Thompson was born at Laversdale, in Cumberland, on January 23, 1803. He was apprenticed to a chemist in Hull—Mr. Foster, of Lowgate—and subsequently engaged as assistant to Mr. Fouracre, of Gloucester. He returned to Hull to the late Mr. Edward Smeeton, with whom, in the capacity of assistant, he removed to Leeds when that gentleman opened his establishment there. By Mr. Smeeton he was very highly esteemed, and at his suggestion, and by his help, he commenced business in Thirsk, in the year 1828, where he greatly prospered. The business then established is now carried on by one of his sons, four of whom are connected with the Pharmaceutical Society. He was interred at Thirsk on Tuesday, the 24th of June, amid signs of universal respect.

Notice has also been received of the death of the following:—

On the 2nd of May, 1879, Mr. Frederick Whiteman, Chemist and Druggist, Vernon Street, Ipswich. Aged 38 years.

On the 2nd of June, 1879, Mr. Richard John Hinsley, Chemist and Druggist, Manchester Road, Bradford. Aged 42 years.

On the 6th of June, 1879, Mr. Benjamin Alfred Eyre, Pharmaceutical Chemist, Tacket Street, Ipswich. Aged 67 years. Mr. Eyre had been a Member ot the Pharmaceutical Society since 1842.

On the 15th of June, 1879, Mr. James Sellick Hicks, Pharmaceutical Chemist, Fore Street, Looe. Aged 40 years. Mr. Hicks had been a Member of the Pharmaceutical Society since 1864.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

Replies.

[315]. Considering the solubility of ammon. chloride in spirit (1 in 50) it would be impossible to obtain a perfect solution from this recipe. The salt should be used in powder, and the insoluble portion shaken up before the "volatile liniment" be applied.

Hastings. D. H.

[316]. A very presentable "jelly" might be made of this, only it should be sent out for convenience in a gallipot with a china or glass spoon. If this did not meet with the intention of the prescriber, it would teach him a lesson on "Incompatibles" and enable him in future to order a mixture that would pour out of a bottle.

Hastings. D. H.

[319]. I should also be glad of a little information about this prescription.

Some time ago the following recipe was brought to be dispensed:—

℞ Litharge . . . . ʒx.
Ol. Olivæ . . . . ℥v.
Ol. Lavand. . . . . ♏ 40.
Ft. ung.

My directions were more vague than A. Y.'s; but as boiling with water was the only way of forming an ointment, except by using wax, the litharge and oil were boiled with water until combination had taken place. The resulting product, though stiff, might still be called an ointment. Shortly after our customer complained of its being darker and harder than what he had got in London. He obtained some more from the same source, which was nearly but not quite white, soft, contained moisture, and had a cooling effect on the skin.

The spirit of emulation being aroused the greater portion of Whit Monday and part of another day were devoted to preparing a fresh lot.

The litharge was found to be contaminated with peroxide, so some fresh, light-yellow protoxide was made by heating carbonate of lead in an iron vessel, from which a much lighter coloured ointment was produced; but still the consistence was too stiff, the colour not quite white enough, and the ointment did not contain sufficient moisture.

The best result was obtained with

Litharge . . . . ʒv.
Ol. Amygd. . . . . ℥iij.
Aq. . . . . ℥iss.

the water being replaced as it evaporated.

I have not had an opportunity of learning whether this retained its appearance and consistence.

The prescription was from the pen of a well-known skin doctor. W.

[321]. This presents a mixture that undergoes chemical decomposition after standing a few hours.

The acid carbonate of soda acting upon the liq. bismuthi displaces ammonia and inevitably precipitates carbonate of bismuth. (This may be proved by filtering the mixture, and washing until it ceases to make lime water turbid. Nitric acid added dissolves the precipitate with effervescence, giving a solution blackened by AmHS.)

Unless the liq. bismuthi had been omitted it would be impossible not to have a deposit.

Hastings. D. H.

[321]. The precipitate was caused by the loss of ammonia. All the bright samples of liq. bismuthi have a slight odour of ammonia. If that was hardly perceptible I should doubt the stability of the compound, particularly if the weather was warm and the customer were to leave the cork out. In such cases I should be disposed to add a few drops of liq. ammon. This addition to the stock bottle, or a mixture, will redissolve the precipitate. The ammonia should be added in small quantities, and the bottle shaken and allowed to stand after each addition. I should tell the customer the cause of the change, and show how the supplying what has been lost restores the mixture. It should be remembered the addition of ammonia only supplies what has escaped from the bottle, and is quite different to adulterating or sophisticating.

H. G. C.

Queries.

[322]. Here is a puzzle to solve; how to make a usable preparation of these ingredients? I had it as an orthodox physician's prescription to prepare.

℞ Tr. Lyttæ . . . . ʒj.
Acid. Sulph: Dil. . . . . ʒij.
Tr. Lavand. Co. . . . . ʒiij.
Vaseline or Prepared Lard . . . ad ℥ij.
M. "for external use."

W. B.

[323]. How should the following be dispensed?—

Sodæ Siccatæ	gtt. 2.
Ex. Nucis V.	gr. $\frac{1}{3}$.
Ex. Gentianæ	q.s.

Ut fiat pilula. Mitte 24.

I enclose a tracing of the prescription from which it will be seen that the gtt. in the first line is very different from the gr. in the second. The prescription is from a well-known and experienced M.D., who could not be consulted at the time. W. S.

[324]. Can any readers of the *Pharmaceutical Journal* throw light on the following?—

℞ Morphiæ (the alkaloid)	gr. 8.
Chloroformi	♏ 60.
Lin. Belladonnæ	ad fl. dr. 4.

Ft. linimentum.

As dispensed by me the greater portion of the morphia, as I expected, remained undissolved, and a "shake the bottle" label was attached. The patient, however, informs me that he has had it before perfectly bright and clear, of a brownish tint (he compared it in colour to tinct. camph. comp.), and about twice as much in bulk as I had sent. I fail to see how this could be done without departing from the formula.

GULIELMUS.

[325]. I should be glad to have the opinion of the readers of the *Pharmaceutical Journal* as to the proper salt of bismuth to use in dispensing the following:—

℞ Bismuthi	ʒij.
Adipis	ʒvj.
Creosoti	♏ v.

M. ft. ung.

I used the subnitrate as being that probably intended, although I must admit that the prescription might as reasonably have been dispensed with either carbonate or oxide. GULIELMUS.

Notes and Queries.

[610]. FURNITURE CREAM.—In reply to A. P. S. the following is an excellent recipe for furniture paste:—

Bees' Wax	$1\frac{1}{2}$ pounds.
Spirit of Turpentine	4 pints.

Dissolve by means of a water-bath in a closed vessel, then add common soap, $\frac{1}{2}$ pound, previously dissolved in 4 pints of water, and stir well together until nearly cold.

A. W. POSTANS.

[610]. FURNITURE CREAM.—I would recommend the following receipt for furniture cream:—

℞ Yellow Wax	℥v.
Turps	Oj.
Castille Soap	℥iss.

Cut the bees' wax in small pieces, and dissolve in the turpentine by a gentle heat; when nearly cool add the soap (first powdered, rubbed up with ℥ij of water), gradually stirring continually until it becomes thick.

FERRI CIT.

[610]. FURNITURE CREAM.—I think A. P. S. will find the following to suit his purpose:—

℞ Ceræ Flav.	$2\frac{1}{2}$ ozs.
Ceræ Alb.	1 oz.
Sapo. Cast.	1 dram.
Ol. Terebinth.	
Aq. Bull.	ana 10 ozs.
Potass. Carb.	1 dram.

Melt the wax and turpentine together, dissolve the soap and potass. carb. in the water and mix while warm, stirring till cold.

Cambridge. G. J. BULL.

[611]. MOORE'S OINTMENT.—I beg to ask through the medium of your Journal, can any of the readers kindly give me a recipe for Moore's or Old Moore's Ointment, much used in Golden Square, West district?

UNGUENTUM.

Correspondence.

LIN. POTASSII IODID. C. SAPONE, B.P.

Sir,—*Apropos* of a new edition of the British Pharmacopœia may I be allowed to suggest that the directions for making the above liniment be made more definite, and also be supplemented by a note as to the appearance it is intended to have when finished.

Ought it to be a solid or a liquid?

Is it meant to be dispensed in a pot or in a bottle?

As it is possible for such questions as these to be asked, I think none can deny that there are grounds for the above suggestion.

The directions say, "mix the two solutions together." Is it intended to add the iodide of potassium solution to the soap solution or *vice versâ*, for the first process results in a solid substance, whilst by adding the soap solution to the iodide of potassium solution a liquid is produced.

There are other difficulties, however, for I have made several experiments, but have had no two results alike, although the same kind of material and the same quantities were used in each case.

There seems to be a difficulty about the soap most advantageous for the purpose; but the experience above recorded would suggest that hard soap is evidently not an "advantageous soap."

I should feel greatly obliged if those who had the framing of the last British Pharmacopœia will come forward and state what this liniment should be like, or rather what they intended it to be like, for, as far as I know the profession, medical men prefer it in liquid form.

However, when lin. potassii iodid. c. sapone, B.P., is prescribed it ought to be dispensed. Here then comes the query. Is it a liquid or a solid or is it both (for it will readily separate into two parts representing each of those conditions), or ought a substance with a jelly-like appearance to be dispensed for it?

An answer that will remove any cause for doubt will be heartily welcomed by W. H. DE B.

"*Quæro.*"—(1) *Trapogon porrifolius*, in flower. (2) Fungus (*Ustilago receptaculorum*) destroying flowers of goat's beard. (See Cooke, 'Microscopic Fungi,' pl. v., fig. 92–94.

Mr. J. R. Thompson is thanked for his communication.

"*Nux.*"—(1) *Eriophorum polystachyon.* (2) *Rhinanthus Crista-Galli.* (3) *Stellaria graminea.* (4) *Crepis setosa.* (5) *Sedum acre.*

G. R. Y.—Several formulæ for syr. ferri lactophosphatis have already been given in the present series of this Journal. Among others, see that sanctioned by the Paris Society, vol. vii., p. 1041.

E. K. C.—We shall be glad to hear the result of the further experiments you propose to make.

W. C. S. (Luton).—The information will be found in the "Students' Numbers" of the medical journals which are issued previous to the opening of the medical schools.

C. J. Bennett.—We know of no better work for the purpose than the one mentioned.

"*Gulielmus.*"—(1). *Trifolium minus.* (2). *Carex vulpinus.* (3). *Arrenatherum elatior.* (4). *Trifolium repens.* (5). *Lychnis Flos-Cuculi.* (6). *Cardamine pratensis.*

Cyprus.—(1). *Cynoglossum officinale.* (2). *Anthyllis Vulneraria.* (3). *Honckenya peploides.*

"*Orchis.*"—(1). *Orchis maculata.* (2). *Gymnadenia Conopsea.* (3). *Habenaria bifolia.*

R. Roberts.—(1). *Orchis maculata.* (3). Send specimen with leaves. (6). *Ceterach officinarum.* Nos. 2, 4 and 5 are correctly named.

G. Stevens.—Recipes for "Nervine Balsam" will be found in the Journal for March 30, 1878, vol. viii., pp. 773 and 782.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Maleham, Nemo, Strachan, J. B. P., G. R. Y., W. C. S., Hirudo, Quaero.

SWEET SPIRIT OF NITRE.—WHAT IT WAS, IS, AND OUGHT TO BE.

BY W. SMEETON.

Under the above comprehensive title appeared a paper, written by Mr. Rimmington, of Bradford, in the November number of the Journal for 1877. It provoked a discussion and the facts that appeared to come out were that the ethereal liquid which is produced when alcohol and nitric acid are distilled together by the B.P. process is a compound of alcohol, nitrite of ethyl, aldehyde, and perhaps other unknown substances, and that the B.P. process would always yield an article containing the same proportion of the same ingredients. But at the outset, Mr. Rimmington condemned the B.P. process as being unnecessarily complex, and one that probably did not meet with universal adoption. Of course this might be said of any process, and the quantity to be operated upon will also be a modifying agent. Mr. Rimmington's remarks respecting the directions to allow the still to cool before adding more acid were quite to the point; but if, on the other hand, the whole of the acid is added to start with the action is very violent, and if the quantities dealt with are large, it is almost sure to lead to loss of ether. If the acid is added later on without waiting for the cooling, red fumes are apt to come over. In this dilemma we are left, and we should have been under obligation had Mr. Rimmington pointed out a more excellent way. Mr. Umney has also stated that nitre made by the B.P. process was unfavourably received, and I suppose most manufacturers must occasionally have found the result unsatisfactory.

Just before the British Pharmacopœia came out, Professor Redwood read a very exhaustive article on spirit of nitre, explaining the B.P. process, and briefly reviewing other processes. The Edinburgh and Dublin forms of making hyponitrous ether first, were dismissed as not being applicable for large quantities and expensive. There may be something in this, for whatever Professor Redwood states is so well considered that it may always be taken as correct. Still, after trying several processes, I have come to the conclusion that with the quantities with which I deal, none is so satisfactory as the Edinburgh plan. It is as easy and takes less time, but what is of much more moment, it makes a nitre that is very pleasant and uniform in character. I am not sure it is the best plan, but it is the best I know, and I do not find it very difficult to manipulate.

I take twelve pints of alcohol and add to it carefully three pints of nitric acid either at once or in successive portions. This is placed in a still having a capacity of eight gallons, connected with a stone worm and Woulfe's bottles to catch what escapes the first condenser and receiver. Action will sometimes commence without artificial heat; if it does not I turn on steam till it does, but before the temperature reaches 140°, distillation commences, rapidly at first, and requires very careful condensation. The distillate is in appearance and quantity about the same as that obtained by the B.P. process, but I think it is more ethereal and certainly more acid. It is now neutralized with milk of lime and solution of chloride of calcium added. The nearly pure ether separates, floats on the surface, the heavy liquid below contains the alcohol of the distillate, and certainly most if not all the aldehyde and possibly other products. With the hope of utilizing the washings and recovering alcohol or ether, I have redistilled them with lime and filtered through charcoal, but it is bad smelling, ultimately goes yellow, and is certainly best out of good spt. nitre, though not worse than much that is sold. The main difficulty of this process is the volatile character of the ether, rendering the separation by a syphon a somewhat risky process, and giving, if inhaled, a most cadaverous hue to the operator. Great care has also to be taken when the water and lime are added to keep all very cold, as the mixture with the spirituous liquid generates heat enough to make the ether boil. With these precautions the process is not more than ordinarily difficult. One ounce of the ether with a pint of sptirit makes nitre of 5 per cent. strength; two ounces 10 per cent. or B.P. strength, as Mr. Rimmington has pointed out. The 5 per cent. is, I think, strong enough for medicinal purposes, and would generally be preferred.

In conclusion, I beg to say that whether this is the spt. nitre that is to be, or not, it has much to recommend it. It has a beautiful sweet flavour, something like chloroform, and I believe is free from aldehyde and other noxious products.

NOTES ON SOME JAPANESE DRUGS.

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society.

ROOTS.

(*Continued from page* 5.)

DEE-OH (53):—*Rehmannia lutea*, Max.

Syn. TI-HWANG, Porter Smith, p. 184; SAS-HIME, Sô mokou Zoussetz, vol. xi. fig. 62; DZIWÔ, Fr. et Sav. vol. i. p. 328; SAÔ HIME, GOMA TOME SAÔ, Phonzou Zoufou, vol. xvii. fol. 23.

This root occurs in pieces one or two inches long and about one-quarter to one-third of an inch in diameter, soft and flexible, and very much wrinkled externally, internally soft and moist, of a deep brownish-black colour, with a darker line marking the juncture of the bark and meditullium. Taste earthy and slightly sweet. Several species of this Gesneraceous genus are largely used in China as alteratives and tonics, and are supposed to possess cooling and purifying properties.

The Japanese character for this drug is identical with that translated Ti-hwang, under *Rehmannia Chinensis*, in Dr. Porter Smith's 'Chinese Materia Medica,' "dee" or "ti" being the name of the plant and "oh," like the Chinese "hwang," meaning yellow, in allusion to the yellow colour of the flowers.

The plant is cultivated in Japanese gardens and flowers in May, and was in the first place probably brought from China.

GAH-DITZ (23):—*Curcuma Zerumbet*, Roxb.

This root corresponds exactly in shape and taste and odour with specimens of zedoary or zerumbet root in the museum of this Society; most of the pieces are, however, of a rather more horny consistence than the zedoary root seen in commerce. Mixed with this rhizome are a few specimens of cassumunar root (*Curcuma Zedoaria*, Roxb.), which are easily distinguishable by their yellow colour when cut or scraped.

Gah-ditz comprises both the long and short zedoary, or in other words, both the central and lateral rhizomes.

This plant is probably not wild in Japan, as it is not mentioned either in the 'Sô mokou Zoussetz' or in 'Franchet and Savatier's Flora'; it is probably cultivated in Japan like several other medicinal plants belonging to the Scitamineæ.

HAK-TAU-AU (48):—*Anemone cernua*, Th.

Syn. NEKO BANA, Fr. et Sav. vol. i. p. 4; HOKINA G'ZA, Phonzou Zoufou, vol. vi. fol. 23; OKINA GUSA, SHAGUMA SAIKO, Sô mokou Zoussetz, vol. x. fig. 34; OLLINA GUSA, Thunb. Fl. Jap. p. 238; KAWARA SAIKO, Sieb. et Zucc. Fl. Jap. p. 14.

This is an unbranched, cylindrical, hard and brittle root, three to five inches long, or more, about the size of a goose quill, coarsely furrowed longitudinally, and crowned with the silky bases of the leaves. The transverse section is brown and horny, and shows a small central cavity lined with white fibres; this cavity appears to run through nearly the whole length of the root. The taste is sweet and slightly acrid. It probably possesses similar properties to the common *Anemone Pulsatilla*, to which plant it is nearly allied.

The Japanese name literally translated means white-headed old man, and is probably given in allusion to the white silky appearance of the tufts of young leaves. The Chinese name Hak-too-woo, is very similar in pronunciation.

The plant, like *Anemone Pulsatilla*, grows in Japan on dry hilly places at an altitude of 500 to 2000 feet, and flowers in March or April.

It is said to be used as a bitter medicine in China and Japan.

HAN-GE (47):—*Pinellia tuberifera*, Ten.

Syn. KARASUBISHAKU, Sô mokou Zouss. vol. xix. fig. 1; Phonzou Zoufou, vol. xvii. p. 23; SANG-PWAN-HEA, Hanbury 'Science Papers,' p. 262, with fig. of root; MIDSUMMER ROOT, PWAN-HIA, Porter Smith, 'Chinese Materia Medica,' p. 149. TOO HANGE, Fr. et Sav. vol. ii. pl. 1, p. 3; FANKE SO, KRAS NO FISIAKU, Thunb. Fl. Jap. p. 233.

This drug consists of small white starchy corms, varying in size from a pea to that of a small marble. They are usually slightly flattened, and have a small depression on one side surrounded by a number of little pits, which are apparently the scars of the radical fibres. They appear to have but little taste, but a powerful pungency is perceptible after the drug is chewed, as in many other plants of the arum family.

According to Dr. Porter Smith the powdered drug has an action like colchicum and has been used for a long time in the Hankow Mission Hospital as a substitute for the sulphate of potash in Dover's powders. Although containing a quantity of starch this drug is never attacked by insects.

The plant is found in uncultivated places and in fallow fields, flowering in May and June. It probably derives its name from the time of flowering, "han" meaning middle and "ge" summer.

KAI (56):—*Dioscorea quinqueloba*, Thunb.

Syn. KIKUBA-DOKORO, Sô mokou Zouss. vol. xx. fig. 54; KAI, TOKORO, Kœmpf. Amœn. p. 827. KASSUDA FANNA DAKKA, KARASUNO SENI, Thunb. Fl. Jap. p. 150.

This is a sliced tuber, the slices being one inch or more broad, about half an inch thick, or rather less, and two or three inches long. The cortical portion consists of a wrinkled pale brown skin, marked here and there with the scars of rootlets. Internally it is yellowish-white and shows a few scattered vascular bundles. The substance is moderately hard and tough. The taste is slightly but not persistently bitter. It has very little odour.

Of its medicinal properties I have no knowledge. The root is edible, according to Kœmpfer, who describes it as similar in appearance to ginger. Thunberg states that the name "fanna dakka" means nose higher, and is given because children put the winged capsules on their noses to make their noses look larger, while "karasuno seni" means crow-berry.

The plant has much the habit of the black bryony of this country, but the leaves are larger and have five shallow lobes. It flowers from June to September.

KAS-HI-YU (43).

This is a large tuberous root, varying in size from two to four inches long and one to two inches in diameter. Externally it is of a blackish-brown colour, with one or two deep furrows, or in some pieces it exhibits a slightly wrinkled surface, while in others it presents transverse scars or ridges which by friction have become pale. Internally the root presents a nut-brown colour and a shining resinous fracture; the structure appears uniform. The root is extremely hard, requiring a blow from a hammer to fracture it. The taste is slightly astringent and the odour earthy.

I have not been able to identify it.

KESSO:—*Patrinia scabiosæfolia*, Link. (Valerianaceæ.

Syn. OMINA-MESHI, Sô mokou Zoussetz, vol. ii. p. 21; WOMINA MESI, JAMA NJAN KUSOO, URO AMISI, ORO AMI, Fr. et Sav. vol. i. p. 216.

This root was not presented with the others, but was offered in the London market under the name of "kesso" and was imported from Japan; as a product of that country it seems to demand notice here. The root resembles that of *Valeriana officinalis* in general appearance and odour, but differs in the central portion to which the rootlets are attached, being very small and short, rarely exceeding one-third of an inch in diameter; the rootlets form a compact tuft from two to three inches long, are of a dark brown colour, and have a slightly scaly surface, by which and by the colour they are easily distinguished from valerian root. The odour of the root is even more powerful than that of *Valeriana officinalis*. The taste is bitter and aromatic. It grows in stony mountainous places and blossoms in July.

KI-KYÔ (33): — *Platycodon grandiflorum*, A.DC. (Campanulaceæ), So mokou Zoussetz, vol. iii. fig. 3; Phonzou Zoufou, vol. iv. p. 14, 15.

Syn. *Campanula glauca*, Thunb. Fl. Jap. p. 88; KEKKO, KIRJO, KIRAKOO, Kœmpf. Amœn. p. 822.

This root is white, about three or four inches long, strongly but sparingly furrowed longitudinally, tapering from just below the part where the stem arises, simple, or once forked, and giving off from the shoulder or thickened portion near the top of the root one or two short often horizontally-spreading lateral branches. Internally it is tough, white, and slightly spongy, with a yellowish-white horny ring surrounding the meditullium. The taste is at first sweet and mucilaginous, but afterwards faintly bitter. The juice is milky in the fresh root, according to Kœmpfer.

These specimens do not in any way correspond with those described under the name of *Platycodon grandiflorum* by Dr. Porter Smith (p. 173). The Chinese character there translated kih-kang is, however, identical with the Japanese character kikyo. The Japanese root was, however, recognized at sight by Mr. Takemura, who told me the plant yielding it had a large blue flower, and on showing him the figure of the plant in the Sô mokou Zoussetz, he at once identified it as the one yielding the root. Dr. Porter Smith's specimen in the museum of the Pharmaceutical Society is therefore probably incorrect.

According to Kœmpfer, this root is considered only second in medicinal value to the celebrated ginseng, which is not surprising, since it has a stronger resemblance to the outline of a human body than even that famous root.

Kikyo grows commonly on the borders of cultivated fields, and flowers in July and August.

KIN-KEE (55):—*Malva sylvestris*, L., Fr. and Sav. vol. i. p. 62.
Syn. ZENI-AOI, Sô mokou Zoussetz, vol. xii. fig. 54.

This root resembles in every respect that obtainable in England, except that it is whiter and evidently carefully washed and rubbed before drying.

It is probably cultivated in Japan, and not really wild, according to Franchet and Savatier.

KUH-SHING (14).

This drug is very similar in appearance to decorticated marshmallow root, but of a more yellowish tint. It occurs in angular pieces four or six inches long and one-third to three-quarters of an inch in diameter, and is very fibrous; the meditullium occupies the greater portion of the root and is marked where it joins the cortical portion by a ring of faint brown radiating dotted lines. The dotted appearance under a lens is seen to be due to the presence of porous vessels. The taste is intensely bitter. Examined by Mons. A. Petit, of Paris, it was found to contain a new alkaloid, to which its bitterness is due.

Thunberg refers "kusin," a name similar in sound but different in meaning, to *Sophora heptaphylla*, L., but the root of that plant does not appear to be bitter. The Japanese character for "shing" means bitter.

I have not yet been able to identify this drug.

OH-REN (58):—*Coptis anemonæfolia*, Sieb. et Zucc. (Ranunculaceæ); Sô mokou Zouss. vol. x. fig. 36.
Syn. KAKOUMA G'ZA, Fr. et Sav. vol. i. p. 10; Phonzou Zoufou, vol. vii. p. 2.

This drug closely resembles in appearance that of *Coptis Teeta*, Wall., but is more slender and more curved, and has less of the smooth stem which is often attached to the latter. The rhizomes are about one or one and a half inches long and two lines thick, occasionally branched, and always bristly with short, slender, wiry rootlets. Externally it is of a dark brown colour and internally of a golden yellow. The taste is bitter.

The Japanese character ("oh-ren," meaning yellow ren) is exactly the same as the Chinese one for hwang-lien, which is the rhizome of *Coptis Teeta*, Wall., and not a *Justicia*, as stated by Dr. Porter Smith in his 'Chinese Materia Medica,' p. 126, and whose specimens in the museum of the Society are certainly the rhizome of *Coptis Teeta*.

The Japanese drug, like *Coptis Teeta*, probably contains a quantity of berberine. It is not a little singular that *Coptis Teeta*, *Berberis Lycium*, *Hydrastis Canadensis* and *Coscinium fenestratum*, which all contain berberine, have all been found useful in inflammation of the eyes.

Two other species of Coptis are figured in Sô mokou Zoussetz, viz., *C. trifolia*, Salisb. (fig. 38) and *C. quinquefolia*, Miq. (fig. 37), both of which are much smaller species, and other species are described by Franchet and Savatier, but all of these have a more slender rhizome.

(*To be continued.*)

INSECT POWDER.*

BY WILLIAM SAUNDERS.

The insect powders of commerce are the powdered flowers of different species of *Pyrethrum*. Those of *Pyrethrum carneum* and *roseum* were introduced some thirty years ago under the name of Persian insect powder, and subsequently those of *Pyrethrum cinerariæfolium*, a native of Dalmatia, Austria, as Dalmatian insect powder. Both the Persian and Dalmatian powders are good insecticides, but the latter is much the more energetic in its action and hence commands a higher price; indeed, it is so much preferred that it is gradually driving the so-called Persian powder out of the market. The fact of the flowers of *P. roseum* being less active than those of *P. cinerariæfolium*, has been accounted for on the ground that the single flowers are much more powerful than the double ones, and that the double flowers occur in *P. roseum* in much larger proportion than in the other species. The flowers, either whole or powdered, preserve their activity for a long period. A recent European experimenter states that he could not perceive any particular loss of activity in samples which had been kept for six years. The fresh (undried) flowers act very slowly as compared with the same dried and powdered, and the plant itself powdered is quite inactive. It is singular that while there are many other composite plants closely related to the genus *Pyrethrum*, as yet this peculiar property has been found only in plants belonging to this genus, and even within this limit there are several species whose value as insecticides is very slight. A large number of Compositæ indigenous to Austria have been tested and found to be of no value in this respect. The flowers of tansy (*Tanacetum vulgare*) are said to have a slight stupefying effect.

The *Pyrethrums* are hardy plants which bloom abundantly the second year from seed. The powder is prepared from the half-open flowers gathered during dry weather and dried in the shade under cover, but the process of gathering, drying and preparing involves so much time that their culture can only be made profitable where labour is cheap.

Insect powders have not attracted general attention as insecticides until within the last three or four years, during which time they have been introduced in various

* From the *Canadian Entomologist*, March. Reprinted from the *American Journal of Pharmacy*, May, 1879.

forms in packages and boxes, accompanied by suitable blowers or insects guns for the purpose of properly distributing the powder, and recommended for the destruction of flies, cockroaches, fleas, bugs, etc. Sometimes these prepared articles have been artificially coloured so as to disguise their source, but all have owed their activity solely to the presence of the powdered flowers of one or other of these *Pyrethrums*.

House flies are very sensitive to the effects of these powders. A few puffs of the dust from an insect gun, blown into the air of a room with the doors closed, the discharges directed towards those parts where flies are congregated, will stupefy and kill them within a very short time. The powder is somewhat pungent, and to breathe an atmosphere charged with it will frequently cause a slight sneezing, but beyond this the operator need not anticipate any annoyance. Frequently during the past summer, when flies have been troublesome, we have pretty thoroughly charged the air in our dining-room and kitchen at night, closing the doors, and in the morning found all, or nearly all, the flies lying dead on the floor. A few minutes after its use they begin to drop on their backs, and after a short time die; if a room be closed for half an hour after using the powder, few, if any, will escape. By some this energetic action has been attributed to the presence of a volatile oil in the flowers, by other and later investigators to a peculiar crystalline principle believed to be an alkaloid, but this point does not as yet seem to be fully settled.

More recently we have been experimenting with this powder on the green aphis which troubles our green-house plants. The usual plan of smoking with tobacco is an unpleasant remedy, and is also very injurious to many plants of delicate constitution, whereas the insect powder used to any extent is perfectly harmless to plant-life. After freely charging the air of a green-house with the powder, blowing it in fine clouds of dust among the plants, the tiny tormentors who are busily engaged in sucking the life out of the leaves and tender shoots, soon manifest symptoms of uneasiness and begin to drop from the plants to the ground, and in the course of an hour or two the larger portion of the enemy's forces will be found lying sprawling on the earth, in the pots, or on the shelves and floor of the house, where, probably partly from the stupefying effects of the powder and partly from their natural inability to find their way to any given point, they fail to reach the plants again and hence perish. By applying the powder freely in the evening and giving the plants a thorough syringing in the morning, they may in the worst cases be almost freed from aphides by a single application; it is better, however, to repeat its use the next evening, so as to make sure work. The powder does not appear to kill this aphis as it does the flies. For the purpose of testing this point we placed a number of them in an open glass cell of a microscope slide and powdered then thoroughly, and found some of them alive after two days of such severe exposure to its influence. Having recently found a plant literally swarming with the green aphis, so that the sight of it was almost disgusting, we submitted it to the action of this powder one afternoon, having previously spread a large piece of white paper under the plant so that the effect of the powder on the insects might be distinctly seen. Almost immediately they began to fall on the paper, and in less than ten minutes a hundred or more of them were lying on their backs or crawling sluggishly about. In the course of half an hour some four or five hundred had fallen on the paper, and when the plant was examined again the following morning, there remained but very few on it, and most of these were removed by a slight syringing. We have had the powder used in green-houses by some of our friends, who also report its success. The matter is well worthy the attention of all those who indulge in window gardening or who grow plants in small conservatories attached to dwellings, since if this proves an efficient and economical substitute for tobacco smoke, it will save much annoyance and some loss. Success will necessarily depend on the quality of the material used, but after the experiments we have tried, we feel confident that with good Dalmatian powder there need be no failure. It will be interesting to learn as opportunity offers how moths and other insects will be affected by the use of insect powders. If the beautiful specimens which sometimes fly into our rooms at night can be drugged in this way and captured without a struggle, we may add many a perfect specimen to our collections which would otherwise be more or less defaced. There is quite a field for experiment here.

GERANIUM OIL.*

Under the name of geranium oil several essential oil derived from species of *Pelargonium* and *Andropogon* come into commerce, which on account of their rose-like odour are used as cheap substitutes for oil of roses as well as in its adulteration. The German true geranium oil, or oil of rose-leaved geranium, as well as the French geranium or "palma rosæ" oil are obtained from the *Pelargonium Radula*, by distillation of the leaves and flowers with water. It is colourless, sometimes, however, with a greenish, yellowish or even brownish colour, the latter especially being the most esteemed. It boils at 216° to 220° C., and solidifies at 16° C. and rotates a beam of polarized light to the right.

The smell is agreeable and resembles that of the rose. The so-called Algerian rose oil, from the leaves and flowers of the cultivated *Pelargonium roseum*, Willd., and *P. odoratissimum*, is very similar to the French oil, but is lævogyre, and is especially used in the adulteration of rose oil, but is itself adulterated with grass oil from various species of *Andropogon*.

The Turkish geranium oil (rosé or roshé oil, oil of rose geranium, ginger grass oil) is the ethereal oil of *Andropogon Pachnodes*, a grass indigenous in the East Indies, Persia and Arabia. It is a yellowish thin liquid, with an agreeable aromatic odour and does not readily solidify. It comes into commerce principally through Smyrna and Bombay and is alleged to be prepared in Mecca.

The "palma rosæ" oil contains pelargonic acid, $C_9H_{18}O_4$, a colourless oily liquid, solidifying at a low temperature, melting at 10° C., and boiling at 260° C.; it is one of the series of fatty acids. Among the other constituents of geranium oil are geraniol, $C_{10}H_{18}O$, isomeric with borneol, and a colourless liquid having an agreeable rose-like odour which boils at 232° C., and upon heating with zinc chloride yields geranien, $C_{10}H_{16}$, as a colourless liquid, smelling of carrots, and boiling at 163° C.

According to Guibourt, rose oil, geranium oil and andropogon oil may be distinguished by means of iodine, nitric acid and sulphuric acid. Under a bell-glass is placed a capsule containing iodine and around this are placed watch glasses containing one or two drops of each oil. The true rose oil retains its colour, whilst both the other oils turn brown, the geranium taking by far the most intense colour. If instead of iodine copper filings over which nitric acid has been poured are put under the bell-glass, the glass becomes immediately filled with red vapour which is absorbed by the oils, the geranium oil becoming apple-green, and the andropogon oil and rose oil dark yellow, the former most quickly. If one or two drops of each of these three oils are mixed with an equal quantity of concentrated sulphuric acid, the mixtures become brown, but while the mixture with rose oil retains its delicious odour, that with the geranium oil smells strong and repulsive, and the andropogon oil acquires a strong fatty odour.

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* Dr. Gintl in Karmarsch and Heeren's 'Technical Dictionary,' from the *Zeits. d. allg. Oesterr. Apot.-Vereins*, vol. xvii., p. 268.

WALNUT LEAVES AND THE EXTRACT OF WALNUT LEAVES.*

BY C. GOVAERTS.

Preparations of the walnut (*Juglans regia*, L.), after having enjoyed in France the popularity often gained by recently introduced medicines, are not much now employed. Experience has demonstrated, however, that the walnut may be classed among the plants most useful in medicine. The author quotes various authorities who speak highly of its antiscrofulous properties.

The Belgian Codex includes an extract of the dry leaves, and the extract enters into the composition of the "Sirop de Vanier," a preparation largely used. The author's experiments have been directed to ascertaining whether this extract represents the maximum of the active principles contained in the leaves and what are the conditions that may influence the quantity of these principles in the leaves and in the extract.

The leaves of the walnut contain principally chlorophyll, tannin, a volatile aromatic principle and an acrid bitter matter (juglandin) found more specially in the green husk and the epiderm of the seed. Distilled in the fresh state the leaves yield a rather aromatic limpid water, neutral to litmus paper.

The fresh juice is green, but upon being heated it abandons its chlorophyll and at the same time becomes sensibly darker in colour.

In drying the leaves lose 50 to 55 per cent. of their weight, but without sensibly altering in colour or taste. The petioles only turn brown.

These leaves cannot be collected according to the general rule,—*i.e.*, at the commencement of the flowering,—for at that time they have scarcely issued from the buds and are far from possessing the desired properties.

If walnut leaves collected at the proper time and recently dried be compared with those met with in commerce the difference in the characters is striking. After some months in fact the dried leaves, exposed to the open air, turn brown and at the same time lose their aromatic odour and bitterness. This physical change, produced under the influence of moisture and air is the index of a chemical transformation that takes place after the drying. The prolonged action of air and moisture gradually converts the juglandin into an insoluble and insipid black substance and the tannin becomes partially insoluble or decomposed.

Experiments were made with preparations from (1) leaves collected in June; (2) leaves collected in October; (3) leaves collected at the proper time, but which had been kept one year. Tannin being one of the most active principles of the leaves, this was estimated as indicative to a certain extent of the value of the respective preparations. The method adopted was that of Löwenthal, based upon the oxidation of the tannin by permanganate of potash in the presence of indigo carmine. A gram of each extract was dissolved in 100 c.c. of distilled water, and 20 c.c. of each solution were submitted to the action of the permanganate.

(*a*). An extract prepared from the juice of leaves collected in June, clarified by heat and evaporated.—Taste: bitter and astringent. Odour: aromatic. Solution: limpid. Tannin in 1 gram of extract: 0·19 gr.

(*b*). Similar leaves were submitted to distillation, and the residue filtered and evaporated to an extract.—Taste: slightly bitter. Odour: very slight. Solution: turbid. Tannin in 1 gram: 0·19 gr.

(*c*). The remainder of the June leaves were dried in the open air and an extract prepared from them according to the Belgian Pharmacopœia.—Taste: bitter and astringent. Odour: aromatic. Solution: limpid. Tannin in 1 gram: 0·20 gr.

(*d*). Leaves collected in October were dried directly and converted into extract.—The product resembled (*c*) in every respect.

(*e*). Extract prepared from leaves one year old.—Taste: slightly astringent and slightly bitter. Odour: none. Solution: very dark. Tannin in 1 gram: 0·10 gr.

(*f*). Extract of commerce.—Similar to (*e*) with the exception of solution being limpid.

It appears therefore that the full grown leaves may be collected at any period during the fine weather, even as late as October, when they can be removed without injuring the tree. The extract of walnut, in order to represent the active principles as completely as possible, should be prepared with such leaves recently dried. The extract prepared from the defecated juice is as rich in tannin, but does not keep so well, whilst that prepared by decoction should be rejected. The leaves falling in autumn should not be used, although there is reason to believe that they are often employed in preparing the extract of commerce.

Walnut leaves of good quality are of a fine green colour on their upper surface and of a darker green underneath, with brown petioles. They have a parchment-like texture, an aromatic odour and a freely bitter and astringent taste. Altered leaves lose the greater part of their odour and bitterness, and turn a dirty green colour, approaching brown. Fallen autumn leaves sometimes have yellow spots on their surface.

* *Répertoire de Pharmacie,* vol. vii., p. 145.

THE GAS QUESTION.*

BY DUNCAN C. DALLAS.

In a former article I endeavoured to show from my own case—

1. That although I had not required more gas, my consumption was over 75 per cent. excess.
2. That this had been going on for about *fifteen months.*
3. That *after* public outcry had been raised, and without any effort on my part to diminish consumption, the amount burnt returned to the normal rate; and,
4. I suggested as a cause of increased consumption, that the gas supplied previously to the outcry had burnt away more quickly than the normal gas.

Now, it is remarkable how coincident in time with the outcry was the reversion to what I have termed the normal gas. As the figures show there was a sudden drop in my consumption equivalent to 75 per cent.

Just previous to the outcry my consumption had been at the rate of 2100 feet per week. In the week May 18th to 25th my consumption was 1200 feet, *i.e.*, just 75 per cent. less than the previous rate. And I believe this would be found to be a general experience. It is remarkable, too, that the increase, ranging over fifteen months previous to the outcry, should be also a little over 75 per cent. This fact, therefore, stands out clear, viz. the gas supplied for at least fifteen months previous to complaint burnt away 75 per cent. more rapidly than the gas supplied not only before the fifteen months, but since complaint became loud and general.

In the *English Mechanic* for June 27th, 1879, much space is given to the gas question, but entirely in the interests of the companies. In the number of same periodical for the week July 4th the subject has been prudently dropped, although the facts in my first article were brought to the notice of the Editor.

In the number for June 27th no attempt is made to touch the *gravamen* of the charge against the companies. An unfortunate "Gas Consumer" is made to stand in the pillory in consequence of some rather wild suggestions as to the cause of the increased consumption. If he be not a "man in buckram," but a real individual, one-tenth the large space devoted to his punishment and demolition of his crude suggestions would have sufficed.

These advocates of the companies prove too much. They argue as if by no possibility could any but the right kind of gas be supplied to the consumer. As they seem so learned in gas matters I humbly think it behoves them

* From the *Brewers' Guardian*, July 8, 1879.

to grapple with the real question. They cannot deny that there has been a great increase in consumption. And I think they will find it hard to deny that since the outcry there has been a great and sudden diminution of consumption, which cannot be accounted for by more economical methods of using. For, as I have shown by my own case, I purposely made no alteration in the conditions, and my rate reverted to that of 1876-7.

Messrs. "Sigma," "Ethylene," and other advocates of the companies, are therefore on one of the horns of this dilemma. Either they know the cause or they do not. If they know the cause and do not confess it they are uncandid and chargeable with what logicians term *ignoratio elenchi*, and this wilfully, in order to throw us off the scent. If they do not know the cause they have no business to write about the matter.

I confess I am not one of those who believe that mixture with atmospheric air will account for the increased consumption. I think there has been a more subtle cause.

The important ingredient in coal gas as an illuminant is olefiant gas. Next in importance are vapours of hydrocarbons. Lastly, there is light carburetted hydrogen, or marsh gas. Now, the specific gravity of marsh gas is a little more than half that of olefiant gas. Therefore a volume of marsh gas will burn away much more quickly than an equal volume of olefiant gas. But the illuminating quality of marsh gas is very feeble compared with olefiant gas. It would not do, therefore, to increase the quality of marsh gas unduly unless means could be found of increasing its illuminating quality. To one who is not in the secrets of the gas companies it is difficult of course to know what particular method has been adopted. But to show that it is possible to improve the illuminating quality of marsh gas in a simple yet scientific manner, and at the same time *increase its volume*, I beg to refer the advocates of the companies to 'Ure's Dictionary,' vol. ii., p. 552, 1875 edition, where they can read:—

"If marsh gas possessing, it will be remembered, a small amount of luminosity be decomposed by its passage through a heated tube or by the electric spark, the carbon it contains will be deposited, while the amount of hydrogen set free *will occupy double the volume of the orginal gas.*" [The italics are mine.] "Yet the flame of this nearly pure hydrogen will be found to possess a greater luminosity than the flame of the original marsh gas, although it has lost nearly the whole of its light-giving material—accounted for by the presence of a very small quantity of acetylene produced during the decomposition."

I came upon this passage *after* I had arrived at a conviction that the increased consumption was due to the supply of a gas that burnt away rapidly. If, therefore, it has been by some such means that the increased consumption has been induced, however much I may admire, as I do admire, the beautiful scientific rationale of the process, and the more beautiful because of its simplicity, especially if by such economical means as the transmission of an electric spark through some huge volume of marsh gas, it can be in a "jiffey" (if I may be allowed the slang) converted into double its volume, not only without loss to its illuminating power, but with positive increase, yet I do object to paying 75 per cent. more when in the result it does me no better service than the original gas, but rather like its crudent parent, "Will o' the Wisp," brings me grief.

On the contrary, the gas ought to be cheaper. Nor would I be greedy. For, if without much increase of cost two volumes of gas are got where previously only one could be obtained, we must hail as a benefactor the clever gas chemist or engineer who effects this. We should not grudge his fortunate company, if, say, they cheapened production 50 per cent. and kept a lion's share for themselves, but kindly gave us—something.

I am glad to see that *The Pharmaceutical Journal* (June 28th, 1879) has devoted a leader referring to the first article on the present subject in last number of *The Brewers' Guardian*, and urging the importance of the suggested Parliamentary inquiry. An excellent recommendation is also made in that leader, viz. that chemists and druggists who are large consumers of gas for heating as well as illumination, "might be of especial service in helping to keep up an examination of the gas supplied to different quarters, and make observations as to its purity, composition, and illuminating power, that would be a useful check upon the results arrived at in other ways."

This would be most valuable. For what satisfaction is it to be told that there is an elaborate system at the works for protecting us, if, when we examine our gas bills, we find that from some cause or another we have not been protected? It is all very well to test milk at the udder of the cow, but it is more than aggravating to see it pour "sky-blue" from the milk-jug on our breakfast-table.

Let them go on protecting us at the works, but let us also be protected at the burners as regards what they deliver. It could be done very easily if Parliament would give just a little attention to the distressed gas consumers.

RECENT CONTRIBUTIONS TO THE HISTORY OF DETONATING AGENTS.*

BY PROFESSOR ABEL, C.B., F.R.S.

Among the many explosive preparations which have during the last thirty years been proposed as substitutes for gunpowder, on account of greater violence and other special merits claimed for them, not one has yet competed with it successfully as a propelling agent, nor even as a safe and sufficiently reliable explosive agent for use in shells; for industrial applications and for very important military or naval uses, dependent upon the destructive effects of explosives, it has had, however, to give place, to a very important extent, and in some instances altogether, to preparations of gun-cotton and nitro-glycerine.

But there appeared little prospect that either gun-cotton or nitro-glycerine, whether used in their most simple condition or in the forms of various preparations, would assume positions of practical importance as explosive agents of reliable, and therefore uniformly efficient, character, until the system of developing their explosive force through the agency of a detonation, instead of through the simple agency of heat, was elaborated.

Before the first step in this important advance in the application of explosive agents was made by Alfred Nobel, about twelve years ago, the very variable behaviour of such substances as gun-cotton and nitro-glycerine, when exposed to the heat necessary for their ignition under comparatively slight modifications of attendant conditions (*e.g.* as regards the completeness and strength of confinement or the position of the source of heat with reference to the main mass of the material to be exploded) rendered them uncertain in their action, and, at any rate, only applicable under circumstances which confined their usefulness within narrow limits. The employment by Nobel of an initiative detonation, produced by the ignition of small quantities of mercuric fulminate or other powerful detonating substances, strongly confined, for developing the violent explosion, or detonation, of nitro-glycerine, opened a new field for the study of explosive substances, and the first practical fruit was the successful application of plastic preparations of nitro-glycerine and of compact forms of compressed gun-cotton, with simplicity and certainty, to the production of destructive effects much more considerable than could be accomplished through the agency of much larger amounts of gunpowder, applied under the most favourable conditions. Whereas very strong confinement has been essential for the complete explosion of these substances, so long as the only known means of bringing about their explosion consisted simply of the application of fire or sufficient heat, no confinement what-

* Lecture delivered at the Royal Institution of Great Britain, Friday, March 21, 1879.

ever is needed for the development, with certainty, of a decidedly more violent explosive action than they are capable of exerting when thus applied, if they are detonated by submitting some small portion of the mass to the blow or concussion developed by a sharp detonation, such as is produced by the ignition of a small quantity of strongly confined mercuric fulminate.

The conditions essential to the development of detonation in masses of nitro-glycerine and gun-cotton, or preparations of them, and the relations to and behaviour towards each other of these and other explosive bodies, in their character or functions as detonating agents, have been made the subject of study by the lecturer during the last ten years, and some of the earlier results published by him in connection with this subject also led to the pursuit of experimental inquiries of analogous character by Champion and Pellet and others.

Some of the chief results attained by Mr. Abel's experiments may be briefly summarized.

It was found that the susceptibility to detonation, as distinguished from explosion, through the agency of an initiative detonation, is not confined to gun-cotton, nitro-glycerine, and preparations containing those substances, but that it is shared, though in very different degrees, by all explosive compounds and mixtures.

It was demonstrated that the detonation of nitro-glycerine and other bodies, through the agency of an initiative detonation, is not ascribable simply to the direct operation of the heat developed by the chemical changes of the charge of detonating material, and that the remarkable property possessed by the sudden explosion of small quantities of certain bodies (the mercuric and silver fulminates) to accomplish the detonation of nitro-glycerine and gun-cotton, is accounted for satisfactorily by the mechanical force thus suddenly brought to bear upon some part of the mass operated upon. Most generally, therefore, the degree of facility with which the detonation of a substance will develop similar change in a neighbouring explosive substance, may be regarded as proportionate to the amount of force developed *within the shortest period of time* by that detonation, the latter being in fact analogous in its operation to that of a blow from a hammer or of the impact of a projectile.

Thus, explosive substances which are inferior to mercuric fulminate in the suddenness, and the consequent momentary violence of their detonation, cannot be relied upon to effect the detonation of gun-cotton, even when used in comparatively considerable quantities. Percussion cap composition, for example, which is a mixture of fulminate with potassium chlorate, and is therefore much less rapid in its action than the pure fulminate, must be used in comparatively large quantities to accomplish the detonation of gun-cotton.

The essential difference between an explosion and what we now distinguish as a detonation lies in the comparative suddenness of the transformation of the solid or liquid explosive substance into gas and vapour.

The gradual nature of the explosion of gunpowder is illustrated, in its extreme, by burning a train of powder in open air; the rapidity and consequent violence of the explosion is increased in proportion to the degree of confinement of the exploding charge, or to the resistance opposed to the escape or expansion of the gases generated upon the first ignition of the confined substance. In proportion as the pressure is increased under which the progressive transformation of the explosive takes place, the rapidity with which its particles are successively subjected to the action of heat is increased.

In the case of a very much more sensitive and rapidly explosive substance than gunpowder, such as mercuric fulminate, the increase in the rapidity of its transformation, by strong confinement, is so great that the explosion assumes the character of a detonation in regard to suddenness and consequent destructive effect. A still more sensitive and rapidly explosive material (such as the silver fulminate and iodide of nitrogen) produces when exploded in open air effects akin to those of detonation; yet even with these bodies, confinement operates in increasing the rapidity of the explosive to suddenness, and consequently in developing a more purely detonative action. Thus, the violence of explosion of silver fulminate is decidedly increased by confining the substance in a stout metal case, and the enclosure of iodide of nitrogen in a shell of plaster of paris has a similar effect. With chloride of nitrogen, the suddenness of detonation, and consequently the violence of action, was found to be very greatly increased even by confining the liquid beneath a thin layer of water.

Detonation, developed in some portion of a mass, is transmitted with a velocity approaching instantaneousness throughout any quantity, and even if the material is laid out in the open air in long trains composed of small masses. The velocity with which detonation travels along trains thirty or forty feet in length, composed of distinct masses of gun-cotton and of dynamite, has been determined by means of Noble's chronoscope, and was found to range from 17,000 to 24,000 feet per second. Even when trains of these explosive agents were laid out with intervening spaces of half an inch between the individual masses composing the trains, detonation was still transmitted along the separated masses with great though diminished velocity.

The suddenness with which detonation takes place has been applied as a very simple means of breaking up shells into small fragments and scattering these with considerable violence, with employment of very small charges of explosive agent. Thus by filling a 16-pr. common shell completely with water and inserting a charge of half an oz. of gun-cotton fitted to a detonating fuze, the shell being thoroughly closed by means of a screw plug, the force developed by the detonation of the small charge of gun-cotton is transmitted instantaneously in all directions by the water, and the shell is thus broken up into a number of fragments averaging fourteen times the number produced by bursting a shell of the same size by means of the full amount of powder which it will contain (13 oz.). Employing one oz. of powder, in place of half an oz. of gun-cotton, in the shell filled with water, the comparatively very gradual explosion of the powder charge is rendered evident by the result; the shell being broken up into less than twenty fragments by the shock produced by the first ignition of the charge, transmitted by the water. In this case the shell is broken up by the minimum amount of force necessary for the purpose, before the explosive force of the powder charge is properly developed. Extensive comparative experiments carried on not long since by the Royal Artillery, at Okehampton, demonstrated that this simple expedient of filling common shells with water and attaching a small charge of gun-cotton with its detonator to the fuze usually employed, allowed of their application as efficient substitutes for the comparatively complicated and costly shrapnel and segment shells.

Another illustration of the sharpness of action developed by detonation as compared with explosion, consequent upon the almost instantaneous character of the metamorphosis which the explosive agent undergoes in the case of detonation, is afforded by a method which the lecturer applied some years since for comparing the violence of action of charges of gun-cotton and of dynamite arranged in different ways. The charges (5 lb.) to be detonated were freely suspended over the centres of plates of very soft steel of the best quality, which rested upon the flat face of a massive block, or anvil, of iron, having a large central circular cavity. The distance between the upper surface of the plate and the charge suspended over it, was four feet. The sharp blow delivered upon the plate by the air suddenly projected against it by the force of the detonation when the charge was fired, forced the metal down into the cavity of the anvil, producing cup-shaped indentations, the dimensions of which afforded means of comparing the violence of the detonation. A much larger charge of powder exploded in actual contact with the plate, would produce no alteration of form in the metal, and the same negative result would be furnished by the explosion over the plate of a heap of loose gun-cotton of the same or greater weight than the charges detonated. The above method of experiment was devised, in the first instance, by Mr. Abel, in July, 1875, for comparing the quality of some specimens of Llandore steel proposed to be used by the Admiralty for shipbuilding purposes, with samples of malleable iron, and it has since been employed by Mr. Adamson in carrying out a very useful series of experiments, recently communicated to the Iron and Steel Institute.

It has been stated that detonation can be transmitted from one mass of gun-cotton or dynamite to another through intervening air-spaces. The extent to which such spaces can be introduced without checking detonation is obviously regulated by the size of the masses of explosive detonated; but the distances of air-space through which the detonation of a moderate quantity of the explosive agent will communicate to similar masses, are very limited, a space of 2 inches being sufficient to prevent the detonation produced by a mass of 8 oz. of gun-cotton, freely exposed, from communicating to contiguous ones. If the dispersion of the force is prevented in part, and direction is given to the gases violently projected from the centre of detonation, the power of transmitting detonation to separated masses of explosive is increased to a remarkable degree. This is readily accomplished through the agency of tubes, the charge first detonated being just inserted into one extremity, while that to which the detonation is to be transmitted is inserted into the other; or separate charges may be placed at different distances inside a long tube, with long intervening spaces, the initiative charge being inserted at one end. A few illustrations of the results thus obtained may be given. The detonation of a 1-oz. disk of gun-cutton in open air will not transmit detonation with *certainty* to other disks placed at a greater distance than half an inch from it; but if it be just inserted into one end of an iron tube 2 feet long and 1·25 inch in diameter, a similar disk, or even a plug of loose gun-cotton inserted into the other extremity of the tube, will invariably be detonated. With employment of 2 oz. of gun-cotton, in a tube of the same material, thickness, and diameter, detonation was transmitted to a distance of 5 feet. In tubes of the same kind, of very considerable length, 2-oz. disks of gun-cotton placed at intervals of 2 feet, were detonated through the initiative detonation of one such disk inserted into one extremity of the tube. In other experiments a long tube of this kind was fitted with branch pipes, 2 feet long, at those parts where the intermediate disks were placed, and charges of gun-cotton were placed at the extremities of these pipes. By the initiative detonation of 1 oz. of gun-cotton all the charges were detonated, the effect on the air being that of one single explosion. The results obtained with equal quantities of gun-cotton varied with the diameter, strength, and nature of the material of the tubes used. Dynamite and mercuric fulminate, applied to their own detonation, furnished results quite analogous to those obtained with gun-cotton; but in applying fulminate to the detonation of gun-cotton through the agency of tubes, some singular and instructive results were obtained, for an account of which the lecturer referred to his memoir on this subject.

Silver fulminate was employed for the purpose of instituting more precise experiments than could be made in operating on a larger scale, with gun-cotton, on the influence of the material composing the tubes, of the condition of their inner surfaces, and of other variable circumstances, upon the transmission of detonation. Half a grain of silver fulminate freely exposed and ignited by a heated body, will transmit detonation to some of the compound placed at a distance of 3 inches from it, but does not do so with certainty through a distance of 4 inches. But when the quantity of the fulminate is just inserted into one end of a stout glass tube 0·5 inch in diameter, and 3 feet long, its detonation is invariably induced by that of a similar quantity of the fulminate placed just inside the other extremity of the tube; this result is uncertain when the length of the tubes of the same thickness and diameter exceeds 3 feet 3 inches. Glass tubes were found to transmit the detonation of silver fulminate much more rapidly than tubes of several other materials of the same diameter and thickness of substance. Thus, with the employment of double the quantity of fulminate required to transmit the detonation with certainty through a glass tube of the kind described, 3 feet in length, it was only possible to obtain a similar result through a pewter tube 31·5 inches long, a brass tube 23·7 inches long, an indiarubber tube 15·8 inches long, and a paper tube 11·8 inches long. The difference in the results obtained was not ascribable to a difference in the escape of force on the instant of detonation, in consequence of the fracture of the tube, nor to the expenditure of force in work done upon the tube at the seat of detonation, since the glass tubes were always destroyed by the first explosion to a much greater distance along their length than any of the others, and the brass tubes, which were in no way injured at the seat of the explosion, did not transmit detonation to so great a distance as the pewter tubes, which were always deeply indented. The transmission of detonation appeared also not to be favoured by the sonorosity or the pitch of the tube employed, as the sonorous brass tube was not found to favour the transmission to the same extent as the pewter tube. Moreover the transmission of detonation by the glass tubes was not found to be at all affected by coating these tubes with several layers of paper, or by encasing them in tightly fitting indiarubber tubes. These differences appeared on further investigation not to be ascribable, to any important extent, if at all, to the difference in the nature of the material composing the tubes, but to be simply, or at any rate almost entirely, due to differences in the condition of the inner surfaces of the tubes. Thus, brass tubes, the inner surfaces of which were highly polished, and paper tubes, when coated inside with highly glazed paper, transmitted the detonation of the silver fulminate to about the same distance as the glass tubes; on the other hand, when the inner surfaces of the latter were slightly roughened by coating them with a film of fine powder, such as French chalk, they no longer transmitted detonation to anything like the distance which they did when the inner surfaces were in the normally smooth condition. Other very slight obstacles to the unimpeded passage of the gas wave through the tubes were found greatly to reduce the facility with which detonation could be transmitted by means of tubes; thus, when a diaphragm of thin bibulous paper was inserted into the glass tube about half-way between the two extremities, detonation was not transmitted, even with the employment of about six times the quantity of fulminate that gave the result with certainty under ordinary conditions; and similarly the transmission of detonation by increased charges of mercuric fulminate and of gun-cotton was prevented by the introduction into the tubes of light tufts of carded cotton wool just sufficient in quantity to shut out the light in looking through the tubes.

Among several other interesting results furnished by an examination into the conditions governing and results attending the transmission of detonation by tubes, a remarkable want of reciprocity was found to exist between mercuric fulminate and gun-cotton. The latter substance is more susceptible to the detonative power of mercuric fulminate than of any other substance, as will presently be further shown. The quantity of fulminate required to detonate gun-cotton is regulated by the degree to which the sharpness of its own detonation is increased by the amount of resistance to rupture offered by the envelope in which the fulminate is confined. From twenty to thirty grains are required if the detonative agent is confined in a thin case of wood, or in several wrappings of paper; but as small a quantity as two grains of the fulminate suffices to effect the detonation of compressed gun-cotton, provided the fulminate be confined in a case of stout metal (sheet tin) and be closely surrounded by being tightly imbedded in the mass of gun-cotton. If there be no close contact between the two, the quantity of fulminate must be very considerably increased to ensure the detonation of the gun-cotton, and, in attempting to transmit detonation from mercuric fulminate to gun-cotton by means of tubes, it was found necessary to employ comparatively very large quantities of fulminate in order to accomplish this, even through short lengths of tubes. But when the quantity of fulminate used reaches certain limits, the detonation may be transmitted from it to gun-cotton through very long lengths of tube. In applying gun-cotton, on the other hand, to accomplish the detonation of mercuric fulminate, it was found that this result could be attained, and through considerable lengths of tube (seven feet and upwards) by means of very much smaller quantities of gun-cotton than is needed of fulminate to induce the detonation of gun-cotton through the corresponding distances.

This want of reciprocity between two detonating agents corresponds to one even more remarkable, which was observed by the lecturer in his earlier investigations on this subject. In the first place, it was found that the detonation of a quarter of an ounce of gun-cotton (the smallest quantity that can be thus applied) induced the simultaneous detonation of nitro-glycerine, enclosed in a vessel of sheet tin and placed at a distance of one inch from the gun-cotton; while with half an ounce of the latter, the same effect was produced with an intervening space of three inches between the two substances. But on attempting to apply nitro-glycerine to the detonation of gun-cotton, the quantity of the former, which was detonated in *close contact* with compressed gun-cotton, was gradually increased in the first instance to three-quarters of an ounce and subsequently even to two ounces without accomplishing the detonation of the latter, which was simply dispersed in a fine state of division, in all instances but one in a large number of experiments.

The force developed by the detonation of nitro-glycerine was found, by careful comparison of the relative destructive effects of corresponding quantities, to be decidedly greater than that of the fulminate, of which from two to five grains suffice for developing the detonation of gun-cotton, when it is in close contact with them. The non-susceptibility of gun-cotton to detonation by nitro-glycerine is therefore, it need scarcely be said, not ascribable to any deficiency in mechanical force suddenly applied when the nitro-glycerine is detonated.

(*To be continued.*)

SPERGULIN, A NEW FLUORESCENT BODY.*

BY C. O. HARZ.

Spergulin occurs in the seed coverings of *Spergula vulgaris* and *S. maxima.* It is produced at the time when the seeds blacken and are nearly ripe. Spergulin is very soluble in absolute and aqueous alcohol. Viewed by transmitted light the solution appears nearly colourless, with a shade of olive-green; by reflected light it exhibits an intense dark-blue fluorescence. Spergulin has not been obtained in the form of crystals. It is very soluble in methylic alcohol, less soluble in amylic alcohol, and scarcely soluble in petroleum or in ether. Concentrated sulphuric acid dissolves it, forming a dark-blue liquid. The fluorescence of an alcoholic solution of spergulin is maintained for more than a year if the liquid be kept in darkness; fluorescence is rapidly destroyed by the action of direct sunlight, and more slowly by that of diffused light.

Small quantities of caustic alkalies, or alkaline carbonates added to an alcoholic solution of spergulin, transform it into an emerald-green fluorescent body; basic lead acetate produces a precipitate in an alcoholic solution of spergulin. The new compound contains 61·85 per cent. of carbon, 7·05 of hydrogen, and 31·80 of oxygen, which agrees tolerably with the formula $C_5H_7O_2$. It appears to be related to chlorophyll, and is probably closely allied with phyllocyanin.

An alcoholic (1 : 8) solution of spergulin showed strong absorption, almost entirely in the violet; in this respect it differs considerably from chlorophyll, phyllocyanin, and phylloxanthin. The author is inclined to regard spergulin as a feeble acid, the acid salts of which, as well as the acid itself, exhibit blue fluorescence, the neutral salts exhibit green fluorescence, and the basic salts are without fluorescent properties.

* From the *Journal of the Chemical Society*, June, 1879. *Chem. Centr.*, 1879, 24–30.

"MERCURIALINE" (METHYLAMINE).*

BY E. SCHMIDT.

E. Reichardt has described (*Jour. f. prakt. Chem.*, 104, 301) a volatile alkaloid "mercurialine," which he obtained from *Mercurialis annua* and *Mercurialis perennis*, as having the same composition as methylamine, but differing from it in being an oily colourless liquid at the ordinary temperature, and in forming an oxalate and sulphate whose crystallizing characters were not in accordance with those given by Wurtz for the corresponding salts of methylamine.

The author has separated a large quantity of the alkaloid which exists in *Mercurialis annua*, and has compared it with pure methylamine prepared from caffeine. The results prove that the two alkaloids and their corresponding salts are in every respect identical, and that Reichardt's "mercurialine" is none other than an aqueous solution of methylamine. It was also found that the oxalate and sulphate of methylamine do not behave in the manner stated by Wurtz (*Annalen*, 76, 324), but that they are readily crystallizable from water; in fact, agreeing with the results obtained by Reichardt with the oxalate and sulphate of "mercurialine."

Trimethylamine in small quantity was also obtained from *Mercurialis annua*, and its presence there, together with a considerable quantity of the primary base induces the supposition that dimethylamine may also be present. In many plants which the author has examined, he has found a small quantity of trimethylamine accompanying ammonium salts, but has met with no species of plants other than those above mentioned, which contain methylamine, although no doubt methylamine is not confined to them.

THE PREPARATION OF ETHYL BROMIDE.†

BY WM. H. GREENE, M.D.

As bromide of ethyl has recently attracted some notice as an apparently safe and agreeable anæsthetic, having all of the advantages of chloroform without producing the nauseating effects which render ether unpleasant, an easy process for its preparation may be acceptable to pharmacists.

Most cheaply prepared by the action of bromine on alcohol in presence of amorphous phosphorus (Personne), ethyl bromide so made possesses a slightly garlicky odour, almost impossible to get rid of; this is possibly due to a trace of ethylphosphine or a phosphinic ether, but however this may be, the product has been objected to on account of the odour.

* (*Liebig's Annalen*, 193, 73—86). From the *Journal of the Chemical Society*, January, 1879.

† From the *American Journal of Pharmacy*, June, 1879

The process recommended by de Vrij, the action of a mixture of strong sulphuric acid and alcohol on potassium bromide, yields a product contaminated with ordinary ether, and as ethyl bromide and ether boil at 40° and 35° respectively, the ether cannot be removed. This contamination is avoided if the sulphuric acid be dilute, and the following process gives satisfactory results in the preparation not only of ethyl bromide but of other alcoholic bromides.

Twelve parts of coarsely powdered potassium bromide and eleven parts of sulphuric acid, diluted with its volume of water, are heated in a retort or flask fitted to a condenser; as soon as hydrobromic acid begins to be disengaged, twelve parts of alcohol are allowed to flow in slowly, as in the preparation of ether. Ethyl bromide distills over with a small quantity of water and some alcohol. The distillate is agitated with water to remove alcohol, the ethyl bromide separated and dried by potassium carbonate, which at the same time neutralizes any free acid. It needs no further purification. About eight parts of ethyl bromide should be obtained. It should be kept in the dark like all other ethereal compounds containing chlorine, iodine or bromine.

A BRIEF REPORT OF THE ACTION THAT HAS BEEN TAKEN IN ROCHDALE, WITH A VIEW TO SEPARATE THE DISPENSING OF MEDICINES FROM MEDICAL PRACTICE.

Last February the Rochdale Chemists' Association appointed a committee to take such steps as might be deemed desirable with a view to an arrangement for the dispensing of medicines to be done by the chemist instead of by the medical man, as at present.

The first thing that was done was to make somewhat extensive inquiries in different parts of the kingdom as to the practice now in use, and as to the effect, so far as the interests of the medical man and the public are concerned. A brief report of the result of these inquiries appeared in the *Pharmaceucical Journal* for May 3, 1879.

After this, the whole of the medical men of the town were invited to meet the committee, on Tuesday evening, May 20, when eleven responded by their presence, being a majority of the medical men of the town. The result was that certain questions were raised by the medical men, and as they involved the chief objections to the plan, it was thought better to give some time for the consideration of these objections, and accordingly the meeting was adjourned to give the committee an opportunity of obtaining further information, and preparing answers to the questions raised.

As a result of further inquiries, valuable information was obtained from Scotland (Edinburgh and Aberdeen, where the practice of dispensing by chemists is almost universal), and after this another meeting with the medical men was arranged, when the following document was submitted:—

Medical Question I.—It is argued by medical men, that if patients are not supplied by them with medicine, they will have to charge a reduced fee, the loss of which will not be covered by the saving in drugs and charges connected with dispensing.

Chemists' Reply.—Taking the figures as given in a typical case put forward by the medical men, in which 7000 visits are supposed to be made annually, if the fee be reduced 6*d.* per visit we have 7000 sixpences £175

But the reduction of the fee would not be made to all the patients, probably 25 per cent. would continue to pay the same fee as before. This estimate would reduce the loss by about . . £44

Added to this the saving in the cost of drugs, estimated at £93

— £137

Probable pecuniary loss where no dispenser is employed £38

This loss would be more than covered by one extra visit per day in each week of six days, or one visit more per day throughout the year would more than cover the loss and pay for the few drugs which would be kept for emergencies.

Question II.—How could medicines be obtained by the public at night, on Sundays and holidays, when shops were closed?

Answer.—Some chemists would have a provision for all contingencies.

Question III.—How would the poor and the very poor pay for their medicines?

Answer.—A standard price being adopted for general use, exceptions would be made as follow:—The prescription might be marked with the letter P (poor) by the medical man, if he thought any case deserving of such a distinction, when the chemist would charge one half or one-third the ordinary sum, and when the patient was very poor, the mark might be V P, when no charge would be made for the medicine then supplied; but this would be followed by the chemist giving a recommendation to the dispensary, or he would refer the case to the charity organization association (if formed), or an arrangement might be made with the guardians to pay one-half or one-third the standard charge; for those in receipt of parochial relief. The chemist would give credit on the recommendation of the prescriber, which might be expressed on the prescription by the letter C, or the chemist would do so on his own responsibility; but when credit had to be given the fully reduced charge could not be made.

Question IV.—What guarantee would the doctor have that the prescription would not be repeated without further instructions from him?

Answer.—The honour of the dispenser, and the return of the prescription to the prescriber within twenty-four hours after being dispensed, except it was ordered to be repeated any given number of times, when it would be returned after being dispensed for the last time.

Question V.—What about counter prescribing?

Answer.—Ever since the incorporation of the Pharmaceutical Society, chemists generally have discouraged prescribing in the hope that they would ultimately have the duty of dispensing the prescriptions of medical men. Where this practice prevails, there is no prescribing done by the chemists, except for such simple ailments as the medical profession do not care to treat, or the public do not think of asking their advice about. The result may be thus briefly summed up. The more dispensing by chemists the less prescribing, the less dispensing the more prescribing.

Question VI.—Could prescribers rely on prescriptions being accurately dispensed with good drugs?

Answer.—The medical profession need be under no anxiety on this point. There are plenty of properly qualified chemists whose honour is a sufficient guarantee that the intentions of the prescriber will be strictly carried out, both as regards accuracy of compounding and purity of drugs. Physicians at present depend almost entirely on chemists to carry out their instructions, which we believe is done quite to their satisfaction, as well as that of their patients.

After the reading of the above, there appeared to be a dead stand at the first difficulty, viz., that of pecuniary loss to the prescriber. But little difficulty, however, seemed to be felt with regard to the other points. Hereupon the conference terminated without securing the result aimed at at present. But the feeling that remained was that one or more of the medical men would cease to dispense for their patients at no distant date. It is hoped that when once a beginning has been made, others may find it to their advantage to follow the example. The committee cannot close their report without expressing their thanks to those gentlemen at a distance who so kindly answered their inquiries, in very many cases with lengthy explanations and valuable suggestions.

The Pharmaceutical Journal.

SATURDAY, JULY 12, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

DISPENSING BY PHARMACISTS AND MEDICAL PRACTITIONERS.

THOUGH the pharmacists of Great Britain would probably not approve, any more than medical practitioners, of being subjected to the very stringent regulations by which the practice of dispensing is made the especial business of continental pharmacists, there is unquestionably great room for improvement in regard to the way this work is now carried out. Lapse of time, which is a remedy for so many evils, must be looked to as one great source of mitigation for the confusion of pharmacy with medicine which has come to the medical practitioners and the pharmacists of to-day as an inheritance from the apothecaries of last century. But that alone would not suffice to bring about a change in the habits of either medical men or pharmacists, and therefore gratitude is due to any individuals or associations that strive by any means to show the desirability of effecting as far as possible a separation of the duties of the dispenser from those of the prescriber.

Some months ago the Chemists' Association of the town and district of Rochdale undertook to make some inquiries throughout the country, in order to ascertain what was the practice in various localities and thus to obtain a groundwork of information upon which to promote arrangements for dispensing to be done by chemists and druggists instead of by medical men as is so often the case at present. A series of questions addressed to the local secretaries of about eighty towns, situated in various parts of the country, had the effect of eliciting the information required as to whether the medical men in the several towns dispensed the medicines for their own patients; whether, in cases where that was not done, the prescriptions were free to be taken to any *bonâ fide* chemist and druggist to be dispensed, and further how, in cases where it was done, that practice affected the medical men on the one hand and the public on the other as regards fees.

Out of the eighty places from which information was sought there were seventy-two from which replies were received. Some of these merely answered the first question without giving any details as to the effects of the practice in force in the particular town, but others gave fuller information and only in one instance was disapproval of the procedure of the Rochdale Association expressed.

It was found that in twenty-eight towns having an average population of about forty to fifty thousand the doctors with some rare exceptions did all the dispensing, or if the dispensing was done by the chemist and druggist, it was done for the medical practitioner rather than for the patient.

In fourteen other towns containing some 1,400,000 inhabitants the practice of medical men dispensing for their patients was largely prevalent, but not universal.

In fifteen other towns, the aggregate population of which amounted to about one million and a half, the practice was more varied, but there were a large number of medical men who did not dispense medicine for their patients.

In fifteen other towns again, with a somewhat larger aggregate population, the practice of medical men dispensing their medicines was either entirely unknown or but very rare.

Among the towns included in the latter class were Liverpool, Birmingham, Edinburgh and several places of resort for invalids, such as Torquay, Cheltenham, etc. The places where dispensing was practised chiefly by the medical men were either situated in manufacturing districts, as Dudley, Wolverhampton, Stoke-upon-Trent, Bradford, etc., or were agricultural centres, such as Norwich, Taunton, Maidstone, Reading, Grantham, etc.

The testimony furnished by those who sent the replies was very generally in favour of medical men ceasing to dispense, as leaving them free from a task somewhat irksome and often interfering with their attendance upon patients. As regards fees it was stated that it made no difference except in the case of very poor patients. There seemed also to be good evidence that where the change had been made, it met with the approval of the public, and of the medical men as well as chemists and druggists, and that each was benefitted in that way which proved in practice to be the greatest boon to all concerned.

We have now received from the Secretary of the Rochdale Association a further report of the action that has been since taken in Rochdale with a view of separating the dispensing of medicines from medical practice. The committee entrusted with the matter invited the medical men in the town to a conference, the result of which was that certain questions were raised by the medical men involving the chief objections to the plan from their point of view. Further information was then obtained in special reference to these questions, and at a subsequent meeting between the committee and the medical men the whole subject was discussed.

The chief question and the difficulty which seems to stand most of all in the way of medical men giving up the supply of medicine themselves has reference to their professional fee, the idea being that they must charge a reduced fee and that the reduction would not be covered by the saving in drugs and expenses connected with dispensing. The answer given to this is that the loss resulting from reduction of fees would be more than covered by the fees received for a larger number of visits.

The other questions do not involve so much difficulty; thus, for instance, in the obtaining of medicine upon Sundays and at night there is little reason to fear chemists and druggists would not be able to satisfy all requirements. As to the security that good drugs and preparations would be supplied by chemists and druggists, it may fairly be taken for granted that, at the present day, medical men need not be under any apprehension. Apart from the influence exercised by the provisions of the Food and Drugs Act, the improved education of the pharmaceutical body may be trusted to as ensuring proper regard to this point and due consideration that the intention of the prescriber should be properly carried out both by the use of pure drugs and accuracy in compounding.

Another question of some importance has reference to the scale upon which the poorer class of patients would be charged for their medicines. It is suggested that to meet this difficulty a standard scale of charges for medicine should be adopted, and that exceptional reductions of charge should be made in accordance with the recommendation of the prescribers, to be made known by marking the prescriptions with the letters P. or V.P., in those cases where the medical man thought the patients entitled to this consideration on the grounds of being poor or very poor. A further provision for such cases is suggested, according to which an arrangement is to be made with the guardians of the poor to pay one half or some proportion of the dispenser's charge.

These suggestions are worthy of consideration by pharmacists generally as being calculated to pave the way towards a very considerable modification of the mode in which the dispensing of medicine is carried out, and as there is no branch of the chemist and druggist's business which is more in need of such a change for the better, we commend to the attention of our readers the work that has been done in this direction by the Rochdale Association. It is eminently desirable that the attempt thus made to provide for the transfer of dispensing to the hands of chemists and druggists should receive general and earnest support from every member of the body, and we are disposed to believe that by such means it may eventually be possible to secure a very much larger share of this business.

The feeling on the part of medical practitioners is in many instances very decidedly in favour of giving up the practice of dispensing, and we would urge upon every member of the trade the importance of taking all possible advantage of this disposition by offering facilities which will remove some of the difficulties attending such a change of procedure, and by giving every assurance to medical men that the dispensing of their prescriptions would be carried out in all respects so as to command the satisfaction of themselves and their patients.

STRANGE CASE OF ARSENICAL POISONING

Another extraordinary case of poisoning with arsenic is reported as having occurred at Huddersfield which recalls to mind the cases of poisoning resulting from the use of "violet powder" containing an admixture of arsenic. A woman who had been in the habit of taking prepared chalk to relieve heart-burn was attacked after taking a dose with sickness and pains, for which a medical man administered a sedative. Two days afterwards the woman died and a *post mortem* examination revealed appearances of arsenical poisoning. It was then found that she had been supplied with powdered "French chalk" by mistake, instead of prepared chalk, and that this "French chalk" contained as much as 40 per cent. of arsenic. It is stated that the French chalk had been supplied by a Manchester firm and the coroner requested the chief constable to communicate with the Manchester police on the subject.

CHEMICAL SOCIETY'S RESEARCH FUND.

According to the *Chemical News* the following grants have just been made from the Research Fund of the Chemical Society:—

£30 to Mr. W. Whiteley Williams, for experiments on an Improved Method of Organic Analysis.

£25 to Mr. M. M. Pattison Muir, of Caius College, Cambridge, for Determining the Physical Constants and Chemical Habitudes of certain Bismuth Compounds.

£15 to Mr. J. M. Thomson, for experiments on the Action of Isomorphous Bodies in Exciting the Crystallization of Supersaturated Solutions.

£50 to Dr. Wright, for continuing his Researches o Chemical Dynamics.

£25 to Mr. F. D. Brown, for continuing his Researches on the Theory of Fractional Distillation.

£30 to Mr. Bolas, for an Investigation of certain Chromium Compounds.

£20 to Mr. F. R. Japp, for an Investigation of the Action of Organo-zinc Compounds on Quinons.

£100 (the De la Rue donation) to Dr. H. E. Armstrong, for the Determination of certain Physical Properties, especially Refraction Indices, of Typical Chemical Compounds.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

The Annual Meeting of the above Association will be held on Thursday, the 17th inst., at 8.30 p.m. precisely, when the President, Professor Attfield, will take the chair, and the Annual Report of the Committee will be read.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

Wednesday, July 2, 1879.

Present—Charles R. C. Tichborne, LL.D., Ph.D., President; Dr. Collins, Messrs. Brunker, Goodwin, Hayes, Hodgson, Holmes, Oldham, Pring (Belfast).

The minutes of the meeting held on June 4 were read and signed.

The President announced the death of Mr. James Whitla, licentiate of Apothecaries' Hall, of Monaghan, a member of the Council; and stated that in accordance with clause 11 of the Pharmacy Act it was necessary to fill up the vacancy thus created within ten days after its notification to him.

Proposed by Mr. Pring, seconded by Dr. Collins, and resolved,

"That this Council have heard with extreme regret of the death of Mr. James Whitla, of Monaghan, and desires to offer to his widow and family their condolence and sympathy in their great affliction; and to express to them the Council's appreciation of the late Mr. Whitla's valuable services as a member of this Board."

Mr. Alexander E. Doran, member of the Society, of Goldsmith Terrace, Bray, Co. Wicklow, was proposed by Mr. E. M. Hodgson, and seconded by Mr. J. L. Holmes, for election to the vacant seat on the Council.

The President having put the motion, Mr. Doran was elected unanimously.

William Whitla, M.D., licentiate of Apothecaries' Hall, Dublin, of Victoria Place, Belfast, was registered as a pharmaceutical chemist.

He was also proposed by Mr. R. W. Pring, and seconded by Mr. E. M. Hodgson, as a candidate for membership.

Mr. James Wells, 52, Upper Sackville Street, Dublin, who was proposed by Mr. W. Hayes at the June meeting and seconded by the President, was now elected a member of the Society.

The above business, which did not admit of postponement, having been transacted, it was

Proposed by Mr. Holmes, seconded by Mr. Hayes, and resolved,

"That the Council do now adjourn, in respect to the memory of the late Mr. Whitla, of Monaghan, member of the Council."

The examination for the pharmaceutical chemists' license was held on the same day, but had not concluded when the Council rose. Five candidates presented themselves for the examination.

Provincial Transactions.

SUNDERLAND CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The general meeting of the Sunderland Chemists' Assistants and Apprentices' Association was held at the rooms, corner of William Street, on Monday evening last, the 7th inst. The President, Mr. R. H. Mushens, occupied the chair. The President gave a brief *résumé* of the past session, saying that he had been much pleased by the manner in which every department of the work had been carried out; that the success of the Association, which had just now closed its first session, had exceeded his highest expectations, which he ascribed to the great interest taken in it by every individual member, as shown by their regular attendance at the meetings, etc. He then stated how the Association had first originated, and how the attempt of the assistants and apprentices in this matter had been ably supported by the chemists, who had rendered very great service to it. The programme drawn up at the commencement of the session had been carried out almost in its entirety, several of the papers reflecting great credit upon their authors. A very fair library also had been raised for the use of the members, which, together with the splendid materia medica collection sent by Messrs. Wright, Layman and Umney and Messrs. Burgoyne, Burbidges, Cyriax and Farries, would be of great value to the Association. Besides these donations, Messrs. Clarke, Bleasdale, Bell and Tollington gave £3 3*s*., at the same time promising £2 2*s*. annually; Messrs. Hearon, Squire and Francis, £2 2*s*.; Messrs. Maw, Son and Thompson, £1 1*s*.; Messrs. Sanger and Son, 10*s*.; Messrs. Southall, Brothers and Barclay, one of their cabinets of materia medica; Attfield's 'Chemistry,' had also been received from Professor Attfield; several books from Mr. George S. V. Wills, and others from chemists in the town.

The President then tendered his hearty thanks to the members for their valuable assistance, and also for the harmony and goodwill which had characterized the past session, rendering his position as much a pleasure as a duty, and expressed a wish that this Association might prosper in the future as it had done in the past; that it might prove useful to every individual member in some way or other and become ultimately second to none in the kingdom.

The Secretary (Mr. R. Thompson) then read his report, in which he stated the number of honorary members was 26, of members 27, and that the average attendance had been 15.

The Treasurer (Mr. A. Harding) read the financial statement, showing the income for the session to be £17 19*s*. 3*d*., the expenditure £6 5*s*. 1*d*., leaving a balance of £11 14*s*. 2*d*.

The reports, as read, were unanimously adopted, and a hearty vote of thanks having been accorded to the officers and committee for their services, to the donors to the library and materia medica collection and to the authors of papers, the meeting proceeded to elect the officers for the ensuing session, with the following results:—President, Mr. A. Harding; Vice-Presidents, Messrs. Robert H. Mushens and R. Leithead; Secretary, Mr. R. Thompson; Treasurer, Mr. G. C. W. Wright; Librarian, Mr. J. Johnson; Committee, Messrs. W. Fowler, J. J. Browell, G. Proctor, J. W. Robinson, C. Rankin and A. H. Rhymer.

ABERDEEN SOCIETY OF CHEMISTS AND DRUGGISTS.

The members of this society held their annual dinner in the Huntley Arms Hotel, Aboyne, last week. Among those present were Mr. D. Reid, (in the chair), Dr. Moir, Baillie Sangster, Messrs Coutts, Cruickshank, Giles, Gordon, Gordon, jun., Presslie, Ritchie, Shepherd, Sinclair, Strachan and J. J. Petrie, Aboyne. After dinner the following toast-list was gone over. "The Queen and the Royal Family," and "The Aberdeen Society of Chemists and Druggists," by the Chairman; The Pharmaceutical Society," proposed by Mr. Presslie, and replied to by Baillie Sangster; "The Medical Profession," by Mr. Cruickshank, acknowledged by Dr. Moir; "The Town and Trade of Aberdeen," proposed by Mr. Strachan, responded to by Mr. Sinclair; "The Aberdeen School of Pharmacy," by Mr. D. Ritchie, replied to by Messrs. Strachan and Gordon; "The Ladies," by Mr. Gordon, jun., responded to by Mr. Giles; "Aboyne and District," by Mr. Shepherd, replied to by Mr. J. J. Petrie; and "The Chairman," by Baillie Sangster. The party returned to Aberdeen in the evening, having enjoyed themselves thoroughly.

Proceedings of Scientific Societies.

SOCIETY OF ARTS.

The History of Alizarin and Allied Colouring Matters, and their Production from Coal Tar.*

BY W. H. PERKIN, F.R.S.

(*Continued from page* 18).

The attention of Graebe, in conjunction with Liebermann, was then turned to alizarin, which they thought probably might belong to the quinone series; but it was important that they should first know to what hydrocarbon it was related. To obtain that information, alizarin prepared from madder was taken and heated with powdered zinc, according to Baeyer's method of reducing aromatic compounds, and in this manner they obtained a crystalline hydrocarbon, having the composition $C_{14}H_{10}$. This was shown to be anthracene, a hydrocarbon contained in coal tar. Reasoning from the information which they had thus obtained, they assumed alizarin to be a dioxyquinone acid of anthracene—

$C_{14}H_{10}$	$C_{14}H_8O_2$	$C_{14}H_6\binom{OH}{OH}O_2$
Anthracene.	Anthraquinone.	Alizarin.

But to prove this to be the case it was necessary to produce alizarin from anthracene.

This hydrocarbon was discovered by Dumas and Laurent in 1832. They obtained it from the product which comes over towards the end of the distillation of coal tar. They gave it the formula $C_{15}H_{12}$, and as this was one and a-half times the molecular weight of naphthalene they called it paranaphthalene. It was further examined by Laurent, who changed its name to anthracene. He also obtained from it a body which he called anthracenuse, by oxidizing it with nitric acid; to this he gave the formula $C_{15}H_8O_4$ and $C_{15}H_7O_5$.

In 1854-55, when studying under Dr. Hofmann, at his suggestion I took up the subject of anthracene for my first investigation. I prepared the hydrocarbon by distilling pitch. Dr. Hofmann afterwards kindly obtained for me, from Messrs. Bethel, several pounds of a product rich in anthracene. On oxidizing anthracene I obtained a product to which I assigned the formula $C_{14}H_{10}O_2$, and not doubting Laurent's formula for the hydrocarbon anthracene, believed this oxygenated product to be derived from it by loss of carbon and hydrogen. These results were not published, and I only mention them here because it was through the experiments I then made that I obtained much information, which afterwards proved to be of great value to me; and, moreover, the products I then made served for the experiments to which I shall have to refer presently.

In 1857, Fritsche examined a hydrocarbon from coal tar, to which he gave the formula $C_{14}H_{10}$, and showed that it had many properties in common with anthracene.

In 1862, Dr. Anderson published an account of his investigations on anthracene. He found it to possess the formula $C_{14}H_{10}$, and to be identical with Fritsche's hydrocarbon. Dr. Anderson also prepared the oxidation product, and found it to contain $C_{14}H_8O_2$. He called it oxanthracene; it is identical with Laurent's anthracenuse, and with the product I obtained.

Graebe and Liebermann at once recognized this as the quinone of anthracene. It, therefore, only remained for them to convert this into the quinone acid by replacing two atoms of hydrogen by hydroxyl, and thus settle the question as to whether alizarin be a quinonic acid of anthracene or not.

The process they adopted has long been used by chemists; it consists in first replacing the hydrogen of the compound with bromine or other halogen, and then treating the resulting body with sodic, potassic or other metallic hydrate, and according as one, two or more atoms of hydrogen have been replaced by bromine, so on its removal by the metal of the hydrate, a compound containing a corresponding number of atoms of hydrogen replaced by hydroxyl is obtained.

Acting upon this principle, Graebe and Liebermann heated anthraquinone in sealed tubes, with bromine, in the proper proportions, to obtain a dibromanthraquinone, $C_{14}H_6Br_2O_2$. And this substance, when fused with caustic potash, yielded alizarin in combination with the alkali, from which it was separated by means of an acid. They also proposed a second method for preparing dibromanthraquinone, viz., by oxidizing tetrabromanthracene—

$$C_{14}H_6Br_4 + O_2 = C_{14}H_6Br_2O_2 + Br_2.$$

The great importance of alizarin, as a dyeing agent, induced Graebe and Liebermann to patent their process, but it was of no commercial value. They had, however, solved the question of its relationship to anthracene and anthraquinone, and also established its formula—

$$C_{14}H_6\binom{OH}{OH}O_2$$

Strecker, in 1866, had given the correct formula for alizarin, but did not publish it in the ordinary way results of research are usually published, but adopted it in his 'Traité de Chimie Organique.' And it was not until he drew my attention to the fact, that I became aware of it. He also states that he instituted experiments in 1855, in conjunction with Staedel, to establish the relationship between alizarin and anthracene. Graebe and Liebermann appear to have had no knowledge of this.

On distilling purpurin, the other colouring matter of madder previously referred to, Graebe and Liebermann also obtained anthracene, and this confirmed the formula Strecker had assigned to this substance, viz., $C_{14}H_8O_5$.

Purpurin is anthraquinone, with three atoms of hydrogen replaced by hydroxyl.

$$C_{14}H_5\left\{\begin{matrix}OH\\OH\\OH\end{matrix}\right\}O_2$$

Graebe and Liebermann's process for the preparation of alizarin being found to be impracticable, it was desirable, if possible, to find a new method which would render their discovery of commercial value.

It has been known for a very long time that sulphuric acid acts upon many organic bodies, producing substances called sulpho-acids. In composition these represent the body acted upon *plus* sulphuric anhydride, the basicity of the product (if derived from a neutral body) increasing with the number of molecules of sulphuric anhydride used in its formation. These so-called sulpho-acids have been found, however, to be nothing more than acid sulphites; thus the acid produced by the combination of benzol with one molecule of sulphuric anhydride is an acid sulphite of phenyl, or phenyl-sulphurous acid:—

$$\underbrace{C_6H_6SO_3}_{\text{Sulphobenzolic acid.}} = \underbrace{C_6H_5SO_3H}_{\text{Phenylsulphurous acid.}}$$

And that obtained by combining naphthalin with two molecules of sulphuric anhydride is an acid disulphite:—

$$\underbrace{C_{10}H_8(SO_3)_2}_{\text{Disulphonaphthalic acid.}} = \underbrace{C_{10}H_6\left\{\begin{matrix}SO_3H\\SO_3H\end{matrix}\right.}_{\text{Naphthylene-sulphurous acid.}}$$

The experiments of Würtz and Kekulé, in 1867, confirmed this view of the constitution of these acids. They found that sulpho-benzolic acid, when heated with caustic potash, produced a phenate and sulphite, thus:—

$$\underbrace{C_6H_5SO_3H}_{\text{Sulpho-benzolic acid.}} + 3\,K\,HO =$$

$$\underbrace{C_6H_5OK}_{\text{Potassic phenate.}} + SO_3K_2 + 2\,OH_2$$

* From the *Journal of the Society of Arts.*

In the same year Dusart also found that disulphonaphthalic acid yielded in the same way a naphthylenate and a sulphite.

$$\underbrace{C_{10}H_6 \left\{ \begin{matrix} SO_3H \\ SO_3H \end{matrix} \right.}_{\text{Disulphonaphthalic acid.}} + 6\,KHO =$$

$$\underbrace{C_{10}H_6 \left\{ \begin{matrix} OK \\ OK \end{matrix} \right.}_{\text{Potassic naphthylenate}} + 2\,SO_3K_2 + 4\,OH_2$$

By the addition of an acid to the products of these reactions they obtained, first from benzol, by means of the sulpho acid, hydrate of phenyl, phenol of carbolic acid, and from naphthylene, the dihydrate of naphthylene.

$$\underbrace{C_6H_6}_{\text{Benzol.}} \qquad \underbrace{C_6H_5OH}_{\text{Hydrate of phenyl.}}$$

$$\underbrace{C_{10}H_8}_{\text{Naphthylene.}} \qquad \underbrace{C_{10}H_6 \left\{ \begin{matrix} OH \\ OH \end{matrix} \right.}_{\text{Dihydrate of naphthylene.}}$$

In this second example it will be seen that we have obtained a body standing to naphthylene as alizarin does to anthraquinone. In other words, two atoms of hydrogen have been replaced by two hydroxyls.

It therefore appeared probable to me that, if a disulpho acid of anthraquinone could be produced, alizarin might possibly be obtained by a similar process.

From my previous knowledge of the remarkable stability of anthraquinone, and that it might be dissolved in strong hot sulphuric acid, and would then crystallize out unchanged on cooling, it did not appear very probable that a sulpho acid could be formed; nevertheless, experiments were made, varying temperatures being employed, when eventually it was found that by heating a mixture of sulphuric acid and anthraquinone very strongly, combination actually took place, the mixture becoming perfectly soluble in water. After removing the excess of sulphuric acid from the new product it was mixed with caustic potash and heated to about 180° C.; it soon became coloured, and then black. When the reaction was considered complete, the black alkaline mass was dissolved in water, and formed a rich purple solution. On acidifying this it became yellow, from the separation of a copious precipitate, which, on examination, proved to be artificial alizarin. This product, when collected on a filter and thoroughly washed, was found to dye madder mordants with the greatest readiness.

The great obstacle to the preparation of alizarin, viz., the use of bromine, was thus removed, and, as the result has proved, a process had been obtained by which this colouring matter could be manufactured in quantity.

I may here mention that, while these experiments were in progress, Caro, Graebe, and Liebermann were investigating the same reaction in Germany.*

A short time after I had discovered this method of making artificial alizarin, I found an entirely new process, in which anthraquinone is not required at all.*

Anthracene forms with chlorine a beautifully crystalline body, called dichloranthracene, having the formula, $C_{14}H_8Cl_2$. This substance combines with Nordhausen sulphuric acid, forming a bright green solution, which consists of a sulpho acid of dichloranthracene. This compound undergoes a remarkable change when heated with sulphuric acid, hydrochloric acid and sulphurous anhydride being evolved, and a sulpho acid of anthraquinone formed. This process has proved to be of great value, as will be seen further on.

When artificial alizarin was first manufactured it was noticed that the colours produced by it differed, to some extent, from those produced with madder or alizarin. The red shades were more brilliant and more scarlet, and the purples bluer; the blacks were also more intense, and some persons went the length of saying that alizarin had not been produced artificially at all. This I refuted in a paper read before the Chemical Society in May, 1870,† when I showed that alizarin could be readily separated from the commercial product, and then possessed all the properties of natural alizarin, both as regards its dyeing power and in its other characteristics. As no doubt now exists on this point, I think I need not further discuss it.

In a foot note‡ in the paper just referred to I stated that "when purifying artificial alizarin by converting it into an alumina lake, I found that, upon digestion with carbonate of potash, this lake gave a red coloured solution, containing a colouring matter dyeing mordants very similarly to alizarin, with the difference that the reds were more scarlet, and the purples bluer or more slaty. I have not obtained this body in a perfectly pure state as yet, but it appears to be crystalline. It gives two faint black bands when examined in alkaline solution with the prism, but these may perhaps be due to the presence of traces of alizarin." Some time after this, I made a complete examination of this substance,§ and my analytical results showed it to have the same composition as natural purpurin, viz:—

$$C_{14}H_5 \left\{ \begin{matrix} OH \\ OH \\ OH \end{matrix} \right\} O_2$$

though it differs from it in properties, in fact, it is an isomeride of that substance. Being a derivative of anthracene, I therefore named it anthrapurpurin. Auerbach,|| in 1872, separated a colouring matter from artificial alizarin. He named it isopurpurin. It is, however, identical with anthrapurpurin. The name isopurpurin is now mostly used for this substance on the Continent.

The importance of anthrapurpurin as a colouring matter can scarcely be overrated. I believe I may truly say it is of as great importance as alizarin itself, and its existence in artificial alizarin has been the cause of its marvellously rapid success, as it gives a brilliancy to the reds which cannot be obtained with madder. Anthrapurpurin differs from alizarin in many particulars. When heated it is mostly decomposed, only a little subliming in orange-red vapours, and condensing as yellowish red leaves. If a mixture of anthrapurpurin and alizarin be sublimed, the

* Graebe and Liebermann, in a paper published in the *Moniteur Scientifique*, April, 1879, p. 399, state that "Caro was the first to observe that anthraquinone, when heated with sulphuric acid above 200°, formed sulphoconjugated acids, which, like the brominated compound, gave alizarin on fusion with potassium hydrate; soon afterwards, or almost at the same time, Perkin made the same observation." Again, at pp. 400—401, they state "The patent of Caro, Graebe, and Liebermann is dated a day before that of Perkin. If any particular importance is attached to dates, the advantages rests without dispute with Caro, for the filing of the patent of the German chemist was delayed through irregularity (*vice de forme*). The signatures had already been given in to the Patent Office, Berlin, on the 15th June." I may remark, in reference to the first statement, that Graebe and Liebermann neither give or adduce any evidence to substantiate their claim to priority. Their remark that I had soon afterwards, or almost at the same time, made the same observation, also goes to show that they have none. And in reference to the statement that their signatures had been given in to the Patent Office, Berlin, on the 15th June, I find that on May 20th I wrote to Mr. Robert Hogg, of Glasgow, enclosing patterns dyed with artificial alizarin, which I had prepared by fusing the sulphoconjugated acids of anthraquinone with potassium hydrate, and my patent might then have been secured, but was delayed. Therefore, their conclusions, from the argument as to dates, should be reversed.

* Patented November, 1869, No. 3318.

† *Journal of the Chemical Society*, 1870, p. 133.

‡ *Journal of the Chemical Society*, 1870, p. 143.

§ *Journal of the Chemical Society*, 1872, p. 659; 1873, p. 425.

|| *Moniteur Scientifique*, 1872, p. 686.

sublimate will consist almost entirely of alizarin, as this substance is not so easily decomposed by heat.

Anthrapurpurin dissolves in caustic alkalies with a more purple colour than alizarin. It also differs in its behaviour with alumina. A solution of anthrapurpurin in sodic carbonate, when mixed with freshly precipitated alumina, is not absorbed by it, whereas alizarin under the same conditions is perfectly absorbed. It crystallizes in orange yellow needles, from alcohol or glacial acetic acid.

By heating it with acetic anhydride I obtained a triacetyl derivative, and by using benzoyl chloride, a tribenzoyl one, thus showing it to contain three replaceable hydrogens. Its alkaline solutions give two faint absorption bands when viewed with the spectroscope, these bands being in the same region of the spectrum as those produced with alkaline solutions of alizarin. When oxidized with nitric acid it does not yield phthalic acid.

On heating anthrapurpurin with ammonia to a temperature of 160°—180°C., in a closed tube, I found it changed into an amidated compound, which has been named anthrapurpuramide. This substance does not dye mordants. Its solution in alcohol is of a clear dark orange-red colour. It dissolves in alkalies with a purple colour. Anthrapurpuramide is isomeric with amido alizarin. Its formula is—

$$C_{14}H_5 \left\{ \begin{array}{l} NH_2 \\ OH \\ OH \end{array} \right\} O_2$$

In my paper on anthrapurpurin it is mentioned that there is a colouring matter in artificial alizarin dyeing alumina mordants of an orange colour.* This was afterwards obtained in a crystalline condition, and was under investigation for some time, but the research was laid aside on account of more pressing subjects. This substance, however, proves to be flavopurpurin, a colouring matter lately described by Schunck and Roemer,† and obtained by them from anthraflavic acid. It has the formula—

$$C_{14}H_5 \left\{ \begin{array}{l} OH \\ OH \\ OH \end{array} \right\} O_2$$

and is therefore isomeric with anthrapurpurin.

The amount of it contained in artificial alizarin is not very large. It is much more freely soluble in alcohol than anthrapurpurin, and crystallizes from that solvent in orange coloured silky needles. Its alcoholic solution, when poured into water, forms a yellow precipitate; this, however, has a satiny aspect, owing to the crystalline character of the precipitate; it dissolves in caustic alkali with a purple colour, redder than that produced with anthrapurpurin, and in ammonia it forms a brownish red colour, anthrapurpurin forming a purple solution.

Flavopurpurin dyes mordants, but the colours on those of alumina are of an orange red colour, the pinks being somewhat of a salmon shade. The purples are more like those of alizarin, but very dull in comparison with them.

In artificial alizarin I believe there is yet another colouring matter not investigated, dyeing alumina mordants a still yellower shade than flavopurpurin. It is apparently present in very small quantities.

We now see that the product at first made and called "artificial alizarin," contained at least three colouring matters, viz., alizarin, anthrapurpurin, and flavopurpurin; as I think it will be convenient to retain this name at present, for simplicity sake, it will be understood that, when I use it, I do not refer to pure alizarin, but to commercial products known by that name.

Before proceeding to speak of some of the products found in artificial alizarin, I wish to draw attention to a soluble intermediate substance which is obtained in its preparation if the process of heating with caustic soda be not carried on sufficiently long. In this case, although the alkaline product dissolved with a strong violet colour, I noticed that, when acidified, no colouring matter, or

* *Journal of the Chemical Society*, 1873, p. 425.

† Deut. Chem. Ges. Ber., 1876, p. 679.

only a small quantity, was precipitated, a strong dark yellow solution being obtained. On isolating this body it was found to be crystalline, forming orange-coloured needles, easily soluble in water, but insoluble in ether. With alkalies it forms a blue violet-coloured solution; it does not dye mordants. When fused with caustic aklali it is converted into anthrapurpurin. From the mode of its formation and from its decomposition with alkalies I gave it the formula:—

$$C_{14}H_6 \left\{ \begin{array}{l} OH \\ SO_3H \end{array} \right\} O_2$$

and named it sulphoxanthraquinonic acid.* Some time afterwards Graebe and Liebermann† further investigated this compound and confirmed this formula. With the alkaline earths it forms two sets of salts—acid and neutral ones—the former being of a yellow colour; the latter violet. These probably could be used as pigments.

The artificial alizarin, as first made, contained not only three colouring matters, but also other products not possessing dyeing powers. These are of considerable interest, as will be seen further on. Amongst these are anthracene, anthraquinone, and hydroanthraquinone, products which are the result of a peculiar reverse action, or process of reduction, which takes place in the preparation of artificial alizarin during the operation of heating with caustic alkali. The first, viz., anthracene, was only formed in the early experiments, and resulted from overheating. But the two other substances are always obtained if caustic alkalies alone are used. Of anthraquinone I have already spoken, but I have not referred to the action of reducing agents upon it. If anthraquinone be mixed with a solution of caustic potash and zinc dust, the liquid quickly becomes red, especially if heated, the anthraquinone dissolving. This liquid may be filtered; but as the oxygen of the air quickly acts upon it, films of anthraquinone are formed; if the air be excluded, a clear red-coloured fluid is obtained, and on the addition of an acid, a yellow precipitate is formed. This substance is hydroanthraquinone, produced from anthraquinone by its union with hydrogen. Its formation may be represented thus:—

$$\underbrace{C_{14}H_8O_2}_{\text{Anthraquinone.}} + H_2 = \underbrace{C_{14}H_{10}O_2}_{\text{Hydroanthraquinone}}$$

The other bodies I have to speak of are not due to any reverse chemical action, but are the products of direct changes, and were regarded as secondary products.

On boiling up artificial alizarin with dilute caustic soda, and adding milk of lime, it was found that the colouring matter was precipitated, leaving a yellow or orange coloured solution. On filtering this off, and adding an acid to the filtrate, a pale yellow precipitate was obtained. A quantity of this was prepared, washed and dried, and from some of it Dr. Schunck‡ succeeded in isolating a beautiful yellow crystalline product. This he called anthraflavic acid, and assigned to it the formula, $C_{15}H_{10}O_4$. Not being satisfied with this formula, I afterwards submitted it to investigation,§ and showed it to have the composition $C_{14}H_8O_4$, which has since been confirmed by others. This formula is the same as that of alizarin, and therefore, anthraflavic acid is an isomeride of that substance. It is prepared from its barium salt, which is somewhat difficultly soluble in water.

Anthraflavic acid is a beautiful substance, crystallizing in bright yellow silky needles, and, when heated, gives a sublimate of golden yellow crystals in the form of leaves or plates, a certain amount being, at the same time, carbonized. It does not dye mordants. It combines with alkalies, forming compounds dissolving in water with an orange red colour. The barium salt, already referred to, crystallizes in needles of a brownish red

* *Journal of the Chemical Society*, 1870, p. 139.

† 'Jahresbericht,' 1871, p. 685.

‡ 'Proc. Lit. and Phil. Soc.,' Manchester, vol. x., p. 133.

§ *Journal of the Chemical Society*, 1871, p. 1109.

colour, and its cold aqueous solution is somewhat similar in appearance to that of potassic bichromate.

Dr. Schunck found that anthraflavic acid when fused with caustic potash was converted into a colouring matter, which he thought to be alizarin. I also believed this to be the case until some time afterwards, when I prepared a sufficient quantity of the colouring matter to dye a pattern with. I then found it produced orange red colours with alumina mordants.*

Schunck and Roemer† have since investigated this reaction, and found that the colouring matter is an isomer of anthrapurpurin; in fact, it is flavopurpurin, which has already been described. Its formation may be expressed thus—

$$\underbrace{C_{14}H_8O_4}_{\text{Anthraflavic acid.}} + 3\,OKH = \underbrace{C_{14}H_5K_3O_5}_{\text{Potassic flavopurpurate.}} + H_2 + 2\,OH_2$$

To effect this change in small experiments, a temperature over 200° C. is necessary.

Dr. Schunck and H. Roemer‡ have published an account of another substance which accompanies anthraflavic acid. They have named it isoanthraflavic acid. I had also succeeded in obtaining this substance, and also in preparing it without the formation of colouring matter, except in small quantities.§ To this I shall refer presently.

Isoanthraflavic acid crystallizes from glacial acetic acid, in which it is difficultly soluble, in yellow needles. These lose their lustre on being dried at 100° C. When strongly heated it sublimes in leaves of a golden or orange colour. This substance has the formula—

$$C_{14}H_6 \left\{ \begin{matrix} OH \\ OH \end{matrix} \right\} O_2$$

and is, therefore, another isomer of alizarin. It differs from anthraflavic acid, in forming a barium derivative, which is easily soluble in cold water with a dark red colour. Heated with acetic anhydride it forms a pale yellow crystalline body, having the formula—

$$\underbrace{C_{14}H_6 \left\{ \begin{matrix} OC_2H_3O \\ OC_2H_3O \end{matrix} \right\} O_2}_{\text{Diacetoisoanthraflavic acid.}}$$

When heated to about 180° C. with caustic potash it undergoes a very interesting change. The mixture gives a black-looking product, which dissolves in water with a beautiful purple colour. On acidifying this with an acid a yellow precipitate is formed, which is found to consist of anthrapurpurin. This change is similar to that which takes place when anthraflavic acid is treated with caustic alkalies, but occurs at a much lower temperature. This reaction is as follows:—

$$\underbrace{C_{14}H_8O_4}_{\text{Isoanthraflavic acid.}} + 3\,OKH = \underbrace{C_{14}H_5K_3O_5}_{\text{Potassic Anthrapurpurate.}} + H_2 + 2\,OH_2$$

Isoanthraflavic acid does not dye mordants.

Another substance was found in artificial alizarin, as a bye-product, by Caro and Glaser. It was first examined in 1871 by Liebermann,‖ who found it to have the formula:—

$$C_{14}H_7\,(OH)\,O_2$$

and named it monoxanthraquinone. It crystallizes from alcohol in fine yellow needles. It does not dye mordants.

Monoxanthraquinone, when fused with alkalies, also undergoes an interesting change. It becomes a nearly black mass, which dissolves in water with a blue-violet colour, and this solution, on being acidified, gives a yellow precipitate, which is nothing but pure alizarin.

$$\underbrace{C_{14}H_7\,(OH)\,O_2}_{\text{Monoxanthraquinone.}} + 2\,OKH =$$

$$\underbrace{C_{14}H_6 \left\{ \begin{matrix} OK \\ OK \end{matrix} \right\} O_2}_{\text{Potassic Alizarate.}} + H_2 + OH_2$$

Now, how can the presence of monoxanthraquinone, anthraflavic, and isoanthraflavic acid in artificial alizarin be accounted for? When sulphuric acid acts upon anthraquinone, two kinds of sulpho acids are formed, namely, a mono and a di.

$$\underbrace{C_{14}H_7\,(SO_3H)\,O_2}_{\text{Monosulphanthraquinonic acid.}} \qquad \underbrace{C_{14}H_6 \left\{ \begin{matrix} SO_3H \\ SO_3H \end{matrix} \right\} O_2}_{\text{Disulphanthraquinonic acid.}}$$

After the manufacture of alizarin had been commenced, Graebe and Liebermann published an account of these bodies.*

They found that monosulphanthraquinonic acid, when heated carefully with alkali, yields monoxanthraquinone.

$$C_{14}H_7\,(SO_3H)\,O_2 + 3\,OKH =$$

$$\underbrace{C_{14}H_7\,(OK)\,O_2}_{\text{Potassic monoxanthraquinonate.}} + SO_3K_2 + 2\,OH_2$$

And this, when further heated, yielded alizarin as previously stated. The disulpho acid, when heated with alkali, they said, formed alizarin.

$$C_{14}H_6 \left\{ \begin{matrix} SO_3H \\ SO_3H \end{matrix} \right\} O_2 + 6KHO =$$

$$C_{14}H_6 \left\{ \begin{matrix} OK \\ OK \end{matrix} \right\} O_2 + 2SO_3K_2 + 4\,OH_2$$

This, as we shall see presently, was a mistake, probably from the fact that the need of a disulpho acid for the preparation of alizarin had never been doubted, the process being supposed to be analogous to that originally described with dibromanthraquinone.

But it was gradually found, when manufacturing artificial alizarin on the large scale, that the smaller the amount of sulphuric acid used to convert the anthraquinone into sulpho acids, the temperature being also kept as low as practicable, that the colouring matter made from such a product yielded with mordants shades of colour more nearly approaching those produced with madder, until eventually the unexpected result was arrived at, that it was necessary to have a monosulpho acid of anthraquinone for the preparation of pure alizarin, and that the disulpho acid does not yield this substance at all, so that, in the preparation of pure alizarin, the following reactions take place, monosulphanthraquinonic acid is first decomposed into monoxanthraquinone; and this, when further heated with alkali, is oxidized into alizarin.

We thus see that this formation of alizarin differs entirely from that originally discovered by Graebe and Liebermann, both as regards the chemicals employed and the chemical changes which take place. We also see that monoxanthraquinone is an intermediate product and not a secondary one.

Disulphanthraquinonic acid, although it does not yield alizarin when heated with alkalies, yields anthrapurpurin. But how is this to be accounted for? It has been shown that the first action of caustic alkali on this acid results in the formation of sulphoxanthraquinonic acid:—

$$C_{14}H_6 \left\{ \begin{matrix} OH \\ SO_3H \end{matrix} \right\} O_2$$

This, when further treated with the same reagent, changes into anthrapurpurin:—

$$C_{14}H_5 \left\{ \begin{matrix} OH \\ OH \\ OH \end{matrix} \right\} O_2$$

* *Journal of the Chemical Society*, 1873, p. 20.
† Deut. Chem. Ges. Ber., 1876, p. 679.
‡ Deut. Chem. Ges. Ber., 1875, p. 1628, and 1876, p. 379.
§ *Journal of the Chemical Society*, 1876, i, 851.
‖ Deut. Chem. Ges. Ber., 1871, p. 108.

* 'Jahresbericht,' 1871, 683-684.

When I became fully acquainted with this fact, I was under the impression that an intermediate body must be formed, standing to anthrapurpurin as monoxanthraquinone does to alizarin, and formed simply by the replacement of the SO_3H group in sulphoxanthraquinonic acid by HO.

Such a substance was found in artificial alizarin, and I have already described it; it is isoanthraflavic acid. In proof of its being always formed previously to anthrapurpurin, I succeeded in obtaining it directly by heating a salt of disulphanthraquinonic acid with a dilute solution of caustic potash. I employed a 5 per cent. solution of this alkali, and only little more than a sufficient amount to effect the decomposition indicated by theory, thus:—

$$\underbrace{C_{14}H_6\left\{\begin{matrix}SO_3H\\SO_3H\end{matrix}\right\}O_2}_{\text{Disulphanthraquinonic acid.}}+6OKH=$$

$$\underbrace{C_{14}H_6\left\{\begin{matrix}OK\\OK\end{matrix}\right\}O_2}_{\text{Potassic Isoanthraflavate.}}+2SO_3K_2+4OH_2$$

The mixture was heated in a closed iron vessel to 180°–190° C. for six or seven hours. In this manner scarcely any anthrapurpurin was formed, and the alkaline solution, when acidified, gave a precipitate consisting chiefly of isoanthraflavic acid. So that in the formation of anthrapurpurin from disulphoanthraquinonic acid we get the following changes:—First, the formation of sulphoxanthraquinonic acid; second, the formation of isoanthraflavic acid; third, the formation of anthrapurpurin; and we see that isoanthraflavic acid is also an intermediate product in the formation of anthrapurpurin, and not a secondary one. The formation of anthraflavic acid has now to be accounted for. When sulphuric acid acts upon anthraquinone, it is found to form two isomeric disulpho acids, one forming an easily soluble sodium salt, the other a less soluble one. The former is known as the β sodic disulphanthraquinonate, the latter as the α. This less soluble, or α salt, when treated with alkalies, undergoes analogous changes to the β salt, but, instead of forming isoanthraflavic acid, yields anthraflavic acid, and this, as previously stated, when heated strongly with alkalies yields flavopurpurin. Anthraflavic acid is, therefore, an intermediate body and not a secondary one.

We see, then, how these various bodies are formed, and as they are proved to be intermediate products, their presence shows imperfection in the process of manufacturing, because, if perfect, these substances should not have been left, but have been converted into colouring matter. There are two other substances whose presence has not as yet been accounted for, and these are anthraquinone and hydroanthraquinone.

Monoxanthraquinone, isoanthraflavic acid, and anthraflavic acid, when being converted into colouring matter by treating with caustic alkali, cause nascent hydrogen to be liberated, as we have seen. This, acting upon other portions of these same substances, reduces them thus:—

$$\underbrace{C_{14}H_8O_3}_{\text{Oxanthraquinone.}}+H_2=C_{14}H_8O_2+OH_2$$

$$\underbrace{C_{14}H_8O_4}_{\text{Isoanthraflavic and anthraflavic acid.}}+H_4=C_{14}H_8O_2+2OH_2$$

And part of the anthraquinone thus formed also unites with hydrogen, forming hydroanthraquinone.

The presence of these two substances, then, represents a certain amount of reverse action, and, consequently, loss to the manufacturer. Fortunately, means have been found of almost entirely preventing their formation, and also of ensuring the intermediate products being converted into colouring matter. I shall have to speak of this further on.

(*To be continued.*)

Parliamentary and Law Proceedings.

The Prosecution under the Apothecaries Act at Birmingham.

Mr. Motteram, Q.C., judge of the Birmingham County Court, gave judgment on Friday, the 4th inst., in the case of the Apothecaries' Company of the city of London against James Harrison, chemist, Stafford Street, Birmingham. The action, which has been several times before the Court, was brought to recover £20 damages, by way of penalty, under 55 Geo. III., cap. 194, sec. 20, against the defendant for prescribing medicine to one Julia Caddick, who was suffering from weakness subsequent to confinement, in November, 1876. The case had been postponed pending the decision of a higher Court in what is known as "Shepperley's case," of Nottingham. The plaintiffs contended that in prescribing medicine for the woman Caddick the defendant infringed the rights of an apothecary. The defendant took refuge under a proviso of the 28th section of the same Act, and counsel on his behalf contended that he had a right to prescribe medicine in a case like that under the notice of the Court. In giving judgment, Mr. Motteram said that if the language of the 28th section were carefully considered, he was afraid it would be found not to have the effect contended for on the part of the defendant. He found from the evidence that the defendant had clearly and unmistakably acted as an apothecary, and the proviso relied upon afforded, in his opinion, no defence in such a case as that. The verdict, therefore, would be for the plaintiffs for £20 damages and costs.—*Times.*

Obituary.

Notice has been received of the death of the following:—

On the 24th of May, 1879, at Newark, Mr. John Hanson Gibson. Aged 21 years. Mr. Gibson was a Registered Apprentice of the Society.

On the 12th of June, 1879, Mr. James Briggs, Pharmaceutical Chemist, Tipton. Aged 64 years. Mr. Briggs had been a Member of the Pharmaceutical Society since 1842.

On the 28th of June, 1879, Mr. William Henry Moon, Pharmaceutical Chemist, High Street, Ilfracombe. Aged 43 years. Mr. Moon had been a Member of the Pharmaceutical Society since 1863.

On the 1st of July, 1879, Mr. Stephen Cox, Chemist and Druggist, Fore Street, Hatfield. Aged 75 years.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

Replies.

[315]. Sal Ammoniæ.
Spt. Nitre.
Sp. Wine.
Opodeldoc.

In this recipe "sal ammoniæ" means liq. ammon., B.P., and if "A Norfolk Man" tries it he will get a clear solution.

In many districts liq. ammon. is well-known by the name of sal ammoniæ or spirit of sal ammoniæ (just as liq. vol. c.c. is called Hartshorn), and recipes similar to the one in question are so commonly met with that I am surprised there should be any doubt or difficulty in the matter.

Manchester. W. WILKINSON.

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[319]. I think W. took an entirely mistaken view of the prescription in question. In my opinion, he should simply have triturated the litharge and olive oil in a mortar till a liniment was formed. The late Professor Hamilton, professor of midwifery in Edinburgh, used to prescribe the following as a nipple liniment :—

℞ Plumb. Oxy. Sem. Vit.
Acetum . . . . āā ʒij.
Ol. Olivæ . . . . ʒvj.

Rub together till a flesh colour is obtained.

H. C. B.

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[322]. What is meant by W. B. in regard to the puzzle to solve, in the admixture of tr. lyttæ, acid. sulph. dil., tr. lavand. co. and vaseline or lard ?

I have made a very nice ointment, almost similar in appearance to pink shaving cream, with the proportions given. I find no difficulty; but I was rather interested in the prescription, owing to the addition of tr. lavand. co., as I have employed a somewhat similar ointment for ringworm. In regard to the compatibility or incompatibility I have nothing to say. It is sometimes very useful as an application.

Northallerton. HENRY BROWN.

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[323]. The gtt. 2 after sod. siccat. was evidently a slip of the pen ; grs. 2 was clearly meant.

Northallerton. HENRY BROWN.

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[324]. The prescription of "Gulielmus" is one of those which a pharmacist is often at a loss to understand, and if he be thoroughly orthodox and will adhere to the exact written order of a physician or surgeon, it certainly is sufficient to raise not only discussion but much doubt as to what is meant by morphia when ordered in the proportion of eight grains to half an ounce of a mixture of chloroform and liniment of belladonna.

I observe "Gulielmus" adds after morphia "the alkaloid," so as to italicise, as it were. Now morphia is very sparingly soluble in chloroform ; so also are the acetate and hydrochlorate. Cold alcohol dissolves one in fifty of morphia, the hydrochlorate is soluble in about sixty parts of cold alcohol, the acetate in a little less, and the sulphate in still less.

I have often used the liniment, although not in exactly the same proportions as given by "Gulielmus," in painful neuralgias of the face. The practical point is, How can a complete solution be obtained ? I am sure in "The Month" this question will occupy, as it deserves, some consideration.

As an old compounder, I saw at once the difficulty. The fact was that the person who first dispensed the prescription fully understood the insolubility of morphia in the menstruum ordered. Was a departure of only a slight degree justifiable, so as to have morphia in perfect solution, although that must necessarily be a salt of morphia, under the circumstances ? I at once say it was. In my opinion the medical man intended perfect solution. How, then, is a perfect solution to be obtained ? It cannot be obtained by using hydrochlorate or acetate of morphia. Sulphate, if well prepared, will dissolve, but the easiest mode is to add a small quantity of dilute sulphuric acid, and all trouble vanishes, to either morphia, or hydrochlorate or acetate.

Some one may say this is unjustifiable meddling with a prescription. I say no. The intention is to have morphia in solution, and if the prescriber is unaware of the insolubility of such a large quantity in a given quantity of menstruum, but yet intends a strong solution, surely it is the business of the pharmacist to carry out his intention.

I look upon this question as one of the most important and interesting that has yet been asked. Not one medical man in a hundred, and not one pharmacist in fifty, has any idea of such exact proportions as given by "Gulielmus."

Northallerton. HENRY BROWN.

Queries.

[326]. I shall be glad if any reader can inform me if the following prescription can be dispensed so as to form a mixture of a presentable appearance :—

℞ Tinct. Gelsemin. Semper. . . . . ʒiv.
Ferri et Quiniæ Cit. . . . . ʒiss.
Croton Chloral Hydrat. . . . . ʒj.
Potass. Bromidi . . . . ʒiv.
Potass. Iodid. . . . . ʒss.
Aquæ Chloroformi . . . . . ad ℥viii.
M. Sign. ℥ss 4tis horis ex aqua.

SUB UMBRA FLORESCO.

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[327]. What is the best method of dispensing the following to obtain a presentable mixture :—

℞ Sodæ Salicylat. . . . . ℈iv.
Croton Chloral . . . . ℈iv.
Quiniæ Sulphat. . . . . ℈j
Aq. . . . . ad ℥viii.
M. Ft. mist. ℥j ter in die sd.

J. H.

---

[328].

℞ Ammon. Bromid. . . . . ʒiv.
Tinct. Hyoscyami,
Tinct. Humuli . . . . āā ʒiv.
Aquæ . . . . ad ℥viij.
M. Ft. mist.

Can any of your readers inform me how the above may be dispensed so that the mixture should be of a clear bright sherry colour—not at all opaque ?

I had the prescription brought by a customer, who assured me it was made up in one of the well known leading city establishments, and it was sent out as thus described.

It was afterwards dispensed by respectable chemists in the country and by myself. All the mixtures obtained in the country corresponded with the one I mixed.

How is it that the London one was an exception, and how can the compound result in a clear bright mixture ?

C. B.

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[329]. Will you kindly inform me through the Journal how I can make a clear mixture of "dandelion and quinine," on mixing the tr. quiniæ with liq. tarax. ?

Luton. W. C. S.

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[330]. Will some of your readers kindly inform me how the enclosed prescriptions should be dispensed ?

No. 1.

℞ Quinæ Sulph. . . . . gr. xx.
Sodæ Salicylatis . . . . . . ʒiss.
Acidi Sulph. Dil. . . . . . . ʒj.
Aquæ Piment. . . . . . . ad ℥viij.

Misce et signe—A tablespoonful to be taken three times a day.

No. 2.

℞ Ferri Perchlor. . . . . ʒiss.
Acidi Hydrochlor. . . . . . gtt. viij.
Aquæ . . . . ad ℥vj.

Misce et signe—A tablespoonful to be taken three times a day.

J. S. NEMO.

Notes and Queries.

[609]. A good ruby colour for bottle lenses is formed by adding a solution of iodine made the same as lin. iodi, B.P. (omitting the camphor), to glycerine slightly diluted. It should be added gradually until the required shade is obtained. Stands well.

CORTEX.

[610]. FURNITURE CREAM.—The following is a good formula:—

Take of—

Yellow Wax	1 lb.
Yellow Soap	2 ozs.
Spirit of Turpentine	2 pints.
Boiling Water	2 „

Melt the wax and soap over a slow fire, add the turpentine, and lastly, stir in the water gently until it is quite cold.

SUB UMBRA FLORESCO.

[611]. MOORE'S OINTMENT. — It is doubtful whether "Unguentum" can obtain an authentic formula for Moore's ointment. Moore was a quack with a cart who treated bad legs, etc., *coram populo.* Leather Lane on Sunday morning was a favourite "pitch." He died a short time ago.

W. J. R.

[612]. SYRUP OF SCAMMONY.—Would some reader kindly oblige me with a good formula for preparing syrup. scammonii, dose ʒj, ad ʒij?

SUB UMBRA FLORESCO.

[613]. DANDELION COFFEE.—Could any reader oblige me with a good form for making dandelion coffee?

FERRI CIT

[614]. "PULV. SALINI EFFERVESC. APERIENTIS."—Information is required respecting the composition of the above, occurring in a prescription signed J. P.

F. C.

[615]. DENTIFRICE WATER.—Could any one oblige me with a recipe for a good dentifrice water.

QUÆRO.

[616]. SILVER PLATING LIQUID.—Will some one kindly furnish me with a formula for a silver plating liquid suitable for coating steel?

VIATOR.

[617]. CHERRY TOOTH PASTE.—D. A. would be greatly obliged for a recipe for cherry tooth paste. He has tried several published in receipt books and journals, but cannot obtain either a good consistency or that bright transparent cherry colour which is so attractive in good tooth paste.

SULPHO-TARTRATE OF QUINIA.—Dr. Prengeber recommends for hypodermic use the following solutions:—

1.	Quinia Sulphate	2·00 gm. or 30 grs.
	Tartaric Acid	0·60 gm. or 9 grs.
	Distilled Water.	6·00 gm. or 100 min.

To be dissolved by gently heating.

2.	Quinia Sulphate	2·00 gm. or 30 grs.
	Morphia (alkaloid).	0·006 gm. or $\frac{1}{10}$ gr.
	Tartaric Acid	0·65 gm. or 10 grs.
	Cherry-laurel Water	6·00 gm. or 100 min.

Both of these injections are very rarely followed by abscess.—*Rép. de Pharm.*, 1879, 99.

CINNABAR-PLASTER. — Dr. Vidal uses with good success, in the treatment of scrofulous ulcerations and of ecthyma, the following plaster, spread upon silk in the usual manner:—

Red Oxide of Lead	2·50 gm. or 40 grs.
Cinnabar	1·50 gm. or 25 grs.
Lead-plaster	26·00 gm. or 400 grs.

Melt the lead-plaster, add the red lead and cinnabar, mix well and spread.—*Rép. de Pharm.*, 1879, 99.

SUMMER DRINKS:—

Milk Lemonade.—Loaf sugar, one and a half pounds, dissolved in a quart of boiling water, with half a pint of lemon juice, and one and a half pints of milk; this makes a capital summer beverage. A half-pint of sherry added is a great improvement.

Still Lemonade.—The juice of three lemons, the peel of one, quarter of a pound of lump sugar, and a quart of cold water. Mix, digest for five hours, and strain.

Lemon Whey.—One pint of boiling milk, half a pint of lemon juice, sugar to taste. Mix and strain.

Lemon Shrub.—The juice of twelve lemons, the thin rind of two, one pound of sugar, the whites of two eggs well whisked, one pint of water, half a pint of rum, and half a pint of brandy. Mix and strain.—*Monthly Magazine of Pharm.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

LIN. POTASS. IODID. C. SAPONE, B.P.

Sir,—In answer to W. H. de B.'s inquiry as to the above preparation, we have much pleasure in giving him the information he requires.

The liniment was, we believe, originally introduced to the Medical Council by the late Dr. Rumsey, of Cheltenham, where it was very largely used. It was always intended to be made with white curd soap dissolved in the whole of the glycerine and water, mixed in a water-bath; then, having powdered the iodide of potassium in a large mortar previously warmed, pour the hot solution on the iodide in the mortar, and stir a few minutes until cold; lastly, add the oil of lemon.

You will then have a white solid preparation which does not separate. It was sent out in covered pots as an ointment, although some London houses send it in wide-mouthed bottles.

South Kensington. PLAISTER AND HILLEN.

"*Beta.*"—*Cotyledon Umbilicus.*

R. G. Bumpstead.—The practice of pharmacy in France is limited to persons possessing diplomas as pharmaciens.

Ricini.—We do not consider that an article answering fairly to the name, or that can be sold without danger of prosecution under the Sale of Food and Drugs Act, can be prepared.

R. Roberts.—(1) Not complete enough to identify; calyx absent. (2) *Cornus sanguinea.* (3) *Vicia Cracca.* (4) *Stellaria graminea.* (5) *Tamus communis.* (6) *Veronica officinalis.*

C. T.—(1) *Lysimachia nemorum.* (2) *Potentilla Tormentilla.* (3) *Orchis maculata.* (4) *Erysimum cheiranthoides.* (5) *Galium saxatile.* (6) *Lycopus europæus.* (7) *Hieracium umbellatum.*

G. Morgan, jun.—(1) *Centaurea nigra.* (2) *Geum urbanum.* (3) *Stachys sylvatica.* (4) *Alliaria officinalis.*

A. H. Cleland.—We should be glad if you would watch the growth and communicate the result at a future time.

F. N.—Ganot's 'Elementary Treatise on Physics,' published by Longmans.

W. Reynolds.—We believe not, but recommend you to apply to the Registrar.

W. B. Stonham.—We are not acquainted with such a work.

"*Owen.*"—A number of papers upon the composition of chlorodyne will be found in vol. xi. of the second series of this Journal.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. J. H. Dingle, H. Long, Audio, Alpha.

SPIRITUS ÆTHERIS NITROSI:

ITS COMPOSITION AND ANALYSIS.

BY F. M. RIMMINGTON, F.C.S.

The nature, substance and quality of spiritus ætheris nitrosi has long been a problem asking for solution; and as I have given a good deal of attention to it for a long time, and feel myself under a pledge to contribute another paper on the question raised some time ago as to the actual existence of nitrite of ethyl in this compound, I now purpose fulfilling that promise.

Perhaps some discriminating minds will draw a distinction between sweet spirit of nitre and spiritus ætheris nitrosi. I make no such distinction, and all that is said in this paper has reference to a spirit that corresponds with that described in the British Pharmacopœia, in nature, substance and quality.

I think all who have attempted the analytical examination of this preparation, will admit it is surrounded with some difficulty.

There is first, an ethereal fluid, so designated; secondly, an ethereal oil or hydrocarbon; thirdly, aldehyde; fourthly, nitrous acid, uncombined; fifthly, acetic acid uncombined; sixthly, alcohol and water.

The presence of nitrite of ethyl in the spirit of the Pharmacopœia has been denied; and I am willing to admit it may be possibly true, but if true, it is culpably wrong, and is the result of mismanagement. If no nitrite of ethyl be formed, what becomes of the nitric acid used in the operation, and what are the products of the chemical action that takes place? It does not distil over, it does not pass away as gas, but it is nevertheless consumed.

After many attempts to investigate this matter, and trying all the methods that suggested themselves to me, or that I could find described for the estimation of the nitrites, I found none that gave satisfactory results until I adopted the following scheme, by which not only the nitrite of ethyl, but all the other constituents, may be accurately estimated.

The following table, at all events, shows the results in two analyses (out of a great many others) of a typical sample, agreeing with the B.P. tests, etc.:—

	(1).	(2).
Water	7·96	7·93
Aldehyde	1·19	1·19
Alcohol	88·10	88·10
Acetic Acid	·47	·50
Nitrous Acid	·59	·56
Nitrite of Ethyl	1·69	1·72
	100·00	100·00

The method of analysis is as follows:—

The nitrite of ethyl is to be estimated by the conversion of its nitrogen into ammonia, first by decomposing it with pure potash into KNO_2, and distilling this with a zinc and copper couple somewhat after the method recommended by Thorpe, but modified by Dr. Cornelius Fox, and titrating the result with standard acid (process in detail given below).

The amount of nitrous and acetic acids are estimated volumetrically. The two acids are afterwards separately estimated.

Aldehyde is estimated by conversion into acetic acid by peroxide of hydrogen, and titrated.

Water and alcohol by difference.

Estimation of Nitrite of Ethyl.

5 c.c. of the spirit are added to 1 gram of pure potash (free from nitre) dissolved in 40 c.c. of pure water in a 50 c.c. graduated, flask, stoppered and capped with leather, digest in a warm place at a temperature of 150°—200° F. for three hours. Allow the flask to cool and then dilute with water to 50 c.c., shake and then take out with a pipette 10 c.c. of the liquid and run it into a platinum dish, and add to it 40 c.c. of water, evaporate on a water-bath to 20 c.c. to get rid of the alcohol, etc. This residue is now to be washed into a flask of 16 ounces (or 450 c.c.) capacity, containing 10 grams of zinc foil coated with copper, and the volume of liquid made up to about 350 c.c. with water, and connected with a condenser; heat is now to be applied and the distillation carried on as usual. Most of the ammonia comes over in the first 100 c.c. of distillate, but it is necessary to distil another 50 c.c. to ensure perfect exhaustion. The ammonia thus obtained is now to be estimated with a standard sulphuric acid, 1 c.c. equal to ·001 gram ammonia.

The amount of NH_3 found is to be multiplied by $100 \times \cdot 824$ which will equal the total nitrogen in the spirit; and this, minus the nitrogen present in the free nitrous acid, when multiplied by 5·357 will give the nitrite of ethyl contained in the spirit.

Estimation of Nitrous and Acetic Acids.

The amounts of these two acids are necessary to be known in order to judge of the quality of the preparation, and for correctly estimating the nitrite of ethyl. 10 c.c. are to be measured with a pipette and run into a platinum dish, and diluted with an equal volume of pure water, and ·5 gram carbonate of potash added, and stirred until dissolved; the solution is then evaporated on a water-bath to dryness. This saline residue is now to be treated with 5 c.c. of pure alcohol for the separation of the potassium acetate, from the potassium nitrite, and again repeated, and the mixed solutions filtered through a very small Swedish filter; this filtrate evaporated in a tared capsule to dryness, and rapidly weighed. The weight minus ·021 gram (the weight of KNO_2 which is dissolved by 10 c.c. of alcohol) and the amount multiplied by ·6122 gives the quantity of acetic acid present in the spirit.

The amount of acetic acid thus found, multiplied by ·7666 gives the equivalent of NO_2 to which it is equal, and this product deducted from the total acidity, (previously determined alkalimetrically,) leaves the nett amount of NO_2 present.

Estimation of the Aldehyde.

Into a 25 or 50 c.c. flask run 10 c.c. of the spirit, and add 10 c.c. of peroxide of hydrogen, and let it stand two or three hours; by this time the aldehyde will have become converted into acetic acid, and may be estimated by decinormal alkali; the amount thus determined, less the number of c.c. required by the free acids previously determined, multiplied by ·0044 will give the amount of aldehyde.

Estimation of Alcohol and Water.

The alcohol is estimated by the specific gravity, and the water by difference.

The foregoing scheme of analysis probably may look formidable in the eyes of very practical people. It certainly involves some nicety of selection of materials, as to purity, but otherwise it is not difficult.

I append the statement of analysis of four samples of spirit of nitrous ether, obtained from different sources and represented as the "best."

	No. 1	No. 2.	No. 3.	No. 4.
Water	10·55	14·12	16·17	15·49
Aldehyde . . .	·75	·21	·26	·00
Alcohol	87·5	85·2	82·60	83·6
Acetic Acid . . .	·16	·03	·18	·16
Nitrous Acid . .	·29	·27	·69	·68
Nitrite of Ethyl .	·75	·17	·10	·07
	100·00	100·00	100·00	100·00

The nice gradation of quality here exhibited, without any design, is very remarkable.

THE BOTANICAL SOURCE OF ARAROBA.

In a former note on Goa powder, which appeared in this Journal,* it was suggested by Mr. E. M. Holmes that this drug might perhaps be derived from a species of *Cæsalpinia* nearly allied to *C. Sappan*, L. This opinion was founded partly on a microscopical examination of the structure of fragments of wood found in the araroba of commerce, and partly on the appearance of a single leaf of the araroba plant, which was found to bear a considerable resemblance in habit to those of *C. Sappan*. This leaf, kindly supplied from the Royal Botanical Gardens at Edinburgh, was obtained from a slip of the plant brought home from Bahia by Dr. J. L. Paterson. Those who are well acquainted with the plants of the Leguminosæ will readily acknowledge the difficulty of judging of the genus from a leaf alone, without flowers and fruit. These have at length been procured, and the true source of the araroba may now be considered to be definitely settled, and the mystery which has so long attended the natural history of the drug to be satisfactorily cleared up. This information is supplied by Dr. J. M. de Aguiar, who has just published at Bahia† a pamphlet containing a very full and detailed description of the plant, with illustrations of the leaves and flowers, a copy of which has recently been placed at our disposal by Mr. T. Christy.

According to Dr. de Aguiar the flowers and fruit which have been obtained show that the araroba plant is more nearly allied to *Centrolobium* than to *Cæsalpinia*, having truly papilionaceous flowers, and that it belongs to the genus *Andira* of the subtribe Geoffræeæ, which is characterized by having a hard drupaceous one-seeded fruit, sweet-smelling violet or purplish flowers arranged in panicles, a calyx with short teeth, and five distinct petals. From *Centrolobium* it is distinguished by the fruit, which in that genus resembles a samara and is furnished with prickles at its base.

The araroba plant is therefore nearly allied to *Andira inermis*, the bark of which was formerly a well known remedy in this country for intestinal parasites, under the name of cabbage-tree bark or worm bark.‡

The following description is a *précis* made from the information contained in Dr. J. M. de Aguiar's pamphlet:—

The plant from which araroba is extracted is one of the larger intertropical trees which are met with between 13° and 15° of latitude, south of Bahia, especially in the forests of Camamu, Igrapiuna, Santorem, Taperoa and Valencia, and rivals in height the tree commonly known under the name of Oleo (*Myrocarpus fastigiatus* or *Myrospermum erythroxylum**), and sometimes attains even greater dimensions. The ordinary height of the tree is 80 to 100 feet; the trunk is straight, cylindrical, and in the two specimens which were measured in the thickest part one was 31 and the other 48 centimetres in diameter. The tree commences to branch at more than a third of its whole height, and forms a not very leafy head, having the form of a segment of a spheroid. The bark of the tree is not very thick and appears to contain scarcely any of the active principle of the plant. The wood has a yellow colour, and is very porous, having numerous longitudinal canals visible to the naked eye, although these are more distinctly seen under a lens. The trunk in a transverse or tangential section presents lacunæ, more or less large according to the age of the tree, and in these a pulverulent substance (araroba) is found, which in trees recently cut down and before being dried is of a light or pale tint, clearer than that of the wood. The medullary centre exhibits a canal different in appearance from the lacunæ, having a diameter much more considerable. The young branches are entirely fistulose.

So far these particulars seem to correspond exactly with the statement of Dr. Rameiro A. Monteiro, published in the *Journal de Thérapeutique*, vol. vi., p. 248.†

The following details, however, have not, so far as is known, been before published in this country.

The leaves are alternate, compound and paripinnate. The petiole in two specimens which were measured was in the one 32 and in the other 44 centimetres in length, having a variable number of pairs of stalked leaflets, in one specimen 20, and in another, 24. The leaflets are alternate and articulated, oblong, obtuse, entire, and emarginate at the apex, measuring from $2\frac{1}{2}$ to $4\frac{1}{2}$ centimetres in length, and from 1 to $1\frac{1}{2}$ centimetres in width. The distance between the points of insertion of the leaflets is about 2 centimetres, so that the leaflets only slightly overlap each other.

The common petiole or rachis is slender, convex on the under surface, and hollowed above into a small very smooth furrow; the secondary petioles which measure about half a centimetre in length are accompanied for a small distance by the rudiments of stipels. The leaflets are feather-veined, of a green colour on the upper surface and of an ashy hue beneath. The inflorescence is centripetal, consisting of a panicle with a variable number of racemes, each of which consists, in the more luxuriant specimens, of about eight flowers or flower buds. The flowers are shortly stalked, alternately arranged, and are each furnished with a bract, which does not develop at the same rate as the flower, and hence the lower bracts appear smaller than the upper ones. The common peduncle is bare of flowers at the base for about a third of its length. The flowers are purple, papilionaceous, measuring $2\frac{1}{2}$ to 3 centimetres without the claw, which is about $\frac{1}{2}$ centimetre long. The *calyx* is gamosepalous, 2 centimetres long, covered with rusty-coloured hairs, a little flattened on three faces, like

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* *Pharmaceutical Journal* [3], vol. v., p. 801, note †.

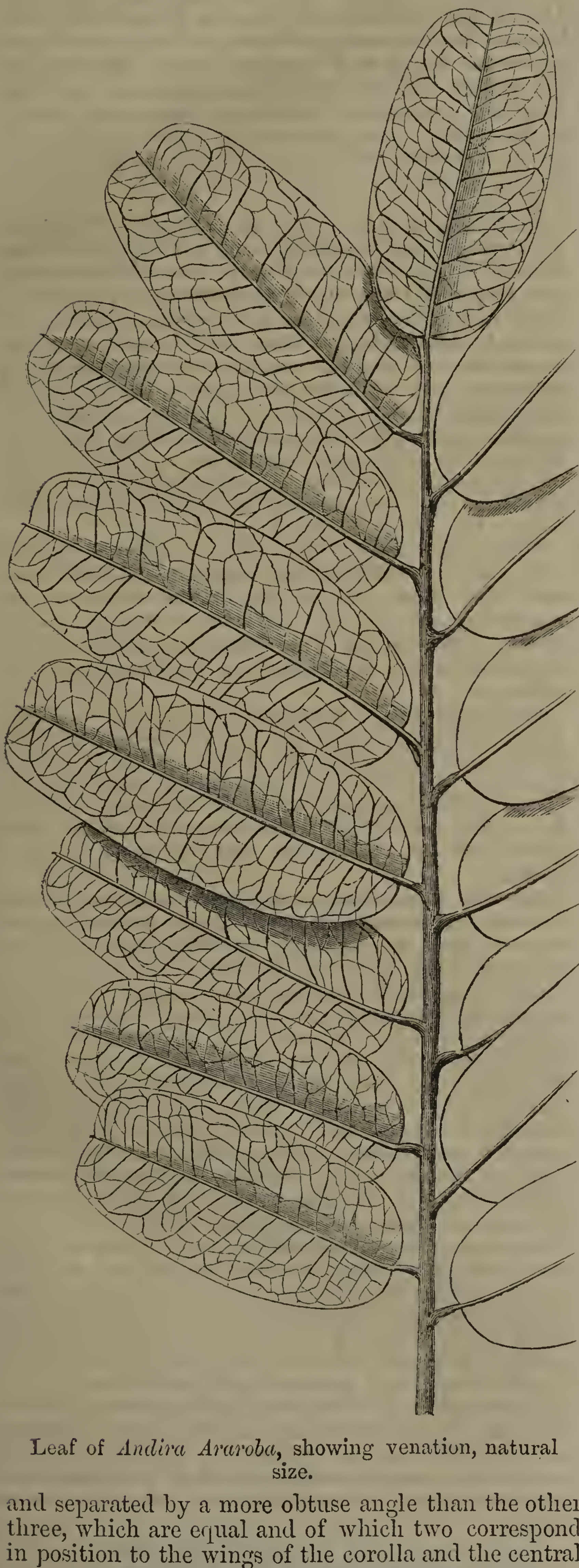
† Memoria Sobre a Araroba, pelo Dr. J. M. de Aguiar. Bahia, 1879.

‡ Lewis, 'Materia Medica,' p. 320.

* Almeida Pinto, 'Diccionaria de Botanica Brasileira,' p. 335.

† *Pharm. Journ.* [3], vol. viii., p. 1048.

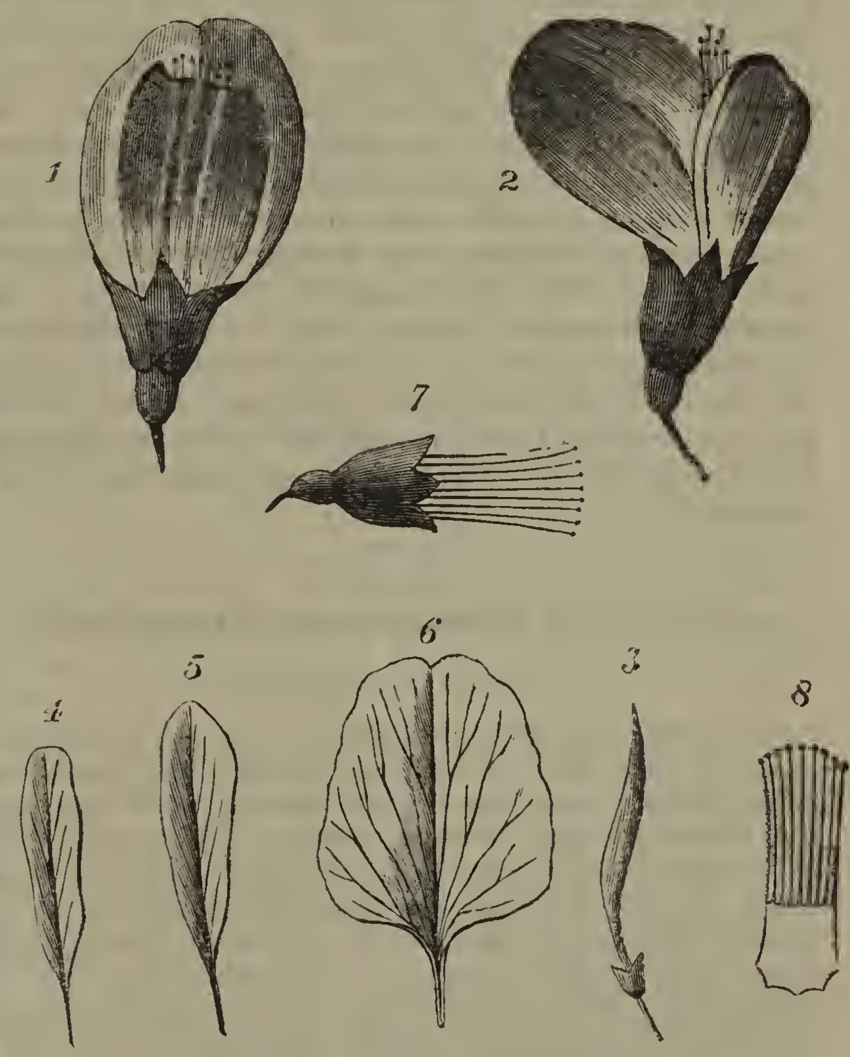
a triangular prism with rounded angles, the dorsal angle being the more prominent and corresponding to the middle of the standard. The calyx is five-toothed, the two upper teeth being larger and longer



Leaf of *Andira Araroba*, showing venation, natural size.

and separated by a more obtuse angle than the other three, which are equal and of which two correspond in position to the wings of the corolla and the central one to the keel.

The *corolla* consists of five clawed petals, the standard being entire, orbicular, about 2 centimetres in diameter, slightly emarginate at the apex, and furnished with a claw about ½ centimetre long, and consisting in great part of the thickened middle vein of the standard. The alæ or wings are obovate, elongated, about 16 millimetres long by 6 broad, curved towards the base, and forming a longitudinal and oblique sinus* (gotteira) near the top of the claw on the side opposite to the standard, the claw being about 7 millimetres long. The two petals forming the keel are similarly formed, but less curved, and 4 or 5 millimetres broad. The *stamens,* nine in number, are monadelphous and perigynous, about 2 centimetres long, and adherent for about a third of their length, but having a slit opposite to the middle of the vexillum. The anthers are ovoid with a longitudinal furrow on their inferior surface, in the middle of which the filament is inserted. The upper surface is convex and smooth. The *pistil* consists of a single carpel, and exceeds the stamens in length by 1 or 2 millimetres. The ovary, which has a stalk about 4 millimetres long, is flattened at the sides, and presents two salient lines or rudimentary wings. The ovary and style (the latter for two-thirds of its length only) are covered with rusty hairs. The ovary is convex on the side opposite to the slit in the androphore, and concave on the side nearest to the two lateral wings.



Flower of *Andira Araroba*.

1. Showing three lower teeth of calyx; 2. Corolla, lateral view; 3. Pistil; 4. Petal of keel; 5. Petal of wing; 6. Standard; 7. Stamens in situ, after removal of corolla; 8. Monadelphous stamens, separated from calyx.

The ovary is one-celled and one-seeded. The embryo is curved, and the seed exalbuminous. The arillus is short and tortuous.

From the above description it will be seen that the araroba plant belongs to the Leguminosæ, and to the tribe of Dalbergieæ. It much resembles in some characters *Dalbergia miscolobium*, Benth., and

* This is not well shown in the original wood-cut.

Andira fraxinifolia, Benth. Neither of these two plants, nor the *Andira inermis*, has the obtuse emarginate leaflets which characterize the araroba tree.

The author believes the plant to have been hitherto undescribed, and proposes the name of *Andira Araroba*, Aguiar, for it, since the drupaceous fruit, panicled inflorescence, purple flowers and the other characters above mentioned clearly point to its being an *Andira*. This opinion is further strengthened by the fact that some other Andiras possess parasiticidal properties, and that the natives, who call the *A. anthelmintica* "Angelim de folha grande," the *Andira Fraxinifolia* "Angelim doce," and the *A. stipulacea* "Angelim Coco," also call the *A. Araroba* "Angelim amargoso," thus recognizing a close alliance in the plants.

With regard to the production of the araroba, the author gives it as his opinion that it is formed by the oxidation of the resin which exists in great abundance in the tree, the oxidation being facilitated by the canals made by insects. He explains the presence of the larger cavities in the tree by the corrosive action of the araroba on the wood. He has not, however, as yet confirmed his theory by experiment. The araroba is collected throughout the year, the older trees being selected because the powder occurs in them in greater abundance. The trunk is cut into sections transversely and these are then split longitudinally. The portions containing powder are then chipped or scraped off with an axe, which is done the more easily as the wood in these parts offers but little resistance. The colour when freshly collected varies from that of the flower of the cotton plant (pale primrose colour), becoming by the action of the air darker, to that of rhubarb, and finally dark purple. The commerce of this article is now chiefly developed in Camamu and Taperoa, although the tree exists in abundance in all the southern part of the Province of Bahia and, according to Drs. Bomfim and Agnello Leite, also in the forest of Sergipe. The tree is not cultivated, but propagates itself spontaneously.

LACTUCARIUM FROM LACTUCA CANADENSIS.*

BY HILAND FLOWERS, PH.G.

The milk-juice, which exudes almost at the commencement of the plant's career, is perfectly inert, though a large quantity is produced. As collected up to July 20, the exudation has a strong narcotic odour, while the palate perceives no bitterness, but simply a flat sweetish taste. Up to this time the plant has borne its reproductive organs, but failed in giving the requisite bitterness. A change, however, occurs about the 25th of July, when we find that the laticiferous vessels are yielding a large supply of juice with a slightly bitter taste and a stronger and more lasting odour. As the season advances, both the bitter principle and the narcotic odour increase.

The milk-juice collected during the latter part of the season dried in irregular masses, crumbling into minute fragments when rubbed between the fingers, and was of a blackish-brown colour, a strong odour and very bitter taste. If kept in a closely-corked bottle it remains soft and is capable of being moulded into cakes. The odour is slightly stronger in the fresh state, and the colour of a greyish-brown.

Aubergier, in 1843, experimented upon this plant, while investigating the subject to ascertain from which lactucarium might be most advantageously obtained; he stated that the milk-juice of *Lactuca canadensis*, or *elongata*, had a flat, sweetish taste and contained mannit, etc., but *no* bitter principle.

In September, 1867, Professor Maisch commenced a series of experiments upon the plant, and upon the personal observation then made, as well as the reports of Doctors DaCosta and Muller, of this city, rested convinced that the plant did contain a bitter principle and did possess decidedly medicinal properties, and that Aubergier had perhaps improperly conducted his experiments, possibly using the expressed juice of the plant, which, according to Professor Maisch (*vide American Journal of Pharmacy*, 1869, p. 145), has a flat, sweetish taste.

Four drachms of the milk-juice collected in September and October were exhausted upon a filter with boiling alcohol. Eight ounces of filtrate were obtained, passed through animal charcoal and concentrated by spontaneous evaporation, when inodorous and tasteless needles were obtained, which melted at about 175° F. and on cooling congealed to a granular mass. They were evidently *lactucerin*. On still further evaporating the mother liquor and adding to it water, a whitish precipitate was produced, from which the aqueous liquor was thoroughly drained. On dissolving the precipitate in boiling alcohol and evaporating the solution spontaneously, more of the tasteless needles were obtained, and pale-brownish bitter scales, which were evidently impure *lactucin*.

The aqueous mother liquor was precipitated by basic acetate of lead, and both the precipitate and the filtrate were freed from lead by sulphuretted hydrogen. On evaporating the solutions, brownish amorphous masses, having a bitter taste, were left, corresponding to the *lactucic acid* and *lactucopicrin* of the European lactucarium.

Lactucerin is in colourless needle-shaped crystals, either united in stellate groups or crossing and overlapping each other; tasteless, soluble in boiling alcohol, petroleum benzin, ether, chloroform, and slightly soluble in cold alcohol; insoluble in water. If heated to above its melting point (175° F.), it volatilizes slowly. Sulphuric acid chars it; nitric acid has no effect unless heated.

Lactucin is insoluble, or nearly so, in water; soluble in alcohol and acetic acid. When pure and not exposed to much heat, the lactucin is in scales of a dull-white cast; under the microscope it presents a rugged surface, slightly tinged with a reddish-brown colour. From my experience, I am inclined to think that if the scales are heated in solution for some time, they will not form again very readily, and are deprived of some of their bitterness. Ammonia will not precipitate it, but rather tends to alter the taste. It is, however, precipitated from alcohol by water, and may thus be purified by repeated precipitation and crystallization. Nitric acid will not dissolve it, nor will the addition of alcohol facilitate this end. The characteristics given by Kromayer, Ludwig and Walz are in accordance with these results.

Lactucic acid is precipitated by basic acetate of lead, care being taken that an excess is not used, for it is soluble in that salt when in excess. It changes blue litmus paper to red, proving its acidity; has an acrid, bitter taste; is soluble in alcohol, both hot and cold, insoluble in petroleum benzin, bisulphide of carbon, ether and chloroform, and has a brownish-green colour.

Lactucopicrin is a brown amorphous mass, and may be purified by repeated treatment with ether, chloroform or alcohol, filtering and evaporating. It has a strong and purely bitter taste, is soluble in alcohol, chloroform, ether and water, and is not precipitated by lead salts from its solution.

The residue of the lactucarium, left after the above principles had been removed by hot alcohol, was treated with bisulphide of carbon, which dissolved a large amount of caoutchouc (*gum elastic*), but there yet remained a

* From th *American Journal of Pharmacy*, July, 1879.

residue, which was treated with ether, removing a pale-yellowish granular powder; with chloroform, removing the remaining caoutchouc and some of the colouring matter, and with alcohol, which yielded, on evaporation, a brownish, bitter, amorphous mass resembling lactucopicrin. Water extracted a large amount of colouring matter. The residue which was now left defied the solvent powers of carbon bisulphide, ether, chloroform, alcohol, water and acetic acid.

The yellowish powder obtained on the evaporation of ether in the above treatment closely resembles lactucerin; but the identity of the two was not proven. When heated it will melt, and volatilize if the temperature is increased. On cooling it forms a resinous mass. It is soluble in hot alcohol, petroleum benzin and chloroform, insoluble in hot or cold water. Sulphuric acid dissolves it, but does not char it. Nitric acid has little or no effect. Muriatic acid dissolves it slightly. Acetic acid and ammonia have no effect. It is precipitated from the alcoholic solution by water.

The statement of Aubergier regarding the worthlessness of this plant is undoubtedly wrong, as there exist, beyond question, several bitter principles with decided physiological action. It is very likely that he collected the juice before the plants were sufficiently matured and the bitter principles developed.

GLYCYRRHIZIN.*

BY J. HABERMANN.

In a previous communication the author had stated that by the treatment of commercial glycyrrhizin with glacial acetic acid he had obtained a considerable quantity of an almost colourless crystalline body. Since then he has pursued the subject as opportunity offered and now presents the result of his further investigation, first giving a *résumé* of the history of the subject.

Our knowledge of the nature of glycyrrhizin is principally based upon the work of A. Vogel, jun.,† T. Lade,‡ Gorup-Besanez,§ and, more recently, Z. Roussin.||

Vogel prepared glycyrrhizin by precipitating an aqueous extract of liquorice root with lead acetate, carefully washing the precipitate, suspending it in water and decomposing it with sulphuretted hydrogen; it was only after repeatedly boiling the mass that he was able to separate the lead sulphide by filtration. Vogel purified the glycyrrhizin by dissolving it several times in absolute alcohol, and he describes it as a light yellow mass, showing no trace of crystallization when considerably magnified, soluble in water, especially when boiling, readily soluble to a large extent in alcohol, and melting at 200° C. to a transparent dark brown mass. He described also the precipitate obtained with neutral lead acetate, as well as a compound with sulphuric acid, and attributed to glycyrrhizin the formula $C_{16}H_{24}O_6$.

Lade obtained his glycyrrhizin by extracting liquorice root with cold water, concentrating upon a water-bath, filtering, precipitating with dilute acid, and purification of the viscous pitchy black precipitate by continued kneading in acidulated and pure water, repeatedly dissolving it in absolute alcohol and evaporating the solution on a water-bath. Lade describes his product as a shining translucent, brown mass, forming upon trituration a brownish-yellow powder, slightly soluble in cold water, especially when containing a little acid, but dissolving more readily in boiling water and giving off then a peculiar odour, recalling that of fusel alcohol. A solution saturated when hot is said to be gelatinous at the ordinary temperature or when perfectly cool to thicken to a clear brown jelly. The taste was extremely sweet, but it was accompanied by a peculiar bitter, and was unpleasant. In absolute alcohol the substance was readily soluble. The yellow colour appeared to Lade to be characteristic of glycyrrhizin. The solutions had an acid reaction upon litmus paper, and small quantities of alkalies made the glycyrrhizin much more soluble in water and coloured the solution deep yellow-brown. Lade also described two lead compounds and attributed to glycyrrhizin the formula $C_{18}H_{24}O_7$. He appears to have been of opinion (1) that glycyrrhizin exists in the root combined with an organic base like ammonia; (2) that he did not succeed in obtaining glycyrrhizin free from nitrogen, although the quantity present amounted to only 0·03 to 0·06 per cent.; (3) that the body was a hydrate, represented by the rational formula— $C_{18}H_{22}O_6 + H_2O$.

Gorup-Besanez modified Lade's method by decomposing the alcoholic solution with small quantities of ether, by which a brown resinous mass was separated, whilst a light wine-yellow solution resulted; this upon evaporation left a light yellow varnish-like residue that yielded a faintly yellowish powder when triturated. Gorup-Besanez expressly states that the product obtained in this way corresponded in properties and composition with the glycyrrhizin of A. Vogel, and differed in analytical results and especially in containing no nitrogen from that of Lade. He describes the preparation and properties of a lead and a lime compound, the former containing six the latter three equivalents of base. Lastly, he describes the decomposition of glycyrrhizin by dilute acids into glycyrretin and sugar according to the equation—

$$C_{24}H_{36}O_9 + H_2O = C_{18}H_{26}O_4 + C_6H_{12}O_6$$

According to this glycyrrhizin would be a non-nitrogenous glucoside, but Gorup-Besanez does not appear to have effected the decomposition by emulsin or any other ferment. The glycyrretin he describes as a brown-yellow resin, with a taste at first scarcely but afterwards strongly bitter, insoluble in water, freely soluble in alcohol, somewhat less so in ether, and precipitated from its alcoholic solution by water. When decolorized by animal charcoal it formed a nearly white powder that he did not succeed in obtaining in a crystalline form. The sugar was obtained as a brownish coloured only faintly sweetish tasted syrup, which reduced alkaline cupric solution in the cold, blackened oxide of bismuth in the presence of carbonate of soda, took a brown colour with potash, showed Pettenkofer's reaction with galls and sulphuric acid, and lastly, upon the addition of yeast, quickly passed into fermentation.

Roussin, like Lade, looks upon glycyrrhizin as an acid, which he calls glycyrrhizic acid, contained in the liquorice root as an ammonia compound. He states that it forms with ammonia two different compounds, of which one, with an excess of ammonia, forms a dark yellow solution, the other, with half the quantity of base, forms an amber solution. According to Roussin, glycyrrhizin plays in both compounds the part of an actual acid, and the compounds are actually salts, capable of undergoing double decomposition not only with all metallic salts, but also with salts of the alkaloids. Roussin considers glycyrrhizic acid to be intermediate in its principal characters between tannic and pectic acids. Of the above-mentioned ammonia compounds the first is a basic glycyrrhizate of ammonia, the second and more important, since it represents the actual sweet principle of liquorice, is glycyrrhizate of ammonia, or ammoniacal glycyrrhizin. In its preparation and purification Roussin followed the method of Gorup-Besanez at first, and then precipitated the ethereal-alcoholic solution with a strong alcoholic solution of ammonia, and washed the precipitate with alcohol. Roussin gives no analytical data.

The starting point of the present author, Herr Habermann, was the glycyrrhizin of commerce, described in the current price lists as "ammoniacal glycyrrhizin," and occurring in more or less deep brown coloured shining amorphous scales. From this substance he finds that a

* Abstract of a paper read before the Vienna Academy of Sciences (*Liebig's Annalen d. Chemie*, vol. cxcvii., p. 105.
† *Journ. f. prakt. Chemie*, xxviii., 1.
‡ *Annalen*, lix., 224.
§ *Annalen*, cxviii., 236.
|| *Pharm. Journal* [3], vi., 53.

crystalline body may be obtained as follows:—Some of it is placed in a good sized retort with glacial acetic acid and heated, while carefully swinging the retort, to boiling. Upon the addition of the acetic acid the substance forms at first a black viscous syrup, which becomes thinner as the temperature rises. The syrup is maintained in full ebullition for a few moments and when solution is complete is filtered through paper as rapidly as possible, preferably by means of a water-bath funnel into a glass or porcelain dish. If sufficient glacial acetic acid has been used solution is not difficult; but if too small a quantity be used there is a separation of crystalline matter in the retort and on the filter, and the filtration becomes prolonged and troublesome. Nevertheless too much solvent is a greater disadvantage than too little, the yield of crystals being smaller. The crystalline mass is separated from the deep brownish black syrupy mother-liquor, pressed, and washed with glacial acetic acid and with absolute alcohol. It still remains contaminated with the dark coloured mother-liquor, and to obtain it perfectly pure and free from ash it requires to be again boiled with glacial acetic acid, filtered rapidly, and the crystalline mass that forms upon cooling recrystallized two or three times from boiling alcohol.

The purified substance forms slightly yellowish bright shining crystalline scales, which under the microscope appear to be homogeneous, perfectly transparent and colourless, and which are better formed in proportion as the separation from the alcoholic solution takes place slowly. In water at the ordinary temperature it is really but little soluble, it forming a transparent faintly wine-yellow coloured jelly, in which isolated hard particles remain suspended in the form of small lumps even after some days. Upon mixing 1 gram with 100 c.c. of water the mass acquires after standing several hours a consistence that will allow an open vessel to be reversed without it falling out. When the jelly is heated it becomes liquefied, and is quite thin when the water boils. In boiling water the compound is very readily soluble. Sufficiently dilute aqueous solutions are at the ordinary temperature gum-like, viscous and frothy. The compound is insoluble in ether, slightly soluble in absolute alcohol even when boiling, slightly soluble at the ordinary temperature in alcohol above 90 per cent., but more soluble therein when boiling. The solubility in alcohol increases rapidly with the amount of water it contains. From weak alcoholic and aqueous solutions it cannot be obtained crystalline; an aqueous solution when evaporated spontaneously or upon a water-bath only yields an amorphous brittle gum-like slightly coloured mass which when dried is not unlike white of egg. Upon treating the aqueous jelly with a little dilute sulphuric or hydrochloric acid it becomes turbid and of greater consistence. Small quantities of ammonia and caustic alkalies added increase the solubility of glycyrrhizin to an extraordinary extent, the solution so obtained being, if the material is pure, almost colourless, but if not pure it is more or less perceptibly coloured. In aqueous solutions sugar of lead and other salts of the heavy metals produce voluminous precipitates; the silver precipitate is cheesy, runs together in globules on being heated, and dissolves readily in ammonia. Similar but more compact precipitates are formed in the alcoholic solution by alcoholic solution of sugar of lead, caustic baryta, etc.; whilst alcoholic solutions of ammonia and caustic potash produce in a strong alcoholic solution precipitates which after standing deposit on the bottom of the vessel as a resinous mass. Fehling's cupric liquor is reduced by it after prolonged heating. Nitric acid dissolves the substance at the ordinary temperature with considerable production of heat to an almost colourless liquid, from which nothing separates upon dilution with water. Upon heating the hydrochloric acid solution over a spirit lamp a brief but tolerably brisk evolution of gas takes place, the liquid becomes turbid through the separation of resinous flocks, and upon dilution with water there is a much more copious separation of colourless flocks. In concentrated sulphuric acid the substance dissolves to an orange-red liquid, from which colourless flocks are precipitated by water.

The substance possesses an intensely sweet taste with an after-flavour faintly resembling liquorice. This after-taste appears to be weaker in proportion with the increasing purity of the product, but in no case in the author's experience was it quite absent. The substance bears a temperature of 100° C. without change, but turns brown at 110° C. and melts at a higher temperature, decomposing to a black pitchy mass and diffusing an odour scarcely resembling that of sugar; finally it inflames and burns with a very sooty flame, and leaves a greyish-black coke-like residue.

Analysis of the crystalline substance was attended at first with considerable difficulty in consequence of adherent acetic acid, which could not be got rid of in the ordinary drying apparatus without discoloration; especially was this the case when the recrystallization from alcohol had not been repeated several times. The difficulty was overcome by drying in a vacuum. Analysis was made of specimens of ash-free substance obtained from different preparations of glycyrrhizin, dried at 100°. As the simplest expression of the mean of the analytical data obtained, the author gives the formula $C_{22}H_{33}NO_9$, but he does not look upon this as the true representation of the molecular weight.

	Mean of results obtained.	Required for $C_{22}H_{33}NO_9$.
C	58·03	58·17
H	7·25	7·71
N	3·07	3·05

Upon treating a solution in strong alcohol with an alcoholic solution of platinic chloride, a crystalline formation of the platino-ammonium salt was obtained. A further investigation, however, led the author to the conclusion that only a portion of the nitrogen is present in this body in the form of ammonia, whilst the other part is combined in another way. The result corresponded with the composition of an acid ammonium salt of a nitrogenous acid represented by the formula $C_{44}H_{62}NO_{18}$ (NH_4), and for this acid the author adopts the name proposed by Roussin, of "glycyrrhizic acid."

Some other compounds of this acid are also described by the author as follows, the analyses being made after drying at 100°:—

Neutral Glycyrrhizate of Ammonium.—$C_{44}H_{60}NO_{18}$ $(NH_4)_3$.—Obtained upon treating an alcoholic solution of the acid salt with excess of ammonia and evaporating to perfect dryness in a vacuum over sulphuric acid. It formed an amorphous, brittle, light yellow-brown, transparent mass, resembling gum arabic. It was extremely soluble in water and alcohol, but insoluble in absolute alcohol; its solutions were precipitated by various metallic salts. It possessed a nauseous sweet taste. It was rather hygroscopic and when heated readily underwent change, apparently giving up part of its ammonia

Neutral Glycyrrhizate of Potassium.— $C_{44}H_{60}NO_{18}K_3$.—Aqueous solution of potash was added in slight excess to a concentrated solution of the acid ammonium salt in weak alcohol. The smell of ammonia was perceptible at the ordinary temperature. The solution was heated for some time, then left to cool, and absolute alcohol added as long as any precipitate was produced. It was then allowed to stand twenty-four hours under a bell glass, at the end of which time the flocculent precipitate had collected into a resinous mass adhering closely to the sides of the vessel. This, after the clear liquor had been poured off, was washed repeatedly and carefully with absolute alcohol and dried at the ordinary temperature over sulphuric acid. It then appeared as a yellowish-white, light, friable mass, very soluble in water and dilute alcohol, but almost insoluble in absolute alcohol and ether.

Acid Glycyrrhizate of Potassium.—$C_{44}H_{62}NO_{18}K$.—If the previous compound be treated in the dry condition with a moderate quantity of acetic acid and heated it dissolves to a clear slightly coloured liquid. From this solution, filtered whilst boiling, the acid compound quickly separates on cooling in colourless microscopically small granular crystals. It has a very persistent intensely sweet taste, exceeding in this respect levulose, cane sugar, and even the acid ammonium salt. The compound swells up in cold water to a jelly, but it is soluble in hot water to a considerable extent, such solution gelatinizing as it cools. It is soluble in aqueous alcohol, especially when heated, very slightly soluble in alcohol above 90 per cent., soluble in glacial acetic acid when heated, and scarcely soluble in ether. All the solutions are colourless. The salt can be dried at 100° C., but upon heating it further it swells and eventually burns with a smoky flame giving off a peculiar odour.

Neutral Glycyrrhizate of Barium, $(C_{44}H_{60}NO_{18})_2$ Ba_3, is obtained as a yellowish-white amorphous body by adding baryta water in slight excess to a hot alcoholic solution of acid glycyrrhizate of ammonium.

Neutral Glycyrrhizate of Lead.—$(C_{44}H_{60}NO_{18})_2$ Pb_3.—Upon treating a solution of acid glycyrrhizate of ammonium with solution of sugar of lead there is produced a very voluminous white transparent mucilaginous precipitate; when alcoholic solutions are used the precipitate is more compact and more convenient for filtering and washing. Dried in a vacuum over sulphuric acid it forms a yellow-brown, transparent, brittle and friable gum-like mass, having a sweet taste. It is soluble in glacial acetic acid, slightly soluble in water, insoluble in alcohol and ether. Upon heating to 100° C. it is perceptibly coloured brown.

Glycyrrhizic Acid.—$C_{44}H_{63}NO_{18}$.—The lead compound is the most suitable material for the separation of the free acid. The precipitate after being well purified by washing and pressing is rubbed up with a little water to a fine mucilage, placed in a beaker in a water-bath and decomposed by a current of sulphuretted hydrogen continued several hours, the mixture being diligently stirred. The finely suspended lead sulphide is removed by boiling and adding to the liquid in small quantities at a time the white of egg beaten to a froth, and when the precipitate appears in large flocks in the colourless liquid filtering while still boiling through coarse paper. The filtrate thickens on cooling to a somewhat turbid jelly, which upon heating in an open dish on a water-bath shrivels up in a remarkable manner, leaving a brown residue resembling dried egg-white. It has a persistent pure, but not excessively sweet taste. The acid reddens blue litmus paper and decomposes the carbonates of the alkaline earths gradually by boiling. It swells up in water at the ordinary temperature to a jelly, without actually dissolving, and with boiling water forms a thin viscous solution. It dissolves tolerably freely in weak alcohol, especially when heated, also in boiling glacial acetic acid, and only slightly in absolute alcohol and ether. It turns brown at 100° C., and puffs up and burns upon further heating to a black coal. Glycyrrhizic acid reduces Fehling's solution upon heating almost as quickly as grape sugar.

The results of this investigation may be thus summed up:—(1) In liquorice root there is contained a peculiar nitrogenous acid in the form of salts; (2) The acid is tribasic and forms neutral and acid salts; (3) Among these salts the acid potassium and ammonium salts are, from their crystallizability and intensely sweet tastes, especially important; (4) It is probably to the ammonium salts of glycyrrhizic acid that liquorice root owes its peculiar sweet taste.

The author is continuing his investigations upon various decomposition products of glycyrrhizic acid and a second constituent of liquorice root.

RECENT CONTRIBUTIONS TO THE HISTORY OF DETONATING AGENTS.*

BY PROFESSOR ABEL, C.B. F.R.S.

(*Continued from page* 29).

That the power possessed by different very highly explosive substances, of inducing the detonation of such bodies as gun-cotton and nitro-glycerine, is not solely ascribable to the operation of mechanical force very suddenly developed, is indicated not only by the singular inertness of gun-cotton to the influence of nitro-glycerine as a detonating agent, but also by a comparison of the behaviour of other detonating substances with that of the mercuric fulminate, when applied to the detonation of gun-cotton. Thus the detonation of silver fulminate is very decidedly sharper than that of the mercury compound, yet it is in no way superior to the latter in its power as an initiative detonating agent; indeed, a somewhat larger amount of it appeared to be required than of the mercury salt to induce detonation of gun-cotton with certainty. Again, the iodide and chloride of nitrogen are far more susceptible of sudden detonation than the silver fulminate; yet while five grains of the latter, confined in a stout metal envelope, suffice to detonate gun-cotton, fifty grains of chloride of nitrogen confined by water appeared to be the minimum amount with which the detonation of gun-cotton could be accomplished with certainty, while no success attended the employment of confined iodide of nitrogen in quantities ranging up to 100 grains.

The incompatibility of these results with the general conclusion, based upon numerous and greatly varied experiments, that the facility with which the detonation of gun-cotton and nitro-glycerine, and bodies of a similar character as explosives, is induced by an initiative detonation, is proportionate to the mechanical force aided by the heat developed by the latter, led the lecturer to the conclusion that a synchronism or similarity in character or quality of the vibrations developed by the detonation of particular substances, operates in favouring the detonation of one such substance by the initiative detonation of a small quantity of another, while in the absence of such synchronism, a much more powerful detonation, or the application of much greater force, would be needed to effect the detonation of the material operated upon. This view has received considerable support from results since obtained by other experimenters, especially by MM. Champion and Pellet; but the subject is one which still needs further experimental elucidation.

The physical character of explosive substances, as also the mechanical condition of a mass of the particular explosive substance operated on, are of great influence in determining its behaviour when submitted to the action of an initiative detonation. The liquid nitro-glycerine is far more sensitive to detonation than gun-cotton; one grain of mercuric fulminate, confined in a metal case, suffices to detonate nitro-glycerine when surrounded by it: but, in order to attain this result with any degree of certainty, it is necessary so to confine the nitro-glycerine as to prevent its yielding to the blow developed by the initiative detonation, and thus to some extent escaping from the operation of the sudden concussion to which the particles contiguous to the fulminate charge are submitted.

If nitro-glycerine be mixed with solid substances in a fine state of division, plastic mixtures may be obtained, and the liquid may thus be presented in something like a solid form to the detonating agent; if the particles of absorbent material be moreover of porous nature, as is the case with the infusorial earth called Kieselguhr used in the production of dynamite, a solid nitro-glycerine preparation may be obtained which contains a very large proportion of the liquid (75 per cent. by weight). In this condition nitro-glycerine may be detonated without any difficulty when freely exposed to air; and although it is

* Lecture delivered at the Royal Institution of Great Britain, Friday, March 21, 1879.

diluted with a considerable proportion of absolutely inert material, its sensitiveness to detonation is not in the least diminished. Each particle of the diluent is enveloped in the liquid, so that no portion of the latter becomes isolated from the remainder by the admixture of inert solid matter; hence, when the initiative detonator is surrounded by such a mass, it is in contact at all points with some portion of the nitro-glycerine, and the latter is in continuous connection throughout, though no longer in a mobile condition; detonation is consequently as readily established and transmitted through the mass as though it consisted entirely of nitro-glycerine. Indeed, while the liquid in its undiluted state, if freely exposed to air in a long layer, transmits detonation with difficulty, and very slowly as compared with compressed gun-cotton (the observed rate of progression being, in several experiments, below 6000 feet per second), detonation is transmitted with ease and certainty through very long trains of a solid preparation of nitro-glycerine, such as dynamite, and the rate of transmission is decidedly more rapid than it is with compressed gun-cotton, a result which is in harmony with the greater sensitiveness to detonation and the greater violence of action of nitro-glycerine.

It has already been stated that gun-cotton may be detonated if a confined charge of not less than 2 grains of mercuric fulminate be detonated when closely surrounded by the substance. But in order to attain this result, the cellulose-product must be presented to the detonating agent in a mechanical condition favourable to its action.

Gun-cotton in a loose flocculent condition, or even if in the more compact form of a spun yarn or thread, cannot be detonated through the agency of a large charge of fulminate buried in the material. The light and loose gun-cotton is simply scattered with violence; portions are sometimes inflamed by the heat developed where the fulminate is detonated, a result which is obtained with greater certainty the less violent the detonation produced by the fulminate-charge. If, however, the gun-cotton be converted into a compact form, either by ramming the wool or thread very tightly into a case, or better still, by reducing the gun-cotton fibre to a very fine state of division, and compressing it, when in that condition, into compact masses, it becomes susceptible of detonation by the initiative action of mercuric fulminate, and the quantity of the latter required to bring about detonation is small (down to the limit which has been named above) in proportion as the compactness or density of the compressed material is increased.

Detonation, when established in compressed gun-cotton, is transmitted with great velocity throughout the mass, as already stated, or from one to another of contiguous masses, laid out in long rows, and even, though at a reduced rate, if small spaces exist between the individual masses. But if a small mass of compressed gun-cotton freely exposed to air be detonated when in immediate contact with gun-cotton wool or loosely twisted yarn, the detonation will not be transmitted to these, but they will merely be scattered and perhaps inflamed.

The difference in the behaviour of nitro-glycerine and of gun-cotton when presented to the action of a so-called initiative detonation under the different conditions spoken of above, admits of ready explanation.

It was established, in the first instance, that the action of an initiative detonation is not ascribable to the heat developed within the detonating material itself, in undergoing chemical metamorphosis. If it were so, the detonating mixture known as percussion cap composition and other explosive mixtures, the detonation of which is attended by much greater development of heat than is obtained by the action of pure mercuric fulminate, should detonate gun-cotton more readily than the latter does, whereas very much larger quantities of such materials are required to attain that result; moreover, the readiness with which gun-cotton is detonated should be solely proportionate to the *amount* of fulminate used, which has been shown not to be the case; and gun-cotton should be more readily detonated when in the loose and open condition than in the highly compressed or compact form, because the latter presents it in the condition least favourable, and the former in that most favourable, to ready and rapid transformation by heat. Again, the actual temperature required for the explosion of nitro-glycerine is very considerably above the exploding temperature of gun-cotton, yet a very much smaller charge is required for the detonation of nitro-glycerine than is needed for the detonation of gun-cotton. On the other hand, a quantity of confined percussion cap composition which, if it were pure mercuric fulminate, would be altogether inadequate for the detonation of gun-cotton, suffices for the detonation of nitro-glycerine.

The action of an initiative detonation has already been compared to that of a blow from a hammer or falling weight. The readiness and certainty with which gunpowder, gun-cotton, and other explosive agents are detonated by the latter agency are regulated by several circumstances; they are in direct proportion to the weight of the falling body, to the height of its fall, and to the force with which it is impelled downwards; to the velocity of its motion; to the mass and rigidity or hardness of the support upon which the substance to be detonated rests; lastly, to the quantity and mechanical condition of the explosive agent struck, and to its sensitiveness.

Gunpowder is much more readily detonated by a sharp blow from a small hammer, than by the simple fall of a heavy hammer, or by a comparatively weak blow from the latter. It is very difficult by repeated blows, applied at very brief intervals, to detonate gun-cotton if placed upon a support of wood or lead, both of which materials yield to a blow, the force applied by that blow being transferred through the explosive agent and absorbed in work done upon the material composing the support. But if the latter be of iron, which does not yield permanently to the blow of the hammer, the detonation of those substances is easily accomplished. If the quantity of the explosive agent employed be so considerable as to form a thick layer between the hammer and support, the force applied is to so great an extent expended in imparting motion to the particles of the compressible mass, that there remains little or none by which its detonation can be accomplished, and if the material be in a loose or porous condition (as in the case of a powder or of loose wool), much work has to be accomplished in moving particles of the mass through a comparatively considerable space, in the operation of compressing them, so that a second or even a third blow is required for their detonation; whereas if, by blows or pressure previously applied, the explosive material will be presented in the form of a compact mass, the particles of which have little tendency to motion when force is applied to them, detonation will be much more readily developed. It appears therefore that the detonation of an explosive substance by means of a blow is the result of the development of heat sufficient to bring about most energetic chemical action, or change, by expenditure of force in the compression of the material, or by establishing violent friction between its particles, consequent upon the motion momentarily imparted to them, and that it is brought about with a readiness proportionate to the resistance which they oppose to their motion by the degree of their contiguity to each other.

The exceedingly violent motion of particles resulting from the sudden or extremely rapid transformation of a solid or liquid explosive body into highly heated gas or vapour (which is the effect of a detonation), must obviously exert force which operates upon a body opposed to it in a manner precisely similar to the force applied by opposing a body in the path of a solid mass which is set into very rapid motion. In other words, a detonation exerts a mechanical effect upon resisting bodies precisely similar to that of a blow from a hammer or from a projectile propelled from a gun. Just as the force of a sufficiently sudden or powerful blow from a hammer is transformed into heat by the resistance to the motion of the hammer which the particles of an opposing body offer, and by the consequent friction established between them, so the force or concussive action exerted by the matter set in motion when a solid or liquid is converted into gas or vapour, will also be transformed into heat, the development of which in an opposing body will be proportionate to the resistance to motion which its particles offer, and to the suddenness and violence of the concussion to which it is subjected. The power of accomplishing the detonation of nitro-glycerine, gun-cotton, or other highly explosive substances, freely exposed to the air, through the agency of detonation produced in their vicinity or in close contact with them, appears therefore correctly ascribable to the heat suddenly developed in some portion of the mass by the mechanical effect, or blow exerted by that detonation, and is regulated by the violence and suddenness (either singly or combined) of the detonation, by the extent to which the particles composing the mass of the explosive material are in a condition to oppose resistance to the force, and by the degree of sensitiveness of the substance to detonation, or to sudden metamorphosis, under the influence of heat thus developed.

It will now be evident why the readily yielding nature of the particles of liquid nitro-glycerine tends to counteract its great sensitiveness to detonation, and why, when the motion of the liquid particles is impeded by their admixture with solid matter, and when they are consequently placed in a position to resist mechanical motion by the force applied through the agency of detonation, its natural sensitiveness to detonation, and the rapidity with which it can be transmitted from particle to particle became fully developed.

Again, the reduction of gun-cotton fibre to a fine state of division, which renders the material readily convertible into very compact and dense masses, places the particles in the condition most favourable to resist mechanical motion upon the application of a blow, or of the concussion resulting from a detonation; hence, compressed guncotton is readily susceptible of detonation in proportion to the extent of compression, or to its density and compactness, while loose gun-cotton wool, or the lightly twisted or compressed material cannot be readily detonated, because the force applied is expended in imparting motion to the readily yielding particles of the mass. If the force applied through the agency of a detonator to a mass of explosive material just borders upon that required for the development of the detonation, or if the condition of the mass is such as hardly to present the requisite resistance to mechanical motion essential for its detonation, then, results intermediate between the mechanical dispersion of the mass and its violent chemical dispersion or disintegration, *i.e.*, detonation, are obtained. Thus, frequent instances have been observed, especially in the experiments in the transmission of detonation through tubes, in which the initiative detonation has brought about an explosion attended with little, if any, destructive effect, portions of the mass being at the same time dispersed and occasionally inflamed. Not only have such results often been obtained with gun-cotton and dynamite, but even mercuric fulminate, exposed to the concussion of a distant detonation transmitted through a tube, has frequently been exploded in a manner quite distinct from the violent detonation developed in other instances. Silver fulminate, which under ordinary conditions detonates violently, even when only a particle of the mass is subjected to a sufficient disturbing influence, has been exploded without the usual demonstrations of force, by the transmitted effect of a detonation of mercuric fulminate. In these instances the violence of the concussion produced by the initiative detonation was only just bordering on that required for the development of detonation, and it appears probable that only some small portion of the mass operated upon was in a condition or position favourable to the action of the initiative blow. The remainder of the mass would then be dispersed by the gases developed from the detonated portion; in some instances the particles would be inflamed at the moment of their dispersion, in others, they would even escape ignition. The latter appears to be always the case when gun-cotton is exploded by a blow from a hammer or falling weight. However carefully the arrangements are adjusted with a view to distribute such a blow uniformly over the entire mass struck, the concentration of a preponderance of the force applied upon some portion or portions of the entire mass appears almost inevitable; hence, only a small portion is actually detonated, the remainder being instantaneously dispersed by the gases suddenly generated while the weight is still resting upon the support.

Some experiments made in firing at masses of compressed gun-cotton, differently arranged and of different thicknesses, with a Martini-Henry rifle, at short ranges, afforded interesting confirmation of the correctness of the explanation given of the operation of a blow upon masses of explosive material under different conditions. Disks of gun-cotton of the same density and diameter, but differing in thickness, were fired at; they were freely suspended, and their distance from the marksman was in all instances 100 yards. The thinnest disks were simply perforated by the bullets, not a particle of the gun-cotton being ignited. Somewhat thicker disks were inflamed by the impact of the bullet, while still thicker disks, fired at under the same conditions, were exploded, portions being in some instances dispersed in a burning state. No instance of detonation was, however, obtained. These differences in effect, obtained with masses of different thickness and weight, are due to the difference in their power to resist mechanical motion when struck by the bullet, and in the different amount of resistance to penetration presented by the thin and the thicker disks.

It has been explained that nitro-glycerine may be largely diluted with inert solid matters without its sensitiveness to detonation being reduced, while its detonation in open air becomes very much facilitated, because the mobility of the particles, and their consequent tendency to yield to the force of a blow or detonation is very greatly diminished. But if a *solid* explosive agent is diluted with inert *solid* matter the case is different; for in such a mixture of the finely divided solid with non-explosive solid particles, there must be a partial and sometimes a complete separation of the particles of the explosive by the interposed inert particles with which it is diluted; hence the sensitiveness to detonation is reduced, and its transmission by the particles is retarded or altogether impeded, by a diminution of the extent of contact between the substance to be detonated and the initiative detonation, and by the barrier which the interposed non-explosive particles oppose to the transmission of detonation. Thus a mixture of mercuric fulminate with more than one-fifth its weight of French chalk could not be detonated by means of one grain of pure fulminate enclosed in a copper capsule, which was inserted into the mixture; that quantity, similarly confined, sufficed to detonate undiluted fulminate through a tube 8 inches long and 0·5 inch in diameter. In experiments made in this direction with finely divided gun-cotton, it was found that although dilution with an inert solid, applied in the *solid form*, reduced the sensitiveness of the material to detonation, this was not the case when it was incorporated with a salt soluble in water, the mixture being then compressed while in the wet state. The compressed masses thus obtained were, when dried, in a condition of greater rigidity than could be attained by submitting undiluted gun-cotton to considerably more powerful pressure, because the crystallization of the soluble salt used as the diluent upon evaporation of the water, cemented the particles composing the mass more rigidly together. The gun-cotton was therefore presented in a form more capable of resisting the mechanical action of a small charge of fulminate than a more highly compressed undiluted gun-cotton, and hence the reduction in sensitiveness due to the detonation of the explosive compound is nearly counterbalanced by the greater rigidity imparted to the mass. If a soluble oxidizing agent (a nitrate or chlorate) be employed as the diluting material, the predisposition to chemical reaction between it and the gun-cotton (which is susceptible of some additional oxidation), appears to operate in conjunction with the effect of the salt in imparting rigidity to the mixture, thus rendering the latter quite as sensitive to the detonating action of the minimum fulminate charge as undiluted gun-cotton. Moreover, the interesting fact has been conclusively established, that these compressed mixtures of gun-cotton with a nitrate or a chlorate are much less indifferent to the influence of detonating nitro-glycerine than gun-cotton in its pure state. Chlorated and nitrated gun-cotton are detonated with certainty by means of half-ounce of nitro-glycerine, whereas the detonation of 2 oz. of the latter accomplished the detonation of ordinary compressed gun cotton only once in a large number of experiments.

(*To be continued.*)

QUEBRACHO, A PALLIATIVE REMEDY IN DYSPNŒA.*

Dr. F. Penzoldt, of Erlangen (*Berl. Klin. Wochenschrift*, No. 19, 1879), narrates some experiments both on man and animals with a new drug, the bark of *Aspidosperma quebracho* (*Apocynaceæ*), sent from Brazil, where it is reputed to have antipyretic properties. The form of preparation used throughout was a watery solution of an alcoholic extract of the bark, ten parts of the latter being percolated with one hundred of alcohol for several days, and the liquid filtered, evaporated, dissolved in water, again evaporated to dryness, and the residue dissolved in twenty parts water.

The main results obtained in frogs were complete motor paralysis of central origin, respiratory paralysis, and diminished frequency of the pulse, independent of irritation of the vagus. In rabbits and dogs, motor paralysis and dyspnœa, increasing with the dose administered, were noticed. The dyspnœa in the rabbit, however, appeared to depend on retardation and deepening of the inspirations; while in the dog the inspirations were accelerated. In the latter, also, there was salivation.

Experiments on animals with artificial fever, produced by injecting putrid fluids, showed no decided reduction of the temperature, and hence quebracho is probably not, as was supposed, an antipyretic. It should be added that it is not an antiseptic, but only temporarily retards putrefaction. The results obtained in actual cases of fever in men were also negative, but Dr. Penzoldt thinks that, considering the close chemical relationship between the alkaloid "aspidodermine" which Baeyer has extracted from quebracho-bark, and quinine, the subject requires further working out in this direction.

By the accidental observation of a patient with pleurisy and emphysema, on whom the antifebrile effect of quebracho was being tried, Dr. Penzoldt was led to try the bark in various forms of dyspnœa, depending on emphysema, bronchitis, phthisis, pleurisy, etc., and obtained remarkably good results. A teaspoonful of the above-mentioned solution was given two or three times a day. The most marked objective phenomenon after its exhibition was a reddening of the previously cyanosed or livid tint of the lips and face. In a case of emphysema where the patient was blessed with a nose the seat of acne hypertrophica, the ordinary violet-blue colour of the organ became fiery red, and excited the surprise of the other patients in the ward. The respirations generally became deeper and less frequent, and the patients expressed themselves subjectively much relieved. The first feeling after taking the drug was one of warmth in the head; many said that they had less desire to cough, and that they found expectoration easier. Occasionally sweating occurred, and in some cases abundant salivation. No bad effects were noticed with the dose mentioned.

Dr. Penzoldt finds that the addition of quebracho solution to blood, in the presence of oxygen, makes it assume a bright red colour, and he is inclined to think that possibly the blood is rendered capable of taking up more oxygen than usual, and carrying it to the tissues. This is, however, merely a provisional hypothesis, and at present there is no satisfactory explanation of the fact that, while moderate doses of the extract alleviate dyspnœa in man, large doses cause dyspnœa in the lower animals.

As yet, quebracho bark is not a commercial product, but the *wood* is imported in large quantities for tanning purposes. The action of an extract of the wood is similar to that of the bark, but weaker. The alkaloid aspidodermine affects the frog, on the whole, just as the extract of the bark does.

* From the *Medical Times and Gazette*, July 12, 1879.

ANALYSIS OF EUPATORIUM PERFOLIATUM.*

BY PETER COLLIER.

The author reports the following result of the examination of "Boneset," *Eupatorium perfoliatum*, Lin. This plant has long had the reputation in domestic medicine of being a good tonic, especially valuable in the spring. Physicians have also attributed to it virtues as a diaphoretic, expectorant, emetic and anti-intermittent. Whether all claimed for it is true must be settled by the physician, but the present chemical examination has been undertaken with the hope of throwing some light upon the proximate principles to which are due the medicinal effects of the herb. Partial analyses have been made by W. Peterson (*Amer. Jour. Pharm.*, 1851, xxiii., p. 206), and by M. H. Bickley (*Amer. Jour. Pharm.*, 1854, xxvi., p. 459).

Probably the bitter principle is the only one of medicinal importance. It is a brown uncrystallizable substance, soluble in water and alcohol, insoluble in ether. It was impossible to purify this substance well.

Upon evaporation of an alcoholic extract of the drug a few white prismatic crystals were deposited. These crystals were difficultly soluble in hot alcohol and insoluble in ether, water, dilute acids and dilute alkalies. They seem, therefore, to be neither acid nor alkaloid, but rather of an indifferent character.

The drug appears to contain very little volatile oil, although its odour may be accounted for by this small amount present.

Starch is not abundant. The tannic acid found gave the usual reactions, except that it failed to precipitate tartar emetic from its aqueous solution. The albuminoids were calculated from total nitrogen, multiplied by 6·25.

It is impossible to say whether sugar was present in the substance, since the bitter principle would probably give similar reactions.

The following analysis is regarded as an approximation only, but care has been taken to eliminate all preventable errors:—

Analysis of "Boneset," Eupatorium Perfoliatum.

Water	9·17	per cent.
Ash	7·51	,,
Albuminoids	13·30	,,
Resins and Chlorophyll	15·15	,,
Indifferent Crystalline Substance .	2·87	,,
Tannic Acid	5·04	,,
Bitter Extractive.	18·84	,,
Gum and Colouring Matter . . .	7·23	,,
Starch Isomers	12·47	,,
Cellulose	9·32	,,
Humus Substances	traces.	
Volatile Oil	traces.	

* From the *American Journal of Pharmacy*, July, 1879.

The Pharmaceutical Journal.

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THE PROSECUTION UNDER THE APOTHECARIES ACT AT BIRMINGHAM.

AFTER a delay of about two years, judgment has been given in the case of prosecution for breach of the Apothecaries Act at Birmingham, and as reported in the Journal last week, that judgment is adverse to the defendant. When the case was tried in the Birmingham County Court in July, 1877, it was believed and expected that the appeal then being made against the decision given in the SHEPPERLEY case would result in causing some light to be thrown upon the questions involved in this prosecution as between medical practitioners and chemists and druggists. Upon that ground the County Court Judge resolved to defer judgment until after a decision had been given in the appeal so as to avoid putting the defendant to the trouble and expense of taking a second case to be decided by a higher tribunal.

At the time the Judge expressed himself as being in some perplexity as to the proper intrepretation of the law relating to the case, and as to what might and might not be regarded as coming within the legitimate functions of the chemist and druggist as a vendor of drugs. Having regard to the opinion expressed by Baron BRAMWELL shortly before, he considered that the recommendation and supply of any medicine or drug for the purpose of relieving some bodily ailment might be technically construed as infringing the terms of the Apothecaries Act, inasmuch as that would be doing what the apothecary had a right to do in the exercise of his calling and under the licence of the Society of Apothecaries.

Whilst recognizing this strict reading of the law as correct from a legal point of view, however, the County Court Judge also concurred with Baron BRAMWELL in thinking that it would be very unreasonable for the Society of Apothecaries to interfere in a case so simple as that of a person asking for and receiving a simple remedy for such an ailment as a headache or any similar ordinary complaint. But he also stated that in his own mind he was not prepared to adopt in its entirety the view of Baron BRAMWELL that in every instance a chemist and druggist furnishing medicine to relieve bodily ailments would be stepping beyond his province and—by infringing upon that of the medical practitioner—be committing a breach of the Apothecaries Act.

The opinion expressed at the time by the Judge was that the Society of Apothecaries never intended to interfere with chemists and druggists supplying remedies in trifling cases. He therefore considered that such an interpretation of the law as Baron BRAMWELL had adopted was too strict, and he appears to have been led to this opinion by recognizing the possibility of a distinction being drawn between mere advice or recommendation as to the kind of medicine and its use for certain purposes, as forming part of the business of vending, and the prescribing of medicine as a result of the examination of a patient by the ordinary means of ascertaining symptoms, and with the object of treating disease.

From a common sense point of view there is much reason for recognizing this distinction, but unfortunately the Apothecaries Act does not either define what is meant by acting as an apothecary or specify whether the rights specially reserved to chemists and druggists by the 28th section comprised the right to do as they and apothecaries also had previously done in giving advice as to the use of simple remedies. As a matter of law, therefore, it was difficult, if not impossible, to decide whether or not the recommendation of medicine or advice as to its use in connection with the vending of it was to be understood in the meaning of the Act as "practising as an apothecary." If this were held to be the case it was equally difficult to decide whether or not the right of giving such recommendation and advice was reserved to chemists and druggists in virtue of usage prior to the Act of 1815.

For the sake of gaining from the decision of the SHEPPERLEY appeal some information and guidance on these points the Birmingham County Court Judge adjourned the case heard by him in 1877. That appeal has now been disposed of, but the assistance it was expected to furnish towards the settlement of the important questions above mentioned has not been obtained. It is still an open question what is meant by acting as an apothecary within the meaning of the Act of 1815. It is still a question where the line is to be drawn between the recommendation and advice properly appertaining to the vending of drugs and medicines, as forming part of the chemist and druggist's business, and the application of remedies to the treatment and cure of disease, which is the function of the medical practitioner holding himself out to the public as specially qualified for that work.

It was upon this view that the decision just given by the Birmingham County Court Judge was based. He takes the evidence of Mr. PARSONS as showing undoubtedly that before the year 1815 chemists and druggists did something beyond merely selling medicines; but he points out that even if they were then in the habit of advising patients or prescribing medicine it does not follow that they ever had the legal right to do so, or that at the present day chemists and druggists are protected by the 28th section of the Act in case they do so. The legal right to practise medicine or surgery and to treat disease is given by the registration of the practitioner who holds himself out, in virtue of the special qualification by which he has secured registration, as the proper person for performing those duties.

In the case that has now been decided at Birmingham the defendant had not the legal right to practise medicine, and as the case for which he prescribed was considered to require medical knowledge and skill, he is held to have "acted as an apothecary" and thus to have come within the provisions of the Apothecaries Act. That this is a just decision of the case we may gather from the resolve of the Executive Committee of the Chemists and Druggists' Trade Association not to appeal against it.

In connection with this matter it will be interesting to learn that the President of the Nottingham Medical Defence Association also expresses regret that the SHEPPERLEY case has not led to a decision of the question as to the legality of counter practice, although affording opportunity for an authoritative exposition of the law. In speaking of the general weakness of the case which has called forth so much comment, he seeks to explain this by stating that it was never intended DEATH'S evidence should be relied upon, and that even in the original county court proceedings he was not to be put into the box. There were—he goes on to say—other witnesses, who, judging from the statements they made to the solicitors of the Medical Defence Association, were prepared to prove a strong case against the defendant. Those witnesses entirely failed to support the objects of the prosecutors, who, Mr. STANGER informs us, would have accepted their defeat if the Judge had not unfortunately given a decision in their favour, partly on the evidence of DEATH, but chiefly on the admissions made by the defendant.

It is seldom that litigation is productive of so much satisfaction all round as is claimed to have been the result of the SHEPPERLEY case, and though we are inclined to think that the most substantial satisfaction fell to the share of the lawyers, we are not at all disposed to interfere with the happiness of those who find reason to be pleased.

A NEW PHARMACY ACT IN THE STATES.

THE "People of the State of New York, represented in Senate and Assembly," have just enacted a law "governing the sale of drugs and poisons in the County of Kings" in that state. For convenience of reference and to illustrate the position which pharmacy is taking in the United States a short abstract will be useful.

In accordance with its title this Act makes it illegal for any one not registered under its provisions, after the first day of October next, to open or conduct any pharmacy or store for retailing or compounding medicines or poisons in the county of Kings; but it also goes further and makes it illegal for any but a registered pharmacist to prepare physicians' prescriptions except under the supervision of a registered pharmacist.

The Act is not wanting in stringency in other directions, for in order to procure the registration necessary a person must (1) be a graduate in pharmacy or in medicine, who has had at least four years' experience in stores where prescriptions of medical practitioners have been compounded and hold a diploma from a legally constituted college; or (2) have had at the time of the passing of the Act ten years' practical experience in the preparation of physicians' prescriptions; or (3) have had four years' similar experience and pass an examination by a Board appointed under the terms of the Act, consisting of three pharmacists and two medical men; or some other recognized Board of Pharmacy.

There are two schedules of poisons. Schedule A corresponds to Part 1 of our schedule in containing the poisons that are not to be sold without registration. Among these are to be found several that are in Part 2 of the British schedule, such as the white and red precipitates, essential oil of bitter almonds, and opium and its preparations, except paregoric and other preparations of opium containing less than two grains to the ounce. On the other hand aconite, savin, ergot and cantharides are remitted to the second schedule, which also includes henbane, digitalis, croton oil, creosote, sulphate of zinc, mineral acids and carbolic acid. The registers used for recording the sale of poisons in Schedule A are to be preserved for five years and to be open for inspection by the proper authorities, and none of the poisons in either schedule are to be sold without labelling the bottle or other containing vessel, as well as the outside wrapper, with the name and address of the seller and the word "poison," or without ascertaining that the buyers are aware of their poisonous nature.

Another feature of the Bill is an adulteration section, which provides that the pharmacist shall be held responsible for the quality of his goods, except in the case of original packages and patent medicines. A conviction for fraudulent adulteration is to be punishable by a fine of one hundred dollars and erasure of the offender's name from the register. The duty of prosecuting for offences under the Act is thrown upon the district attorney upon information laid by the Board of Pharmacy.

THE Sale of Food and Drugs Act (1875) Amendment Bill was read a third time in the House of Lords on Wednesday last.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

At a meeting of the Board of Examiners for England and Wales, held in London, on Wednesday, July 16, 1879, the report of the College of Preceptors on the examination held on July 1 was received.

Three hundred and sixty-five candidates had presented themselves for examination, of whom *one hundred and eighty-one* had failed. The following *one hundred and eighty-four* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

(Arranged alphabetically).

Allen, Ernest Edward ....Winchester.
Allen, Richard ....Ramsey.
Angus, Wm. Cockburn ....Aberdeen.
Armstrong, Charles ....Streatham.
Bailey, Henry ....Chesterfield.
Bailey, Walter Thomas ....Coventry.
Baker, Alfred, jun. ... .March.
Barber, William John ....Croydon.
Barnett, Henry Frederick ....Uttoxeter.
Baron, Richard Edward ....Alderney.
Barrass, Arthur ....Hingham.
Beesly, Charles William ....Cambridge.
Berry, Walter ....Manchester.
Betts, George Priest................Norwich.
Blair, Thomas, jun. ....Girvan.
Blankley, T. E. B. ....Sleaford.
Bostock, Samuel ....Hyde.
Bousie, William Hutton ....Kirkcaldy.
Bradley, Frederick William ...Wisbech.
Brice, Ernest.............................Wirksworth.
Briggs, George ....Leeds.
Brindle, Edward ....Edinburgh.
Broad, Arthur Edmund ....London.
Broumpton, Frederick Richard.London.
Brown, Andrew P. ....Glasgow.
Brown, Charles Maltby ....York.
Bruce, Alexander Gibb ....Broughty Ferry.
Butterfield, Frederick Victor ...Thirsk.
Butler, Ernest F. N. G. ....London.
Callow, Ewan ....Douglas.
Cameron, John Wallace ....Sunderland.
Capper, William ....Bath.
Carruthers, Christopher ....Carlisle.
Chadwick, Arthur ....Leeds.
Clarke, Walter ....Bromley.
Clayton, Walter F. ....London.
Clegg, George ....Accrington.
Cooper, Harry Stanley..............London.
Countze, Napoleon W...............Bournemouth.
Crookes, George Wilkson ....Eckington.
Cubey, Robert Hewison ....South Shields.
Cummings, John Dickie ....Alloa.
Deakin, John William..............Leftwich.
Deck, Arthur Albert ....London.
Dibble, Alfred Tom..................Bristol.
Dickson, James Currie ....Dumfries.
Dixon, Philip Thomas ....King's Lynn.
Dodds, Ernest ....Sheffield.
Dunn, George M........................London.
Edwards, Henry ....Bootle.
Edwards, Llewelyn ....Llandyssul.
Elliott, Henry ....London.
Ellisson, Charles ....Barnsley.
Elston, Albert ....Long Sutton.
England, William......................Sheffield.
Fairhurst, John James ....Grappenhall.
Farlow, James Southward ....London.
Farthing, Thomas William ....Devonport.
Flower, Edward Ashbrook ....Derby.
Fooks, Robert Spiller ....Bridport.
Forster, James ... .Musselburgh.
Foster, Henry Simpson..............Rotherham.
Freshury, John William S. ....Lincoln.
Gascoyne, Edward ....Wolverhampton.
Gaskin, Alfred Charles..............Wolverhampton.
Gibson, Matthew Henry ....Matlock Bath.
Glasspole, Lorenzo B. ....Portsmouth.
Gooch, Stephen Leeds ....Reepham.
Greaves, John Elijah ....London.
Green, Charles A. P....................London.
Green, Frederick ....London.
Green, Joseph H. B.....................Swindon.
Grey, William ....Blyth.
Gourlay, Robert George ....Lytham.
Graham, Frederick Albert ....Leeds.
Grant, Daniel ....Edinburgh.
Grimwade, Edward Hall............Croydon.
Haining, Edward ....Dumfries.
Hankinson, Alfred William.......Grange-over-Sands.
Hall, Ernest Edward ....Wednesbury.
Hart, Edgar Thomas ....Rochester.
Hartley, George Thomas............Bath.
Hasler, Joseph ....Blackburn.
Hawley, Arthur ....Coventry.
Henderson, David James ....Dunbar.
Hill, Major ....Sleaford.
Hocken, James Preston ....Heaton Chapel.
Hornby, Robert William.............London.
Horsfall, William.........................York.
Hurcomb, Lawrence E.................Nottingham.
Idenden, Richard Frederick ......Dartford.
Ingham, William Linnell ....London.
Inman, Thomas Leonard.............Batley.
Irvine, John C. D. ....Aberdeen.
Jarvis, Joseph Alexander ....Devizes.
John, Benjamin ....Narberth.
Johnson, Henry Haden ....Sedgley.
Johnson, Sydney Arthur..............Wisbeach.
Jones, Eustace Harry ....Dartford.
Jones, Maurice Howell ....Machynlleth.
Jones, Thomas John......................Cardigan.
Joye, Joseph...................................Southport.
Keene, Walter F. W. ....Margate.
Knox, John ....March.
Lawton, Ernest...............................Barnsley.
Levick, George A. M. ....Mansfield.
Llewhelin, Ivor Vaughan ....Fishguard.
Loudon, John James ....Glasgow.
Lumby, Walter................................Tranmere.
Macaulay, Colin McUlloch ....Perth.
Marshall, Henry B. K.....................Hardingstone.
Massey, William ....Preston.
McEwan, David ....Perth.
McMaster, Thomas ....Stranraer.
Matthews, Henry Paget...................Aldershot.
Melhado, Howard Emanuel ....Ramsgate.
Mercer, Frederick Clarke ....Coventry.
Middleton, Burton ....Ilkley.
Milton, Alexander ....Aberdeen.
Mohun, Charles Thomas ....Herne Bay.
Morgan, Richard ....London.
Morgan, William John ....St. Clears.
Mussellwhite, William.....................Basingstoke.
Naylor, James Louis ....Brownedge.
Neale, Matthew Henry ....Woolwich.
Neech, James Thomas.....................Felmingham.
Oldis, Edward Charles.....................London.
Owen, Robert Godfrey ....Liverpool.
Owen, William ....Towyn.
Pawson, Frederick Thomas..............Oakham.
Priestly, William ....Harrogate.
Pugh, Joseph ....Wotton-under-Edge.
Pye, Thomas ....Bennetthorpe.
Rees, Harding ....South Norwood.
Roberts, Griffith ....London.
Robinson, Thomas ....Wigton.

Roper, Joseph Charles............Chesterfield.
Rowe, Arthur ....Windsor.
Rowell, Joseph Elsum............Whittlesea.
Rowntree, Alfred Henry.........Manchester.
Rule, Alexander ....Aberdeen.
Rushton, Martin ....Liverpool.
Sant, Esdras ....Pontypridd.
Sapsed, William George ....London.
Saunders, Samuel Harry.........Oswestry.
Scudamore, George William ...Bristol.
Shadwick, Joseph....................Wigton.
Shepard, William....................Newport, I.W.
Shepperd, William John.........Newport, I.W.
Siddall, George Ward ....Plymouth.
Skoulding, William George......Oakham.
Smalley, Arthur William ....Stamford.
Smedley, Arthur William W....Northampton.
Smedley, Frederic Robert ......Northampton.
Smith, Corbet Edward............Newport, I.W.
Southwell, Charles Bullock......Bridgenorth.
Spicer, George William ....Cranleigh.
Spivey, Fred.............................Huddersfield.
Spurge, Ernest Clements ....Ipswich.
Staley, Henry ....Burton-on-Trent.
Strachan, Alexander ....Rothienorman.
Stuart, Alexander...................Dufftown.
Swinburn, Banks ....Penrith.
Thomas, Thomas ....Swansea.
Thomas, William Morgan ....Glamorgan.
Thomason, Henry Williams ...Birmingham.
Thompson, Michael John ....Hexham.
Timm, Edmund ....Goole.
Valpy, Edmund Renouf ....Aylesbury.
Vaughan, Edward Edwards ...Rhyl.
Vickery, William Henry.........Plymouth.
Walker, Arthur ....London.
Walker, Arthur Heesom.........Altrincham.
Walker, James Henry............Hyde.
Watt, George ....Aberdeen.
Watt, John ....Leslie-by-Insch.
Whaley,Thomas Cope ....Barnsley.
White, Cresswell Fitzherbert...Chippenham.
Whyte, James ....Aberdeen.
Williams, George Alfred..........Shrewsbury.
Wilson, John ....Kirkcaldy.
Wilson, Joseph........................Chislehurst.
Wing, Arthur Joseph ....Cambridge.
Young, John...........................Arbroath.

The following is a list of the centres at which the examination was held, showing the number of candidates examined at each centre and the result:—

	Candidates. Examined.	Passed.	Failed.		Candidates. Examined.	Passed.	Failed.
Aberdeen	16	9	7	Lancaster	6	4	2
Birmingham	21	10	11	Leeds	17	8	9
Brighton	1	1	0	Lincoln	7	4	3
Bristol	12	7	5	Liverpool	13	7	6
Cambridge	4	2	2	London	52	36	16
Canterbury	2	2	0	Manchester	20	9	11
Cardiff	7	3	4	Newcastle-on-T.	10	4	6
Carlisle	9	6	3	Northampton	6	3	3
Carmarthen	8	5	3	Norwich	14	4	10
Carnarvon	9	3	6	Nottingham	12	4	8
Cheltenham	3	0	3	Oxford	1	1	0
Darlington	6	0	6	Peterborough	15	10	5
Douglas, I. of M.	2	2	0	Sheffield	7	7	0
Dundee	7	4	3	Shrewsbury	4	3	1
Edinburgh	16	6	10	Southampton	15	6	9
Exeter	8	3	5	Truro	4	1	3
Glasgow	12	5	7	Worcester	2	0	2
Guernsey	1	0	1	York	11	4	7
Hull	5	1	4				

The questions for examination were as follows:—

FIRST OR PRELIMINARY EXAMINATION.

1st *July* 1879.

Time allowed: Three Hours for the three subjects.

1. Translate the following passages into English:—

A. Eo concilio dimisso, iidem principes civitatum, qui ante fuerant ad Cæsarem, reverterunt, petieruntque, uti sibi secreto de sua omniumque salute cum eo agere liceret. Ea re impetrata, sese omnes flentes Cæsari ad pedes projecerunt: "Non minus se id contendere et laborare, ne ea, quæ dixissent, enunciarentur, quam uti ea, quæ vellent, impetrarent; propterea quod, si enunciatum esset, summum in cruciatum se venturos viderent."

B. Cæsar loquendi finem fecit, seque ad suos recepit; suisque imperavit ne quod omnino telum in hostes rejicerent. Nam, etsi sine ullo periculo legionis delectæ cum equitatu prælium fore videbat, tamen committendum non putabat, ut, pulsis hostibus, dici posset, eos ab se per fidem in colloquio circumventos.

2. Decline throughout *principes*, *re*, *finem*, *equitatu*, *colloquio*.

3. Explain the construction known as the "Ablative Absolute," by the aid of the examples of it in the above passages.

4. Name the prepositions which occur above, arranging them in a table, according to the case which each takes after it.

5. Translate into Latin:—Cæsar did not wish the conference to be broken off. They appointed a day for the conference. The Helvetii were defeated by Cæsar. The forces of Ariovistus were distant four and twenty miles from our men.

II. ARITHMETIC.

(The working of these examples, as well as the answers must be written out in full.)

6. Find the value of 1 cwt. 3 qrs. 12 lbs. at £1 2*s.* 6*d.* per cwt.

7. Calculate the equivalent, on the metric system, of 10 oz. 5 dr. 2 scr.

8. Divide $(\frac{3}{8}+\frac{5}{16})$ by $(\frac{1}{4}+\frac{1}{5})$.

9. Express as decimals $\frac{1}{4}$, $\frac{1}{5}$, $\frac{3}{8}$, $\frac{5}{16}$.

10. What is the income corresponding to an Income Tax of £13 2*s.* 6*d.*, at the rate of 7*d.* in the £?

11. Compare the measurement of weight in the metric system with the various English standards. Why is the metric system easier to work?

III. ENGLISH.

12. What parts of speech may an adverb qualify?

13. Explain, by the help of examples, the correct use of *shall* and *will*.

14. In what respects does the Relative agree with its Antecedent? How far is it independent of its Antecedent?

15. Parse:—

"If the pilot slumber at the helm,
The very wind that wafts us towards the port
May dash us on the shelves."

16. Write a short essay on one of the following subjects:—The Electric Light, the Phonograph, the Telephone, the War in Zululand, Recreation, Co-operative Stores.

Provincial Transactions.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION OF GREAT BRITAIN.

MEETING OF THE EXECUTIVE COMMITTEE.

A meeting of the Executive Committee of this Association was held at the office of the Association, 23, Burlington Chambers, New Street, Birmingham, on July 8, 1879, at 1 p.m., Mr. Thomas Barclay (Birmingham), President, in the chair. Mr. Robert Hampson (London), Vice-President.

Present—Messrs. Andrews (London), Arblaster (Birmingham), Bell (Hull), Churchill (Birmingham), Cross (Shrewsbury), Davison (Glasgow), Holdsworth (Birmingham), Jones (Leamington), Maltby (Lincoln), Reynolds (Leeds), Southall (Birmingham), Symes (Liverpool), Walker (Coventry), and the Solicitor of the Association.

The minutes of the previous meeting of the Executive were read and approved, the appointment of committees and officials for the ensuing year was proceeded with.

In reply to a question, the Secretary said the taxed costs of the defendant in the case of the Apothecaries' Company *v.* Shepperley, amounting to £165 15*s.* 8*d.*, had a few days previously been paid to the Association.

Mr. Jones directed the attention of the committee to the medical bills before Parliament.

The President said he thought it would be undesirable for the Association to take any steps in regard to these bills until the Select Committee which had been appointed by the House of Commons had issued their report.

Mr. Hampson said it appeared evident that the medical profession were not disposed to allow the question of counter practice to rest. The Apothecaries' Company had just sustained a case in that town and gentlemen reading the medical journals would find their tendency was to support all the demands of the medical men. If the Select Committee were going into the whole question of medical legislation the question naturally arose as to the desirability of the Association moving in the matter.

Mr. Davison said he thought the fact of so many medical men keeping open shops, in very many instances managed by unqualified persons, should be brought under the notice of the chairman of the Select Committee. In Glasgow alone there were about a hundred and twenty such shops.

Mr. Symes said the Select Committee would scarcely be likely to accept any dicta from the Association. If the Association attempted to in any way regulate the practice of medical men it would be stepping out of its province.

Mr. Reynolds said the Duke of Richmond's Bill was the only medical bill which stood any chance of passing during the present session of Parliament.

It was moved by Mr. Hampson, seconded by Mr. Reynolds, and unanimously resolved :—"That the Law and Parliamentary Committee be directed to watch the proceedings of the Select Committee sitting to consider the medical bills in the House of Commons, and to take such action as they may deem necessary."

The President said the gentlemen present would be aware that the Birmingham County Court judge had given his decision a few days previously in the case of the Apothecaries' Company *v.* Harrison, tried in the Birmingham County Court so far back as July 2, 1877, the judgment being withheld pending the decision in the case of the Apothecaries' Company *v.* Shepperley. The decision of the judge was in favour of the plaintiffs, and the defendant had been fined £20 and costs. The Secretary would read the judgment.

The following judgment was then read :—

"This is an action brought by the plaintiffs against the defendant to recover the sum of £20 by way of penalty under the 20th section of the 55 Geo. III. c. 194, for practising as an apothecary without having first obtained the necessary certificate. It was heard before me as far back as July 2, 1877, and was adjourned in consequence of the pending of an appeal to the High Court of Justice against the decision of the county court judge at Nottingham, in a case similar to the present and under the same Act of Parliament. That appeal has now been disposed of, and I am sorry not to be able to derive the assistance from it I anticipated. So far as concerns the question of what is meant by 'acting as an apothecary' within the meaning of the Act, or the still more important question whether in virtue of usage prior to the Act in 1815, the right continued for chemists to act as apothecaries in the treatment of simple ailments and the administration of simple remedies for their relief, the law is left very much in the same state of doubt as it was before. The facts of the case are really these. The defendant is a chemist and druggist carrying on business at Birmingham, and a young woman named Julia Caddick being unwell was advised to go to the defendant's shop for medicine. In her evidence she states that she went to the defendant's shop on November 27, 1876, and saw the defendant and asked him if he would make up some medicine to relieve her from a weakness she was suffering from. She says, 'she told him it was a weakness left on her from her last confinement, and that her womb came down.' She says further, 'that the defendant felt her pulse, looked at her tongue and asked her to describe her feeling, when she told him she suffered much from pains in the back.' After this, according to her evidence, the defendant gave her a bottle of medicine which he said would do her good, and told her to take it according to the instructions on the bottle. She says, 'she gave the defendant one shilling for the medicine and took some of it at once in the shop.' A bottle half full of medicine was produced in court at the trial by the witness and she stated that it was the same she obtained from the defendant at his shop on November 27. The witness was cross-examined at length, but her evidence was not shaken in any respect. The above is all the evidence on the part of the plaintiffs I consider necessary to state at length except that of the medical man, Dr. Suffield, who, in his examination stated, 'that he had heard the evidence given by the woman, and from her description of her suffering, and from what she stated she had told the defendant, he should imagine she was suffering from anæmia, which was a constitutional complaint of a dangerous character, frequently leading to death, if the patient was not properly treated.' In diagnosing a complaint of the nature described, Dr. Suffield observed, 'that one would go a little deeper into particulars than seemed to have been done in this case by the defendant.' On cross-examination Dr. Suffield said, 'he did not think feeling the pulse was a sufficient diagnosis of the disease.' Upon being requested by defendant's counsel, he examined the medicine in the bottle and said he thought it was a preparation of iron and would be a proper medicine for the case. In opposition to this, defendant himself was called as a witness and the material parts of his evidence were to the effect 'that he remembered Julia Caddick visiting his shop in November in the afternoon. She came and asked him to supply her with a bottle of strengthening medicine for a weakness after lying in.' He denies that he examined her at all and states it was not necessary. He says, 'he did not feel her pulse, and she did not tell him anything about the womb coming down.' He admitted, however, 'that he did ask her if the weakness had anything to do with her confinement, stating that he did so because he saw she had been recently confined, and had a baby in in her arms which she said was hers.' The witness then stated, 'I said to her, do you mean general weakness of the constitution; when she said, yes.' The witness then added, 'I mixed her up some stuff which I put into a bottle and put a label upon it. The label on the bottle which had been produced the witness admitted was his label.' He said, 'that the mixture in the bottle was not what the woman had from his shop, that he would swear.' This, with the exception of the evidence of an aged chemist called by the defendant, to whose evidence he should refer hereafter, is the whole of the evidence on the one side and the other, so far as the real question to be determined in the case is concerned. By the 20th section of the 56 Geo. III., c. 194, under which this action is brought, it is enacted, 'that if any person shall after the 1st August, 1815, act or practise as an apothecary in any part of England or Wales without having obtained a certificate as mentioned in the preceding section of the Act he shall be liable to forfeit and pay the sum of £20.' The 28th section of the same Act, the one on which defendant grounds his defence, enacts by way of proviso 'nothing in this Act contained shall extend or be construed to extend to prejudice, or in any way to affect the trade or business of a chemist and druggist in the buying, preparing, compounding, dispensing or vending drugs, medicines or medicinable compounds, wholesale and retail, but all persons using or exercising the said trade or business, or who shall, or may hereafter, use or exercise the same, shall and may use, exercise, and carry on the same trade or business in such manner and as fully and amply to all intents and purposes as the same trade or business was used, exercised or carried on by chemists and druggists before the passing of this Act.' The first point in this case to be considered is, has the defendant in the instance proved by this evidence acted as an apothecary? if he has, and is not protected by the proviso (it being admitted he has not obtained a certificate from the Society of Apothecaries), he is undoubtedly liable to pay the penalty sued for and the verdict must be for the plaintiffs. The defendant, however, raises two questions by way of defence. First, he says in what he did he did not act as an apothecary, and second, that if in strictness it should be held that he did, inasmuch as he was only carrying on his business of a chemist as chemists carried on their business before the passing of the Act in 1815, he is protected by the proviso referred to, which he contends permits chemists and druggists to carry on their business in the same manner as they did before the passing of the Act, and that chemists, so he says, the evidence proves were in the habit of advising patients in trifling cases as well as supplying them with medicines, and he argues that the present is a case of that character which a chemist would have treated before the passing of the Act, as the defendant has done since. Now with reference to the question raised by the first part of the defence, whether in what the defendant did he acted as an apothecary, the case of the Apothecaries' Company *v.* Lotinga, 2 M. and R., p. 500, decided in 1843, goes perhaps more fully into the question than any other, and in that case, Mr. Justice Cresswell told the jury that, 'an apothecary is a person who professes to judge of internal disease by its symptoms and applies himself to cure that disease by medicine,' and in the same case he tells them that 'a chemist is one who sells medicines which are asked for,' and in effect states, 'that if a chemist himself selected the medicines and determined on what he ought to give, he is stepping out of his lawful province as a chemist and entering upon that of an apothecary.' The definition of a chemist as given by Mr. Justice Cresswell in Lotinga's case would appear not to be large enough, because the 28th section of the Apothecaries Act referred to clearly shows that the trade of a chemist was not confined to selling medicines which were asked for merely, but extended to the preparing, compounding and dispensing them. His lordship's definition of an apothecary is, however, doubtless perfectly correct, for as recently observed by Mr. Baron Pollock, in Shepperley's case, it is to be presumed that Mr. Justice Cresswell did not mean internal as opposed to external disease, in the sense of a man having an eruption produced by some diseased condition of the body which the learned Baron observed would not be any less an internal disease, and if anyone proceeded to judge of it by the symptoms and apply medicine for its cure the law would equally apply to him as it would to the man who attempted to cure a persistent difficulty of indigestion, a diseased condition of the lungs or any of the other evils to which flesh is heir and which affect mankind internally. There is another case, The Apothecaries' Company *v.* Nottingham (34 L. T. N. S. 76), tried before Lord Justice (then Baron) Bramwell in 1876. In that case it was proved 'that the defendant, who was a certified chemist, but not an apothecary, had been in partnership with a duly qualified medical practitioner, but it was also shown that this medical man was not always on the spot. It also appeared in evidence that the defendant had on various occasions been applied to for advice and medicine, both of which he gave to the applicants, but did so as an ordinary shopkeeper from behind the counter. It did not appear that he ever went from his shop to attend on patients, and he was proved in cases of serious illness always to have referred the patients to the doctor with whom he was in partnership,' and the learned Judge in addressing the jury said, 'I feel some little difficulty in putting the case to you, for on the defendant's own admission he says he prescribed and that if a person brought a child to him suffering from diarrhœa and asked what was good for it, he gave a medicine; if, however, the case was serious he sent it to the doctor. Surely,' said the learned Baron, 'that is acting and practising as an apothecary within the meaning of the Act.' There is also a third case, known as 'Wiggins's case,' tried before Mr. Justice Field, on the 23rd and 24th May, 1878, in the Bail Court at Westminster (but not reported, so far as I know, in any of the recognized legal reports), in which his Lordship approves and adopts the definition of Mr. Justice Cresswell in Lotinga's case with the qualification mentioned by Baron Pollock. Upon these authorities, and there are several others of earlier date, I am bound to find and must hold upon the evidence, which is clear and decisive, that the defendant, in what he did, acted as an apothecary in contravention of the Act of Parliament and has incurred the penalty prescribed by it, for it is distinctly proved by the plaintiffs' evidence, and that of the defendant cannot be relied on to alter it in any material degree, that the defendant in performing the acts mentioned in the evidence to enable him to form an opinion on the case proceeded, in the language of Mr. Justice Cresswell, to judge (or pretend to judge) of the internal disease from which the young woman was suffering by the symptoms ascertained by his acts, and applied himself to cure it by medicine. If this is not acting as an apothecary, it is really, I believe, impossible to define what acting as an apothecary is. Upon the second part of the defence the defendant called a witness, named Thomas Parsons, who said 'he was eighty-four years old, and had been apprenticed to a chemist and druggist in 1809.' He said he was apprenticed to Messrs. Blews and Company of Worcester, where one of the partners was an apothecary; and that he (the witness), in the shop, over the counter, and as I understand him, others in the same shop supposed to be competent, though not apothecaries, were in the habit of giving advice as well as medicine in trifling cases, but that if the case were a serious one it would be attended to by the principal, meaning, I suppose, the partner who was an apothecary. This evidence undoubtedly shows that chemists in carrying on their business before the year 1815 did something (lawful or otherwise) beyond selling medicines merely, as stated by Mr. Justice Cresswell, and if the present instead of being a case of a serious character, as I find it from Dr. Suffield's evidence to have been, had been of the trivial nature of those referred to in the evidence of Mr. Parsons, the second part of the defence would have arisen and would deserve serious consideration; but the evidence of Mr. Parsons convinces me that though chemists before 1815 might have advised in trivial cases, they were not in the habit of advising and prescribing as the defendant has done in a case of the serious nature of the present, but would have sent such a case to the apothecary. If, however, it be correct, as Mr. Parsons in his evidence states, that before 1815 some chemists were in the habit, in trifling cases, of advising as well as supplying persons with medicines, it does not at least follow that they ever had the legal right to so advise and supply the medicine or are protected by the 28th section of the Act in case they do. If I were at liberty to speculate, I think it is very probable that some chemists, before 1815, did act as Mr. Parsons says they did, and as is well known some do now, but if they did, I believe they had no legal right to do so and were usurping the rights of those who had, just as the surgeon, as shown by Lotinga's case, usurped and contended for the right to advise and supply medicine as an apothecary, or indeed as the apothecary did when, as is known, he sometimes exercised, though illegally, the right of the physician to attend and prescribe for patients, before he possessed the legal right to do so, which at the present time he undoubtedly possesses. If the language of the 28th section is carefully considered I am afraid it will be found not to have the effect contended for by Mr. Herbert on the part of the defendant. He says that the business of chemists before 1815 extended to, or was carried on by them, 'in advising or prescribing in the shop, over the counter as it were, in cases of a trifling nature and supplying the persons with medicines for the cure of them, and secondly are protected in what they do now, provided they do no more than they did then; but the section with regard to the business of a chemist does not say a word about advising or prescribing.' On the contrary it would seem, from the language used, rather to ignore the fact that to do so formed, at the time of the passing of the Act, any part of the chemist's business. The words of the section are 'that nothing in the Act contained shall extend' or be construed to extend, to prejudice, or in any way to affect the trade or business of a chemist or druggist in—be it observed, not the advising or prescribing as stated by Mr. Herbert was the chemist's business in small matters, but only in 'the buying, preparing, compounding, dispensing, and vending drugs, medicines and medicinable compounds wholesale and retail.' The section then proceeds to provide that all persons using or exercising the said trade or business, or who shall or who may thereafter use or exercise the same, shall and may use, exercise, and carry on the same trade or business, in such manner and as fully and amply to all intents and purposes as the same trade or business was used, exercised or carried on by chemists and druggists before the passing of the Act. What business, therefore, the section provides is not to be affected by the Act, and what might be carried on notwithstanding the Act, would appear to be not that trade of a chemist as carried on by him according to Mr. Parsons's evidence in the 'advising and selling medicines,' but only as he carried it on in the buying, preparing, compounding, dispensing and vending his drugs. So it is this trade or business of a chemist so described, not the enlarged or extended one as contended for by Mr. Herbert, that the Act permits him to carry on (and protects him in doing) as fully as he might have done before the passing of the Act. The Legislature would appear not to have known (if indeed it existed) of this extended business of a chemist as now contended for, or if it did, it appears to have ignored it as no part of the legitimate business of the chemist, and declined to protect him in the exercise of it after the passing of the Act. The words 'advising and prescribing' are, as already remarked, not mentioned in the proviso, and there is no word so used in it that could by any ingenuity be construed as including these words unless it be the word 'dispensing,' and that word in my opinion does not, for the true meaning of the word dispensing (in pharmacy), according to Bailey's Dictionary, is, when simples of a composition are set in order lest any of the ingredients should be forgotten; and according to Rees's Encyclopædia, title 'Dispense' (in pharmacy) means 'To dispose and arrange several medicines, either simple or compound, by weight in their proper doses or quantities in order to be employed in the making of the composition.' I have made these few observations for the consideration of the defendant and those associated with him; they form no part of my judgment, which is in no way founded upon them, for, as I have already said, I find the present case was of a serious if not a dangerous nature, and in that view of it I do not understand that even the defendant's counsel would contend his client had the right to treat it as he has done. The defendant, I find from the evidence, has clearly and unmistakeably 'acted as an apothecary,' and the proviso relied upon, in my opinion, affords him no defence in such a case as this, even though I were to admit it is possible that he might in those trifling cases contended for by Mr. Herbert, which for the reasons given, however, I very much doubt. The verdict, therefore, will be for the plaintiffs."

Verdict for the plaintiffs, £20, and costs.

In reply to a question from the President, the solicitor said there were three courses open, provided the Association desired to carry the case further, namely, application for a new trial, appeal by case or appeal by motion. An application for a new trial would have to be supported by one of three grounds, either that the Judge refused evidence that was proposed, that he admitted evidence wrongfully, or that the verdict was against the weight of evidence. Taking the last first, as the Judge acted in the capacity of Judge and jury, he would no doubt say the verdict was not against the weight of evidence, and would refuse a new trial if it were applied for. As regarded the admission of evidence wrongfully, if any such course was taken, according to the Judge's view it was in admitting the testimony of the defendant's aged witness, as to the mode of conducting a chemist's business prior to 1815, and in no other respect had evidence been improperly admitted. Then lastly, as to the refusal of evidence, no evidence which was tendered at the trial was refused. An appeal might be had by case or motion; of these the former was to be preferred as the facts were in such a case stated by the Judge and the matter was brought under review much more easily than was the case where upon motion the Judge's notes taken at the trial were produced in court. After consultation with counsel and taking into consideration that the Judge had found as a fact that the defendant had treated a dangerous case, and that this must be admitted in any subsequent appeal, and since the judgment of one County Court would not govern a case in any other court, he (the solicitor) could not advise the Association to proceed further in that action.

The Executive then went into committee to consider the question of an appeal and after a long and careful discussion on all the points of the case, it was moved by Mr. Churchill, seconded by Mr. Jones, and unanimously resolved:—"That the finding of the County Court Judge in the case of the Apothecaries' Company *v.* Harrison, being as follows: 'I find the present case was of a serious if not a dangerous nature,' this Committee is of opinion that no further steps should be taken by the Association in this action."

Some considerable discussion took place on the advisability of steps being taken by the Association to amend the Pharmacy Act, 1868, when it was moved by Mr. Arblaster, seconded by Mr. Symes, and unanimously resolved:—"That the Law and Parliamentary Committee be directed to take any steps which they may deem desirable to obtain information to enable them to bring about modifications in the Pharmacy Act, 1868, to restrict the sale of scheduled poisons under cover of the patent medicine stamp to registered chemists and druggists, and to report to the next meeting of the Executive."

The President said the next question on the agenda paper was the consideration of the advisability of steps being taken by the Association to endeavour to obtain the exemption of all registered chemists and druggists from jury service. He continued to say that he was frequently receiving letters from chemists and druggists, relative to the extreme hardship which they suffered from being compelled to attend on juries, and he would move:—"That the Law and Parliamentary Committee be and are hereby empowered to take such steps as they deem advisable to obtain the exemption of all registered chemists and druggists from jury service."

The resolution was seconded by Mr. Andrews, supported by Mr. Arblaster, and carried unanimously.

Several letters were read from members of the Association complaining of cases of infringements of the Pharmacy

Act, when it was moved by Mr. Andrews, seconded by Mr. Symes, and unanimously resolved:—"That the secretary be instructed to collect evidence of infringements of the Pharmacy Act, 1868, and forward particulars of same to the Secretary and Registrar of the Pharmaceutical Society."

The case of a member of the Association against whom an action had been brought by the Excise authorities for the sale of methylated spirit without a licence was considered. It was moved by Mr. Davison, seconded by Mr. Hampson, and unanimously resolved:—"That the secretary be instructed to investigate the case of a member against whom legal proceedings have been taken by the Excise authorities for the sale of methylated spirit without a licence, and that the solicitor be instructed to defend the action if the case on investigation be found satisfactory."

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association was held on June 26, Mr. C. H. Hutchinson, F.C.S., in the chair.

After the reading of the minutes, Mr. R. H. Parker read a paper on "Myrrh." This paper will be printed in a future number of the Journal.

After a short discussion,

Mr. J. G. Sangster read his report on "Pharmacy," in which he gave an account of the following preparations:—Vaseline, oleate of mercury, oleate of zinc and guaiacate or lithia.

Oleate of Mercury is made by triturating together for some hours oleic acid and freshly precipitated mercuric oxide till combination is effected. In this process heat must be avoided. The ordinary strengths used are 5 per cent., 10 per cent. and 20 per cent. The first and second are thick liquids, the third having the consistence of a soft ointment.

Oleate of Zinc is usually prepared by mixing together hot solutions of soft soap and sulphate of zinc. The precipitated oleate is washed and dried by hydraulic pressure. It is of the consistence of suet, and possesses a pearly-white colour. To mix it with other fats it must be first melted.

Guaiacate of Lithia, introduced by Dr. Garrod, is in the form of dark brown scales. It is prepared by digesting pure guaiacum resin with a saturated solution of lithium hydrate, decanting the clear solution, evaporating and scaling. It is usually ordered in the form of pills, for which spirit is the best excipient.

Mr. Sangster then noticed the following mixture which he had dispensed:—

℞ Ferri Am. Cit.	. . . .	℥ss.
Quin. Sulph.	. . . .	gr. 12.
Acid. Citric.	. . . .	ℨj.
Sp. Chlorof.	. . . .	ℨj.
Aquæ	. . . .	ad ℥vj.

The quinine was dissolved with the citric acid in a small quantity of water and the scale compound in another portion of water. On mixing the two solutions a reddish-brown precipitate occurred, which in a few days dissolved in the supernatant liquid, giving a clear green solution. It seemed to him probable therefore that a compound resembling the citrate of iron and quinine of the Pharmacopœia was formed.

After a short discussion the meeting adjourned.

SOCIETY OF ARTS.

The History of Alizarin and Allied Colouring Matters, and their Production from Coal Tar.*

BY W. H. PERKIN, F.R.S.

(*Continued from page 38*).

I will now refer to the process of making artificial alizarin by means of dichloranthracene in place of anthraquinone.

Sulphuric acid forms two sulpho acids with dichloranthracene, a mono and a di.

To obtain the former, pure dichloranthracene is intimately mixed with concentrated sulphuric acid, warmed up to about 50° C., the mixture being well stirred; this process is continued for about twenty-four hours. It is then diluted, boiled, and filtered from any undissolved dichloranthracene. This filtrate gelatinizes on cooling, and consists chiefly of monosulphodichloranthracenic acid; it is formed thus:—

$$C_{14}H_8Cl_2 + SO_4H_2 = \underbrace{C_{14}H_7\,(SO_3H)\,Cl_2}_{\text{Monosulphodichloranthracenic acid.}} + OH_2.$$

On boiling this with an oxidizing agent, it yields monosulphanthraquinonic acid.

$$C_{14}H_7\,(SO_3H)\,Cl_2 + O_2 = C_{14}H_7\,(SO_3H)\,O_2 + Cl_2.$$

And this, when fused with caustic alkali, behaves in the same manner as the acid prepared from anthraquinone, yielding finally, pure alizarin.

If the dichloranthracene be heated more strongly with sulphuric acid, it is converted into the disulphodichloranthracenic acid* thus:—

$$C_{14}H_8Cl_2 + 2\,SO_4H_2 =$$
$$\underbrace{C_{14}H_6 \left\{ \begin{matrix} SO_3H \\ SO_3H \end{matrix} \right\} Cl_2}_{\text{Disulphodichloranthracenic acid.}} + 2\,OH_2$$

An acid remarkable for the fluorescence of its solutions and salts. If the heating with sulphuric acid be increased after the acid is formed, a very remarkable change takes place, sulphurous anhydride and hydrochloric acid being evolved in abundance, disulphanthraquinonic acid being at the same time formed:—

$$C_{14}H_6 \left\{ \begin{matrix} SO_3H \\ SO_3H \end{matrix} \right\} Cl_2 + SO_4H_2 =$$
$$C_{14}H_6 \left\{ \begin{matrix} SO_3H \\ SO_3H \end{matrix} \right\} O_2 + SO_2 + 2\,HCl$$

This, of course, when fused with alkali, eventually forms anthrapurpurin; and, as some of the disulphanthraquinonate is also formed, a little flavopurpurin is likewise produced.

There is also another reaction which takes place. As dichloranthracene combines with sulphuric acid, water is liberated, so that this acid becomes somewhat diluted. This does not readily form a sulpho acid with the dichloranthracene which has not dissolved, but when heated with it, converts it into anthraquinone.

$$\underbrace{C_{14}H_8Cl_2}_{\text{Dichloranthracene.}} + SO_4H_2 = \underbrace{C_{14}H_8O_2}_{\text{Anthraquinone.}} + 2\,HCl + SO_2$$

As the temperature rises, the acid becomes concentrated, and then combines with it, forming chiefly monosulphanthraquinonic acid.

The process of making monosulphanthraquinonic acid from the monosulphodichloranthracenic acid has not been carried out successfully on the large scale, partly owing to the processes of filtration being very difficult to perform. But the preparation of artificial alizarin from the sulpho acids prepared by heating dichloranthracene strongly with sulphuric acid, is a process of very great importance.

As pure alizarin can now be obtained in any quantity, attention has been turned to the preparation of its derivatives. In 1874, I studied the action of bromine upon it, and obtained monobrom alizarin, having the formula $C_{14}H_7BrO_4$.† This compound dyes mordants somewhat similiarly to alizarin, the colours being a little redder in shade, but not sufficiently different to make it of technical interest. In 1875, I also obtained a nitroderivative of alizarin by acting on diaceto alizarin with fuming nitric

* From the *Journal of the Society of Arts*.

* *Journal of the Chemical Society*, 1871, p. 15.

† *Journal of the Chemical Society*, 1874 p. 401.

acid.* This substance crystallizes in beautiful orange needles, and has the formula, $C_{14}H_7(NO_2)O_4$. It produces with mordants colours very different from alizarin, giving with alumina brilliant orange, and with iron mordants reddish purple colours. It would be a valuable deying agent if it could be produced by a more easy process.

When treated with reducing agents, such as sodium amalgam, or metallic tin and potash, its blue alkaline solution changes to a clear bright red colour, containing another new derivative, namely amidoalizarin, $C_{14}H_7(NH_2)O_4$. This also dyes mordants, the alumina ones of a purple and the iron ones of a bluish or steel-like colour.

A second, or β nitroalizarin, isomeric with that I produced, has been obtained by Rosenstiehl,† and, apparently about the same time, by Caro,‡ by submitting dry alizarin to the action of nitrous acid vapours. It is now manufactured in some quantities, and is known as alizarin orange. Like the nitroalizarin previously described, it gives orange colours with alumina mordants. They are, however, much yellower, and not so fine. This nitroalizarin dissolves in dilute alkalies with a purplish crimson colour; but strong alkaline solutions precipitate it, especially caustic soda, and this property affords a means of purifying it. When boiled with metallic tin and caustic potash, it is reduced, becoming blue and then yellowish green; but, on exposure to the air, this solution changes back to bluish green. Schunck and Roemer§ have just published an account of this reduction product; it is an amidoalizarin isomeric with that just described. It crystallizes in deep yellow prismatic needles, and dissolves in potash with a blue colour. It dyes alumina mordants a dull red, and iron mordants a dull grey colour.

A very peculiar result has been obtained by M. Prud' homme‖ by heating a mixture of glycerine, β nitroalizarin, and concentrated sulphuric acid. By this means a colouring matter is obtained which dyes alumina, and especially iron mordants, an indigo blue shade. It crystallizes in needles of an almost black colour, but having a coppery reflection. The formula is $C_{17}H_9NO_4$. It is manufactured commercially, but as its colours are fugitive it has not met with much favour.

F. de Lalande¶ has made the interesting discovery that purpurin, identical with that found in madder, can be obtained by the oxidation of alizarin. He takes a solution of one part of alizarin in eight or ten parts of sulphuric acid, and adds to it one part of arsenic acid or peroxide of manganese, and heats this mixture to a temperature of 150° to 160° C., until a drop of the fluid mixed with an alkali gives a red coloration. The product is then thrown into water, and the purpurin which precipitates is collected on a filter and well washed.

In this paper I have purposely confined my remarks to the colouring matters and other substances obtained in the manufacture of artificial alizarin, and also to some of the more important derivatives of alizarin; a considerable number of products have, however, been obtained, which are related to anthracene, although this hydrocarbon has not been used in their preparation, such, for example, as anthraflavone from oxybenzoic acid, etc. And, although I do not propose to give an account of these bodies, I wish briefly to refer to some very interesting results which have been obtained by Baeyer and Caro.

These chemists have observed that, when phenol is heated with phthalic acid or anhydride and an excess of sulphuric acid, that two monoxanthraquinones are produced, one identical with that already described, the other being an isomeride of that body. Both of these, however, when fused with caustic alkali, yield alizarin.

* *Journal of the Chemical Society*, 1876, vol. ii., p. 578, and *Deut. Chem. Ges. Ber.*, 1875, p. 780.
† *Deut. Chem. Ges. Ber.*, 1876, 1063.
‡ Patent No. 1, 229, March 22, 1876.
§ *Deut. Chem. Ges. Ber.*, 1879, 558.
‖ *Bull. Soc. Chem.* (2), xxviii, 62—64.
¶ 'Jahresbericht,' 1874, p. 486.

By substituting pyrocatechin for phenol in the above process, they succeeded in obtaining alizarin at once. These results, although at present of no practical value, are of considerable scientific interest, and also show us that anthracene is not the only artificial source of alizarin.

From what I have already said it will be seen to what an advanced state the chemistry of my subject has arrived (and yet there is much to be done), and only those who have been interested in the progress of the manufacture can rightly appreciate the great value of all this research in forwarding the successful and enconomical production of these colouring matters.

As I have already shown, both of the important colouring matters of madder have now been obtained from anthracene, and not only so, but new products allied to these have also been produced, the most important one being that valuable colouring matter anthrapurpurin; we have also flavopurpurin and the derivatives of alizarin. So that, with these colouring matters, dyers and calico printers are not only able to produce all the various madder styles, but to introduce colours of greater beauty and variety than when employing the natural dye-stuff madder.

(To be continued.)

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

Replies.

[315]. In my reply to this question in last week's Journal, I am made, by a printer's error, to say, "sal ammoniæ" in three instances. It ought in each case to be "sal ammoniac." W. WILKINSON.

[322]. Will Mr. Brown kindly detail the method of making a stable preparation of this formula? I can, like him, get a pink creamy ointment; but I fail to induce the components to remain in the combination any sufficient time for the daily use of the patient, and obviously that is the intention of the prescriber.—ANON.

[324]. Permit me to correct what I gather from the remarks of Mr. Henry Brown is a misunderstanding relative to this prescription. Mr. Brown, to whom I am greatly indebted for his clear and lucid arguments, says:—"I observe 'Gulielmus' adds after morphia, 'the alkaloid,' so as to italicize as it were." The words however were not my addition, but formed part of the prescription, and this being so forced me to the conclusion that the prescriber meant what he had written. I cannot think that the pharmacist under those circumstances would be justified in adding anything to convert the morphia into a salt, but having explained my position in relation to this point shall be glad with further expressions of opinion thereon.
GULIELMUS.

[324]. In Mr. H. Brown's very practical answer to No. 324, he does not explain how the preparation which was first obtained by the patient was (according to the statement by "Gulielmus") about twice as much in bulk.

The addition of a small quantity of acid. sulph. dil. could not cause such a difference.
G. H. WRIGHT.

[326]. The mixture containing tr. gelsemin., fer. et quinæ cit., butyl chloral hyd., potass. bromid., potass. iodid.

and aq. chloroform., may be made perfectly transparent, and therefore "presentable," by adding a little magnesia, and filtering through fine filtering paper. The question is, How far is a dispenser justified in thus turning out a slightly opaque mixture as bright and as clear as dark sherry wine? In this case, and in many other instances (328, *infra*), a perfectly bright mixture may be obtained by the simple act of filtration through magnesia, bismuth or orris root, as the case may be. I hold, however, whilst a strong advocate for elegant dispensing, that a mixture like the above, which is only slightly opaque, should not be sent out clear. By filtration, as suggested, I have convinced myself that no change in constitution occurs; but, there is a manifest injustice done to other compounders and other houses, by having resort to the process indicated.

I am aware some houses make it a study to send all mixtures out transparent, if such is possible without undue interference. If therefore, a prescription similar to that given by "Sub Umbra Floresco" or C. B., 328, is filtered, and sent out bright by the first house at which it is compounded, and then the patient has it dispensed at another pharmacist's, will he not naturally wonder why in the one case it was transparent, but in the other opaque? And will he not think that in the first instance it was properly compounded, and look upon the first pharmacist as superior in his art to the second, because from the same ingredients he is able to turn out a bright and pleasing mixture, whilst the second is only able to form a muddy looking compound? I see a great injustice to members of the pharmaceutical body by such procedures. If the patient is whimsical, or if the medical man's wish is understood in such instances, I think in all fairness a note might and ought to be written, such as, "Filter through magnesia," by the medical man or pharmacist who first dispenses the mixture. If such is not done, there is manifest unfairness in thus treating any such prescription.

By what means is a pharmacist, even in the same town, to know exactly how a mixture was at first compounded and its subsequent treatment, if a note be not appended indicative of the mode in which it was dispensed, *i. e.*, provided such a mixture was sent out perfectly transparent?

Northallerton. HY. BROWN.

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[327]. I am afraid J. H. cannot, without materially altering the prescription, send out a mixture of sodæ salicyl., croton. butyl. and quinæ sulph., so as to have the quinine in perfect solution. If the quinine is dissolved by the aid of an acid it is at once precipitated on the addition of the salicylate and, in the form of a resinoid mass, adheres to the sides of the bottle. The best mode is just to powder the quinine very fine and add "shake the bottle." The mixture is not unsightly and the quinine will remain long enough in suspension to enable a correct dose to be measured.

HY. BROWN.

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[328]. Is sufficiently answered in my note, *vide supra*, 326. When filtered the mixture is a beautiful light sherry colour and has its original taste unaltered. The small quantity of the resin of the hop only removed.

HY. BROWN.

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[330]. No. 1 is another example somewhat akin to No. 327. In this case the only way I see out of a difficulty is to omit the acid. sulph. dil., dissolve the sodæ salicyl. and rub up the quinine. The same remarks apply, in the main, as in No. 327, *supra*.

No. 2. "J. S. Nemo" should use solid perchloride of iron and add the acid. hydrochlor. after solution. The HCl is added to obviate oxidation.

HY. BROWN.

Notes and Queries.

[614]. "PULV. SALINI EFFERVESC. APERIENTIS."—The composition of this preparation is published by Messrs. H. and S. Kirby and Co., of 14, Newman Street, W., in their formulæ.

London, W. VERITAS.

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[618]. NICOTINE.—Will some reader state a process for extracting the nicotine from tobacco, and leaving the tobacco inert for smoking?

FRAXINUS.

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[619]. STAMPING INK.—Wanted a formula for a good black ink to use with india-rubber stamps on paper.

W. W.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE SUPPLY OF GAS.

Sir,—No doubt I only express the sentiments of hundreds of your readers when I express my thanks that you have taken up the gas question.

I have had my attention drawn to a discussion now going on in *The English Mechanic*, and to the evident partiality "and unfairness of that journal to any but one side of the discussion," and have come to the conclusion that the *Mechanic*, like a good many other journals connected with trade interests, is probably influenced in favour of the gas companies and the great body of gas engineers up and down the country. This last year, as witnessed by newspapers in every part of the country, has given rise to complaints from every class, but instead of trying to help and trace the cause—and most assuredly there is one—the effort seems to be to try and intimidate and "burke" any inquiry.

I trust you will exercise patience and give scope in your columns for free ventilation of the subject, and if the approaching Conference would add "Gas Deterioration" to the list of subjects requiring elucidation, it would be a very legitimate inquiry. Gas engineers and gas officials certainly have not the ability, even if they had the willingness to clear up the present difficulty.

The reference to the production of "marsh gas" by gas companies in place of olifiant gas, as explained in the letter of your last number, to my mind goes a long way to explain matters and I should like to ask my brother chemists if they can bring any evidence to prove that consumers near the works are more often complaining than those at a greater distance away? My theory is that ordinary coal gas is a "wonderful" compound of various gases, and that the lighter and least luminous find their way to the nearest outlets, and those streets nearest the works are the worst lighted.

Any evidence *pro* or *con.* would tend to clear up a difficult problem. MORE LIGHT.

"*Natura*."—It is a mixture of the light hydrocarbons of petroleum.

"*Apprentice*."—Boil with nitro-muriatic acid and precipitate with ammonia.

J. H. Dingle.—(1) *Sonchus asper*. (2) *Festuca ovina*. (3) *Lolium perenne*. (4) *Festuca Myurus*. (5) *Festuca loliacea*. (6) *Pinus sylvestris*.

A. P. S.—(1) Fellowship of the Chemical Society is conferred by election. (2) The other degree is granted by some foreign universities upon conditions varying with the university.

C. Marshall.—The seeds of *Garcinia purpurea* yield the fat known as "Kokum butter." A description will be found in 'Pharmacographia,' p. 79.

C. Kemp.—(1) *Hypericum perforatum*. (2) *Listera ovata*. (3) *Lithospermum officinale*.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Bermingham, Davidson, Roberts, Sawyer, C. H. F. Student.

"THE MONTH."

After the continuous rain of May and June, it might have been expected that St. Swithin would waive his claim to his accustomed sway of forty days, but since such has not been the case, it is only natural that the long continued rainy weather should give rise to grumbling in agricultural districts; still there is perhaps some reason to be thankful that the weather has been wet rather than fine. Owing most likely to the heat of last summer and to other conditions, as yet not well understood, the number of insects would probably have amounted to a plague this year, had not the wet weather to a certain extent limited their numbers. In *Nature** accounts are given of a swarm of butterflies (apparently *Vanessa Cardui*), being observed on the continent, which obscured the light of day and took two hours to pass, proceeding in a north-westerly direction. This or a similar swarm appears to have passed through Turin on June 2nd, through Switzerland from the 2nd to the 9th, Alsace, France and Spain from the 5th to the 10th, and through Wurtemberg from the 11th to the 21st. The majority of specimens examined by Professor Eimer, of Tubingen, proved to be females, apparently seeking a place to deposit their eggs, of which they were full. This insect is very common this year in the south of England.

Another instance of the abundance of insects this year occurred at Elizabethpol, in Armenia, where the vegetation has been devasted by grasshoppers and locusts. At this place the locusts were so numerous and settled so thickly on the Russian soldiers' faces, uniforms and muskets, that the major ordered firing at them for half an hour, to drive them off, but as this produced no effect a march back was ordered.

Some results of an interesting series of experiments as to the proportion of carbonic anhydride present in the atmosphere and the extent to which it is affected by various causes are reported by M. Reiset in the current number of the *Répertoire de Pharmacie* (vol. viii., p. 308). At a station in the open country a few miles outside Dieppe, having the sea on its west and north-east horizon, and at an elevation of 320 feet, which was taken as a standard for comparison, the mean of ninety-two observations gave equal to 2·942 parts, by volume, of CO_2 to 10,000 of air. The observations at this station were very concordant, the difference between the maximum and minimum proportion of carbonic anhydride observed not exceeding 3 parts in 100,000. Air taken in a leafy wood gave an average of 2·917 parts of CO_2 per 10,000, the average in the air taken at the standard station at the same time being 2·902; air taken in a fine crop of red clover gave 2·898 parts CO_2 per 10,000 against 2 915 at the standard station; air taken in a field of barley and lucerne grass in July gave 2·829 parts of CO_2 per 10,000 against 2·933 at the standard station. These results demonstrate how instantaneously the diffusion of gases takes place. On the other hand the presence of a flock of three hundred sheep at pasture, on a calm day, in the neighbourhood of the apparatus, raised the proportion of carbonic anhydride to 3·178 parts in 10,000 of air. In Paris, in the month of May, observations extending over three years gave an average of 3·027 parts by volume in 10,000 of air.

Comparatively few fresh plants are out in flower this month in the Botanical Gardens. At Regent's Park, in the Economic House, the pimento is in blossom, and in the Herbaceous Ground at Kew, *Actæa spicata*, *Delphinium Staphisagria*, *Nigella sativa*, *Pyrethrum roseum* and *P. Parthenium*, valerian, coriander, rue, black and white mustard, lavender, alkanet, borage and motherwort are in flower.

Of rarer British plants now in blossom at Kew may be mentioned *Liparis Loeselii*, *Stachys germanica*, *Verbascum Lychnitis* and *V. pulverulentum*, *Echium violaceum* and a variety of *Linnæa borealis*.

In the country the elder may now be seen covered with blossom, and the red poppy and the white mustard already deck the railway embankments and chalky cornfields with their lively hues, while the pretty pink-flowered cent ury, always retiring when a cloud overcasts the sun, scarcely opens its blossoms for more than an hour or two now and then.

The digitalis, one of our handsomest wild flowers, is now in perfection. In London it seems coming into fashion again as a garden ornament, cartloads of plants in full blossom being hawked about the streets. A correspondent in the *Gardeners' Chronicle* calls attention to the absence of this plant from the Cotswold Hills and attributes it to the fact that it loves a sandy soil, but does not flourish on the silurian limestones and shales. The Cotswold Hills are almost entirely composed of the cream coloured limestones of the inferior oolite, and to this he attributes its absence. The writer has, however, seen magnificent specimens of the foxglove on the chalk hills of Kent, and it is probably rather the porous character of the soil that it prefers, than its chemical composition, although digitalis can scarcely be called a plant of the chalk.

The flowers of this plant are said to be exclusively fertilized by humble bees, which alone are large enough to fill the corolla, and thus deposit pollen on the stigma. The flowers are proterandrous and appears to be capable of self-fertilization if not visited in time by insects. The anthers at first occupy a transverse position but as they ripen become longitudinal.*

Another plant belonging to the Scrophulariaceæ deserves notice from having been used in former times for the disease known as "burnt holes" in children. A formula for the ointment of *Scrophularia* may still be found in Cooley's 'Cyclopædia' This is the *Scrophularia nodosa*, a common plant in damp ditches by roadsides, etc. From the other British species it is easily distinguished by its acutely pointed, smooth leaves and tuberous knobby root; *S. aquatica*, which grows in similar situations, having obtuse leaves. The flower is interesting on account of the presence of the rudiment of a fifth stamen (staminode) at the base of the upper lip of the flower. This staminode differs slightly in shape in the different species, and in some cases it bears pollen In the genus *Pentstemon*, which is not uncommon. in gardens, the fifth stamen is furnished with a long filament, but the anther is abortive, and the filament is bent in a curious manner from the upper towards the lower lip of the flower, from which it appears to spring, so as to be out of the way of the pistil. *Scrophularia nodosa* is proterogynous; both this species and *S. aquatica* are fertilized by wasps, and as the

* June 26, p. 197.

* Lubbock, 'British Wild Flowers in Relation to Insects,' p. 138.

pistil is bent downwards from the mouth of the corolla it strikes the pollen-dusted breast of the wasps when they visit the flower. It is rather singular that irregular flowers are hardly ever wind-fertilized.*

The leaves of *S. nodosa* are said to possess emetic and purgative properties and are sometimes used externally as an application to burns and swellings, being simply bruised before being applied. In olden times this plant was considered an excellent remedy for the scrofula or king's evil, whence its name. A decoction of the root is sometimes used by farmers for the scab in swine. The juice of the leaves of the water betony, *Scrophularia aquatica*, formerly had a reputation as a cosmetic for the face, "to take away the redness and deformity of it." This plant must not be confounded with the wood betony (*Betonica officinalis*), which is quite a different plant, belonging to the Labiatæ.

Another little plant, common in heathy places and woods, *Veronica officinalis*, is now in blossom. As its name indicates it was formerly used in medicine. It was at one time official in the Edinburgh Pharmacopœia, under the name of *Veronica mas* or *Betonica pauli*. At the present day it is sometimes used by homœopaths. It possesses bitter and astringent properties, although probably in a less degree than the Koromiko (*Veronica salicifolia*), which a short time ago was so highly spoken of as a New Zealand remedy for diarrhœa. When the Linnean system of botany was in vogue the plant was comparatively easy to determine, but at the present day the tyro in botany finds it somewhat difficult to assign a place to the plants of this genus, since the ovary when young is difficult to examine, and the plants differ from the majority of the order to which they belong in having only two stamens in the flower, as well as in the corolla being not very obviously irregular, at least to an unpractised observer. The present species is easily distinguished by its small flowers and *obovate stalked* leaves from *V. Chamædrys*, the most beautiful and consequently the most commonly recognized species, which has sessile leaves, and from *V. montana* which has *ovate* stalked leaves.

The arrangements for fertilization differ considerably in the different species of this genus. In *V. Chamædrys* the anthers and stigmas ripen at the same time, but the stamens turn outwards, while the stigma projects straight forward, so that self-fertilization is impossible. In *V. Beccabunga* (whose curious name is supposed to be derived from the German *bachbunge*) the flowers are proterogynous, and in *V. hederæfolia* the flowers are minute and fertilize themselves.

The Scotch fir (*Pinus Sylvestris*) seems to have produced an unusual abundance of male flowers this year, and the paths and roads in plantations are now everywhere strown with the fallen catkins.

In a letter to the *Times* a few weeks ago, a correspondent wrote, "After a heavy rain a thin film of sulphur has been observed at Windsor, Slough, and in the neighbourhood generally, to settle upon the surface of rain water caught in butts and cisterns." According to a letter on the same subject in *Nature*, by Mr. P. H. Carpenter, "it was first observed on the afternoon of Sunday, June 8, after a remarkably heavy shower, and much disturbed the inhabitants of some of the villages around Eton, who fancied that it smelt 'awful like brimstone,' of which its yellow colour was somewhat suggestive. In some places it gave rise to such a feeling of fright that the people were afraid to go to bed, thinking that the judgment day was at hand." On investigation the sulphur proved, as might have been supposed, to be pine pollen (probably from *Pinus sylvestris*) blown from Windsor Forest. A local chemist and druggist is said to have supported the sulphur theory—a statement which it may be hoped is mistaken. The pollen of Coniferæ is so different in appearance from sulphur, under the microscope, and is so characteristic, that such a mistake could hardly have occurred to any one familiar with the use of a microscope.

† Darwin, 'Forms of Flowers,' p. 147.

The compound pollen of the Gymnosperms has long been known, but it is only lately that F. Elfiring, of Helsingfors, has proved in Strasburger's laboratory, at Jena, that the pollen cell of wind-fertilized or self-fertilized angiosperms is also compound, or in other words that each pollen grain becomes divided into two cells, the one of which plays the part of a vegetative cell merely, and the other takes upon itself the growth and functions of the pollen tube. Of these cells the vegetative one is the smaller and is only separated from the larger by a wall of "cortical plasm," which in particular instances can become transformed into a firmer membrane. The pollen grain may thus be likened to the microspore of a lycopod. This observer does not, however, appear yet to have examined the pollen of cleistogamous flowers, which, as suggested by Dr. E. P. Wright in *Nature*,* might reveal some interesting facts.

The little pine tortrix moth, *Ortholæna turionana*, may now be seen hovering around the fir trees and depositing its eggs on the buds. Later on in October, little turpentine drops may be seen on the buds, underneath which the grub may be found.

It is a singular fact that the flowers of the dahlia have a narcotic effect upon the bees which visit them, so much so that the cultivation of the dahlia has been pronounced to be incompatible with the success of bee-keeping. The honey of the oleander is also avoided by bees and is known to be fatal to flies. The dahlia is such a common flower in gardens that its insecticidal properties might easily be investigated with regard to other insects.

Most persons who live in the country are familiar with the singular botanical monstrosity known as the "hen and chicken" daisy, in which a number of small stalked capitula arise from the primary one. Such a growth in the water-lily family is, however, a great rarity. An instance of this kind is figured in the *Garden*, for July 12th, in which secondary stalked flowers are produced from the primary flower, and in another specimen leaves as well as flowers arise from the primary flower.†

The extent to which a medicinal preparation may be affected by the soil upon which the plant it is prepared from has grown is illustrated by an experience of M. Gérardin, a pharmacien in the Marne department. Having prepared some extract of belladonna from a defecated juice, he found it after some weeks full of granulations. These were removed by dissolving the extract in distilled water and decanting. After washing and drying at 100° C., they proved to consist of a mixture of silicate and chloride of potassium equal in weight to 6·8 per cent. of the original extract. It was then remembered that the

* June 19, p. 183.

† See *Journ. Bot.*, 1877, p. 59.

belladonna plants used had been collected from a spot which had long been frequented by charcoal burners for their operations and the remainder of the explanation was to be found in the pronounced taste of solanaceous plants for silica and potash.

Some time ago an attempt was made in Mozambique to cultivate the opium poppy. The yield of opium from the first crop only amounted to a few pounds, which upon examination proved to be only of moderate quality; it had the appearance of a soft extract of a clay-brown colour and contained 4 per cent. of morphia, 4·3 per cent. of narcotine and 40·9 per cent. of moisture. A specimen of this Mozambique opium was recently presented to the Society's Museum by Messrs. T. and H. Smith; another is included in the case sent by them to the Sydney International Exhibition, and it is noticeable that it has been described by two journals at least, when referring to this case, as the first opium grown in Africa, a statement that would hardly pass muster in the Board schools, notwithstanding the extent to which Egypt has become Europeanized. Messrs. Smith's case appears to rival in interest and value that sent to Paris by the same firm and described in this Journal last year. Perhaps the most striking objects would be some splendid crystallizations of caffein, aloin, muriate of thebaia, codeia and muriate of papaverine, the demand for the latter alkaloid on the continent being said to be in excess of the supply. There is also the cryptopia from 10,000 lbs. of opium, as well as specimens of the new bodies gnoscopine and meconoisine. Among the salts of morphia are the muriate in crystalline cubes, the sulphate in woolly needles resembling sulphate of quinine and the tartrate which has been recently recommended by Dr. Erskine Stuart as the best preparation of morphia for hypodermic injection. There are also specimens, several ounces in weight, of muriate of apomorphia in large steel grey crystals and of cantharidin in fine four-sided prisms.

M. Carles recently called the attention of the Bordeaux Pharmaceutical Society to the presence in commerce of quinine containing an exaggerated quantity of water. A sample examined lost 17 per cent. of water when dried at 100° C., or 5 per cent. in excess of the normal quantity. The same sample was found to contain a quantity of quinidine. M. Dambier said that he had recognized the same fact several times in sulphate of quinine obtained from good houses.

Japanese wax has been the subject of an investigation by Dr. E. Buri, of the University of Strasburg. From the results obtained (*Archiv d. Pharm.*, xiv. 403) he has come to the conclusion that this substance, like other fats, is a mixture of several glycerides, the mixture of fatty acids yielded upon saponification consisting principally of palmitic acid. The palmitic acid is accompanied by one or more acids having a higher melting point, the presence of one having been ascertained which has a melting point considerably higher than that of stearic acid. There is also a small quantity of oleic acid.

According to the *Pharmaceutische Zeitung* a German house is bringing into the market a number of so-called "extra strong essential oils," obtained by the fractional distillation of the finest and most aromatic parts of the respective oils from the less characteristic and more or less indifferent portions. They have, as a rule, a higher boiling-point, and a higher specific gravity than the unseparated oils, and some of them are more soluble in spirit, but this is not always the case. It is claimed, however, that all these oils are essentially improved in aroma.

According to MM. E. Duvillier, and A. Buisine, in the *Comptes Rendus*, the trimethylamine of French commerce, which is chiefly obtained, as indicated by M. Vincent, by the calcination in a close vessel of the residue after the distillation of spirit from beetroot mash, is far from being a pure product, it containing only about 5—10 per cent. of trimethylamine, while dimethylamine is present to the extent of 50 per cent., besides which there are present in the remainder monomethylamine, monopropylamine and monoisobutylamine in about equal proportions.

A new antiseptic agent is reported to have been recently discovered accidentally, during experiments on separating the crystalline sugar from molasses. It is, according to the *Scientific American*, now sold at twenty-five cents the pound, and is made in large quantities by dissolving in water equal parts of chloride of potassium, nitrate of sodium and boracic acid, filtering and evaporating to dryness. It is easily soluble in water and is deliquescent. It passes under the unscientific name of double borate of potassium and sodium, and its action as an antiseptic is said to be prompt and to continue undiminished for a long time.

Messrs. Paterno and Oglialoro, in the *Gazetta Chimica Italiana*, state that the limonine of Schmidt, extracted from the seeds of oranges and lemons, is not identical, as that writer supposed, with the calumbin of Wittstock, derived from calumba root. Limonin is obtained in magnificent colourless shining laminæ, fusible at 275°, while calumbin crystallizes in colourless prisms, fusible at 182°. Its formula is $C_{21}H_{22}O_7$, while that of limonin is $C_{26}H_{30}O_8$.

In the *Practitioner*, Dr. T. N. Dolan reports that he has found chloride of barium successful in certain forms of aneurism, and recommends a trial of it in some cases in which the administration of iodide of potassium is inadmissible. The dose given appears to have been one-fifth to two-fifths of a grain.

Dr. Rutherford in a communication to the *British Medical Journal*, referring to the variation in the dose of euonymin required to produce the desired effect, remarks that "allowing for individual peculiarities, I cannot but suspect that the substance found in the market is not always of the same strength." It is highly desirable either that a definite process for the manufacture of this substance or that tests for discriminating its quality should be sought for and published by those who have introduced these remedies into medicinal use in this country, so that dispensers may know what particular preparation to use.

An interesting account of the dugong, the oil of which is used as a substitute for cod liver oil, is given in *New Remedies* for July. One merchant engaged in the fishery is said to capture as many as six in a day. Unless some protection be afforded it, this interesting cetacean will probably become an extinct animal in the course of years, especially since its flesh makes an excellent substitute for bacon, dugong rashers being easily mistaken for those of pork.

The possibility of poisoning by the absorption of aniline through the skin deserves to be known. A chemist in Poland was experimenting with aniline, when the bottle burst and part of the contents saturated some of his clothing. A few hours afterwards weakness in the muscles set in, his speech became affected, he forgot a number of words and became comatose. By the use of stimulants he recovered, but the muscular weakness remained during the following day. The fact of the symptoms not appearing until a few hours afterwards, although a quantity of the aniline had evaporated in the room, seem to show that the aniline acted as a poison by entering the circulation through the skin.

M. Battandier, in the *Journal de Pharmacie*, points out the danger of using glass wool in analysis. He has found certain samples to contain a quantity of lead, which is easily dissolved out by alkaline or acid liquids.

In *Comptes Rendus* for July 7, it is stated Dr. Tellef Dahll has found a new metal in the arseniuret of nickel and nickel-glance at Oterö, a little island situated some kilometres from the town of Krage. It is obtained by roasting the ore to drive off sulphur and arsenic, dissolving the product in acids and precipitating by sulphuretted hydrogen; the precipitate washed free from nickel and again roasted is the crude oxide of the metal. To the new metal the author has given the name of Norvegium with the symbol Ng. The metal is white, malleable to a certain extent; sp. gr. 9·66. It is soluble easily in nitric acid, but only with difficulty in hydrochloric acid. It is also soluble in sulphuric acid. The solution of the oxide in nitric acid is blue, becoming green on dilution with water. The new metal is characterized especially by the green precipitates formed in solution of its salts by caustic potash, ammonia, and carbonate of soda, the precipitate being soluble in excess, giving blue solutions, and by the insoluble brown precipitate which is produced even in acid solutions by sulphide of ammonium. In the oxidizing flame of the blowpipe, with borax, it gives a yellowish green glass, which turns blue on cooling, the blue colour being clearer in the reducing flame. Microcosmic salt gives a yellow glass, turning emerald green, then violet and blue on cooling. With carbonate of soda upon charcoal the oxide is easily reduced, as also in a current of hydrogen gas.

At the recent drug sales there have been noticed Botany Bay kino, hog tragacanth, salep, jaborandi, patchouli and coca leaves, and Australian gum arabic. Goa powder, which has lately been scarce, has been offered in quantity and of good quality; but the Calabar beans which have been noticed have occurred only in small quantity and present an immature appearance.

From Manchester, offered as cinchona bark, we have seen the bark of *Stenostomum acutatum* in long smooth cylindrical quills. In the London market a new kind of cinchona bark has recently been offered, having the quilled appearance of *C. lancifolia* with the hard character of *C. cordifolia*, and possessing a fracture scarcely at all fibrous; it contains 1·75 per cent. of quinine.

It must often have been observed by those engaged in the compounding of prescriptions, that of the many formulæ which puzzle dispensers, not a few are for external applications in some one form or other of skin disease. The intractable character of these affections may oblige that part of the medical profession who make these diseases their special study to seek for remedies beyond the precincts of the Pharmacopœia. To that course there would be little or no objection, indeed it may be considered an ultimate advantage to medical science, were it not for the fact that these remedies are too often pitchforked together in defiance of chemical laws, or in relative proportions utterly at variance with their physical properties, and this too when a trifling alteration would in many instances result in an efficient, and, perhaps, elegant preparation. A member of the medical profession may be excused his ignorance of pharmacy, the study of disease is of itself sufficient to absorb his leisure time, but he may with advantage to himself and his patients recollect that there exists a pharmaceutical body trained to the art of compounding medicines, and ready to assist him with the pharmacy of any new remedial agent, or the judicious combination of the older ones, either for his formulæ in private practice or for the compilation of a hospital pharmacopœia.

In considering the prescriptions *seriatim*, the first that requires notice is that of No. 322, where "vaseline or prepared lard" is directed as a base for the other ingredients of the formula. Vaseline is ill adapted to retain, without separation, the quantity of fluid contained in this prescription; but an elegant preparation may be made by using the lard, and for the present purpose it should be melted in a water-bath, and, the other ingredients being added, kept well stirred until set or nearly cold, when the whole of the fluid will be taken up, a pink ointment resulting without any appreciable separation and of a suitable consistence for external application. Ointments are usually directed to be made on a slab, or by trituration in a good sized mortar; but it should at the same time be borne in mind that a more satisfactory preparation can sometimes be made by melting the base, such as lard, and after the addition of any other ingredient continuing the stirring until the ointment by gradual cooling has become of a suitable consistence.

The dispenser may reasonably conclude that the "gtt 2" after sodæ siccatæ, in No. 323, is an error due to a slip of the pen on the part of the writer, and that he intended it to be two grains. The combination of soda siccat. with ext. gentian. is quite usual, and the proportion just that which would be expected to form a pill with the extract of gentian.

It must be accepted that the writer of the prescription No. 324 intended pure morphia to be used from his having written "the alkaloid" after morphia, the dispenser therefore has no alternative but to use morphia, and as it is not soluble in the chloroform or in the rectified spirit of the liniment, or both combined, his next best course is to diffuse the alkaloid through the fluid. This may be facilitated by rubbing it in a mortar with a few drops of glycerine, and then adding the chloroform and liniment of belladonna. The morphia will by this means be thoroughly diffused through the fluid. It is difficult to understand why an alkaloid, incapable of solution in the menstruum, should by the writer be preferred to a dissolved salt of that alkaloid, in the same relative proportions. He may have had an end in view when he ordered the alkaloid, or he may not have been aware of its comparative insolubility in chloroform or rectified spirit. "Gulielmus" observes that the patient had previously obtained the liniment from the same prescription of a high colour—a brownish tint, and about twice as much in bulk. Accurately prepared the bulk should not exceed four fluid drachms, and if the liniment was sent out in the usual blue fluted poison bottle, the morphia, though only diffused, may have escaped the patient's observation.

No. 325. Bismuth is very frequently ordered in a prescription without its being indicated what preparation of bismuth the writer intends; but it is usual to use the subnitrate. It should be borne in mind for the dispenser's guidance that the subnitrate, as a salt of bismuth, stood alone in some Pharmacopœias prior to the issue of the B.P. It was the only preparation of bismuth in the London Pharmacopœia, and was the "bismuthum album" of the Edinburgh. Many of the profession, so long accustomed to one Pharmacopœia preparation of bismuth, still continue to write "bismuth," regardless of the carbonate which has been more recently introduced. The subnitrate is very valuable as an external application in many forms of skin disease. It may often advantageously supersede the oxide of zinc when there exists a very irritable condition of the surface of the skin, and in the case of children the subnitrate is especially soothing.

The prescription, No. 326, must be dispensed as others previously discussed containing ferri et quinæ citrat. with potass. iodid. The ferri et quinæ cit. should be dissolved in about ℥j of the aq. chlorof. and the other ingredients in the remainder, with which a little mucilage has been previously mixed; to this should be added the solution of the ferri et quinæ cit. There must necessarily result a decomposition with the formation of a precipitate which may be easily shaken up; the combination does not result in an elegant mixture, but in appearance is not very objectionable.

In the mixture, No. 327, the quinine is not directed to be dissolved, and if it were to be made into a solution, directly on the addition of the salicylate of soda, the quinine would separate as a resinous substance more or less adhering subsequently to the sides of the bottle. If the following method be adopted a satisfactory mixture will result. The salicylate of soda and chloral hydrate should be dissolved separately and then mixed together, and the quinine rubbed in a mortar to a fine powder should be suspended by the aid of about ʒiv of mucilage, and then added to the other ingredients previously in a state of solution; the quinine will be well suspended in the milky mixture. Care should be taken to have the quinine in a state of minute division, and this may be assisted by the addition of about an equal weight of sugar of milk to the quinine whilst being triturated in a mortar previous to the addition of the mucilage.

The prescription, No. 328, cannot be dispensed "so that the mixture should be of a clear bright sherry colour and not at all opaque." If the tincture of hop be of the proper strength there will be a deposit of organic matter with resin of the hop. The flocculent deposition is determined by the bromide of ammonium; without this ingredient neither of the tinctures deposit, but with this salt there is a precipitate from the hop only and not from the henbane. It is scarcely necessary to discuss the question how it was that a London house sent the mixture out bright, and besides it is quite immaterial in presence of the fact that if correctly dispensed there will be a flocculent separation which ultimately deposits leaving the supernatant fluid bright and of a pale yellow colour.

In No. 329, W. C. S. asks, "how a clear mixture can be made of dandelion and quinine, on mixing tr. quinæ with liq. taraxaci?" In the B. P. there is a suc. tarax., a recognized preparation made according to a prescribed formula, but many wholesale houses send out another preparation as liquor tarax.; it is therefore difficult to answer this question without being made aware of the mode of preparation of the liq. tarax. used. There is a turbidity in the mixture of tr. quinæ and suc. tarax., B. P., and it will be followed by a precipitate due to the mixture of tr. quinine with a preparation of a weaker spirituous strength, as the precipitate disappears on the addition of a little rectified spirit.

The mixture, No. 1 of No. 330, must be treated in principle as the prescription previously referred to, No. 327, but in this there is acid. sulph. dil. to dissolve the quinine, which will necessarily make a little difference in the manipulation. The salicylate of soda dissolved in a part of the pimento water should have a little mucilage mixed with it, and the quinine dissolved by the acid and diluted with another portion of the pimento water should be gradually and with shaking added to the salicylate of soda; the result here will also be milky, and closely resembling in appearance the one previously commented on. There is no essential difference with regard to manipulation in these two mixtures of salicylate of soda and quinine. In the former one the quinine is not dissolved, but rubbed to a fine powder and suspended by the aid of mucilage; in the latter the quinine is dissolved in dilute acid, but that acid is neutralized immediately on its coming into contact with the soda, and the quinine, thrown out of solution by the loss of the acid is retained in suspension by the mucilage.

With No. 2 of No. 330 the difficulty is not apparent. The prescription should be dispensed exactly as written, with solid perchloride of iron, adding the acid during solution. This method is adopted in making the tinct. ferri chlorati, 'German Pharmacopœia,' using solid perchloride, dilute spirit and hydrochloric acid.

An emphatic protest must be entered here against the doctrine that medicines dispensed with pharmacopœial preparations and in accordance with the prescription must necessarily be sent out bright. All pharmacopœial preparations should be of the B. P. standard, and if the result of mixing any of these in varying proportions in accordance with the prescription of a medical practitioner should be a turbid mixture, or one with a flocculent deposit, however unsightly this may be, the dispenser is not justified in removing, by filtration or otherwise, for the sake of an elegant result, any of that separated matter without the special sanction of the writer of the prescription; the result would often be a removal of the most active constituents of the medicine prescribed.

PHARMACEUTICAL PREPARATIONS OF COCA.*

BY GEO. W. KENNEDY, PH.G.

Although coca leaf is, comparatively speaking, a new remedial agent in many localities, yet in other places it is extensively known and largely used both in families and prescribed by physicians. In taking a retrospective view of the literature of the drug, I was agreeably surprised to find that so much had been written and so many experiments made with the object of isolating the

* From the 'Proceedings of the American Pharmaceutical Association,' 1878.

active constituents of the leaves, as well as to determine their therapeutic action.

In the last issue of the 'Proceedings,' for the year 1877, page 188, a very correct drawing of the plant will be found, made from a plant growing in the Royal Botanic Gardens, Regent's Park, London, to which I call your attention. The leaves of several species of Erythroxylon have been known from time immemorial, and were used especially among the Indians for chewing, mixed with lime and wood-ashes. Numerous and somewhat fabulous accounts are given of their physiological action: a moderate use is said to produce excitement of the functions, to relieve or prevent muscular fatigue, and to some extent to take the place of food; while an immoderate chewing of the leaf, like that of opium, frequently becomes an habitual vice, producing all the deleterious symptoms and consequences of narcotics, such as a state of half intoxication, stupor, with visionary dreams, premature decay, complete apathy and idiocy. These peculiar symptoms rendered the presence of a narcotic principle probable and induced experimentalists to undertake the investigation of the drug.

Neumann made approximate analyses of the leaf and discovered and described the alkaloid named *cocaina*. Stanislas Martin made a hasty examination, from which it appears that he discovered a bitter principle and a substance analogous to theina. Maisch subsequently was led to think that the plant contained also a volatile alkaloid. This supposition was afterwards confirmed by Lossen and Woehler, who separated the new alkaloid and named it *Hygrina*. They also discovered that when cocaina is heated with muriatic acid it is decomposed, benzoic acid and a new base, *Ecgonia*, being formed. Dr. S. R. Percy, of New York, also claims to have been the first to separate the active principle, to which he proposed the name *Erythroxylin*, inasmuch as the name cocaina might be confounded with other substances of a similar name.

So far, then, we have the following interesting and important active constituents of the drug:—Cocaina (or *Erythroxylin*), hygrina, besides the essential oil, to which I have not yet alluded and to which the odour of the plant is due, and of these the first-named alkaloid is undoubtedly the principle to which attention should be given in making galenical preparations. I find from the condensed reports of investigators that it is soluble in 704 parts of water, more soluble in cold alcohol, and quite soluble in hot alcohol and ether. From all the information I have been able to obtain appertaining to this subject, I would recommend a fluid extract and an elixir, and would propose the following formulæ, which I have found to furnish very satisfactory preparations:—

Extractum Cocæ Fluidum.

Coca leaves, in moderately fine powder	16 troy ounces.
Alcohol (95) per cent.	12 fluid ,,
Water	4 ,, ,,

Moisten the powdered leaves with the above menstruum, pack it carefully into a conical percolator, cover the surface of the powder with a disk of paper and add the remainder of the menstruum; when the liquid begins to drop from the percolator close the lower orifice with a cork, cover the percolator closely so as to prevent evaporation and allow it to remain in this condition forty-eight hours. The cork is then to be removed and percolation allowed to proceed, dropping not faster than at the rate of forty drops per minute, as quick percolation will not furnish good results and should be discountenanced, more especially in the manufacture of concentrated preparations. When the drug to be operated upon is small and the menstruum large, as in most of the tinctures, percolation can be allowed to proceed at the rate of sixty drops per minute with excellent results. The first twelve ounces of the percolate should be reserved and percolation continued with the same menstruum until the drug is thoroughly exhausted; evaporate the last portion at a temperature not higher than 130° F., until reduced to four fluid ounces and mix this with the reserved portion. The fluid extract prepared in accordance with this formula will be found of a dark greenish-brown colour and to contain in the highest degree the odour and taste characteristic of the drug,

Elixir Cocæ.

Coca leaves in moderately fine powder	℥iv.
Alcohol and water, of each a sufficient quantity.	
Oil of orange	gtt. vj.
Oil of cinnamon	gtt. ij.
Syrup	℥iv.

Mix three measures of alcohol with one of water, moisten the powder with two fluid ounces of the mixture, pack it firmly in a conical percolator and gradually pour on a sufficient quantity of the menstruum until eleven and a half fluid ounces of percolate are obtained. Dissolve the oils in a half ounce of alcohol, add to the percolate and finally the syrup. This will furnish a very elegant elixir, and each fluid drachm will represent the active constituents of fifteen grains of the drug when carefully prepared.

THE VALUATION OF TINCTURE OF OPIUM.*

BY PROFESSOR ALB. B. PRESCOTT, M.D.

Twelve samples were obtained, each from a different drug store in Michigan; three in Ann Arbor; three in Detroit; three in East Saginaw, and three in Grand Rapids, the best tincture being asked for in each case.

Each sample was worked by Hager's process (as given in Dragendorff's *Werthbestimmung einiger starkwirkender Droguen*, p. 91) and by Staples' process as used by Procter (*Pro. Amer. Phar. Asso.*, 1870, p. 131; *Am. Jour. Phar.*, 1871, p. 65). I also would refer to the report of L. M. Rice, *Pro. Amer. Phar. Asso.*, 1871, p. 447, and to that of D. C. Dott, *Phar. Jour. Trans.*, 1876, September 16, p. 239. All the operations here reported were done by Mr. Henry Heim, to whom this report is indebted for faithful work and careful study.

The process of Hager, modified for the tincture and in other details, was conducted as follows: The specific gravity of the tincture was taken, and a weighed quantity (from 25 to 30 grams) evaporated nearly to dryness on the water-bath; 1 gram of freshly slaked lime was added, with trituration, then 24 c.c. of distilled water added, and the mixture heated on the water-bath for one hour. The whole was then transferred to a small filter previously wetted, and the residue of the filtration washed with warm water until the filtrate dropped nearly colourless, and the filtrate evaporated on the water-bath to about 25 grams. The liquid was transferred, with rinsings, to a small wide-mouthed bottle, and while it was still warm 1 c.c. of ether and 3 drops of benzole were added with shaking, then 1·1 gram of ammonium chloride added and dissolved and the mixture set aside twenty-four hours. The liquid was then agitated, the crystals detached from the interior of the bottle, the whole brought upon a small filter, previously dried and weighed, the crystalline residue washed with about 8 c.c. of distilled water, dried at about 50° C. (120° F.) and weighed. Hager directed to leave the mixture three hours for separation of morphia. He has also advised to deduct one-tenth for impurities in the crude morphia of the process (the crystals not being washed with ether or chloroform). But the filtrate, about 25 grams, if holding only one-thousandth of its weight of morphia in solu-

* Paper read at the twenty-sixth annual meeting of the American Pharmaceutical Association. From the 'Proceedings.'

tion,* would carry about 0·025 of the alkaloid, fully as much as the one-tenth for foreign substances weighed with the morphia. Now when twenty-four hours are given for crystallization of morphia, there can scarcely be less than 1 part of morphia remaining in 1000 parts of the filtrate. It is not likely, however, that one-tenth the weight of the crystals (not ether-washed) is as much as the impurities. It will be seen from the results given with Staples' process that the ether-washing alone removes a variable quantity, averaging not far from one-tenth the weight of the crystals, and ether-washing certainly does not leave absolute morphia. I should advise ether-washing of the crude morphia in this Hager's process for the tincture and then leave remaining impurities to balance the morphia remaining in the filtrate. The process after Staples was conducted as follows:—

Morphiometric Work with Tincture of Opium. With Hager's Process.

Number	Specific gravity.	Tincture taken. Grams.	Crude. Morphia Grams.	Morphia per cent. of Tincture.	Grains Morphia (crude) per fl. oz. of tincture.
1	0·957	28·730	0·2560	0·891	3·88
2	0·959	27·910	0·1494	0·535	2·81
3	0·959	26·984	0·1998	0·740	3·22
4	0·962	27·112	0·1809	0·670	2·88
5	0·955	28·630	0·2187	0·763	3·31
6	0·969	27·860	0·2970	1·08	4·88
7	0·959	26·100	0·1800	0·689	3·00
8	0·944	27·774	0·1890	0·681	2·92
9	0·952	27·870	0·1845	0·662	2·58
10	0·958	27·700	0·2268	0·755	3·43
11	0·950	—	—	—	—
12	0·950	25·338	0·0837	0·330	1·42
Mean	0·956	—	—	—	3·11
U. S. P. standard (officinal morphia).				0·867	3·75

With Staples' Process.

Number	Tincture taken. Grams.	Ether wash. Morphia. Grams.	Morphia per cent. of Tincture.	Grains Morphia per fl. ounce.	Grams lost in ether washing.
1	25·608	0·214	0·885	3·64	0·019
2	28·200	0·167	0·595	2·81	0·034
3	28·010	0·180	0·642	2·69	0·027
4	27·965	0·159	0·568	2·48	0·016
5	28·870	0·251	0·862	3·78	0·026
6	28·045	0·265	0·944	4·16	0·019
7	28·175	0·195	0·692	3·01	0·026
8	27·505	0·117	0·422	1·82	0·014
9	28·935	0·176	0·608	2·55	0·016
10	28·028	0·223	0·795	3·47	0·021
11	29·302	0·158	0·539	2·32	0·018
12	26·120	0·115	0·440	1·89	0·013
Mean	—	—	—	2·84	—

The tincture (about 25 grams, of ascertained specific gravity) was evaporated to one-half its bulk on the water-bath, then set aside twenty-four hours for the tarry matters (soluble in alcohol but not in water) to subside, and decanted upon a filter, the filtrate being received in a small wide-mouth bottle. The tarry residue was washed with 4 c.c. (about 1 fluid drachm) of water and the washings filtered into the previously obtained filtrate. To the clear liquid in bottle was added an equal bulk of alcohol of specific gravity 0·835 and then a mixture of 1·3 c.c. (20 minims) of water of ammonia (specific gravity 0·96) with 1·7 c.c. (25 minims) of alcohol. After agitation, the bottle was closed with a stopper and set aside for four days. The liquid was then agitated, the crystals detached from the side of the bottle, and the whole filtered upon a small filter previously dried and weighed. The last portion of crystals was rinsed from the bottle upon the filter with a little of the filtrate. The crystals were then washed with 4 c.c. (1 fluid drachm) of diluted alcohol, then with the same measure of distilled water, then dried at about 50° C. (120° F.) and weighed. The dried crystals were then washed with 8 c.c. (2 fluid drachms) of washed ether, dried at 50° C. and again weighed.

The directions in Staples' process are to leave twenty-four hours for crystallization of the morphia and to add the ammonia in two portions, in both which particulars the process was departed from.

The process of Hager, it will be seen, takes less time than that of Staples, but the time depends greatly on the period given for formation of morphia crystals. By long standing a slightly greater yield is obtained.*

I have for some time been of the belief that Staples' process was the best for tincture of opium, but as Mr. Heim's results somewhat strengthened the comparative usefulness of Hager's process, I must hold it as nearly or quite as good as the other. Staples' process yields the best crystals of morphia.

* See report of volumetric estimation of total alkaloids as morphia in the filtrates of this work with Hager's process in the writer's paper on Morphiometric Processes for Opium, read at the Atlanta Meeting and to be published hereafter.

* The filtrates of Mr. Heim's work were extracted with amyl alcohol (preceded by benzole-washing in case of Staples' process), and the extracted alcohol, after evaporation of the amyl alcohol, was estimated in acid solution by Mayer's solution. The details and results are given (from Mr. Stecher's work) in the writer's report on Morphiometric Processes for Opium.

INDIGO-BLUE.†

BY E. SCHUNCK.

In the first part of this paper reference is made to previous papers containing accounts of indigo-blue obtained from *Isatis tinctoria*, in which it exists in the form of a glucoside, indican: this when treated with acids, splits up into indigo-blue and indiglucin. It is also decomposed by the action of caustic alkalies, a substance being formed which yields indigo-red, indifulvin, and leucine, when treated with acids. In some more recent experiments on indican from woad leaves, tyrosine has been found amongst the products of decomposition. The indican used consisted of a crude alcoholic extract of the leaves; it is therefore difficult to say whether the tyrosine existed ready formed in the leaves, or was the result of the decomposition of the indican; the latter is more probable, since tyrosine is almost insoluble in alcohol, and therefore would not be contained in the alcoholic extract in quantity. That there is some connection between indigo-blue and tyrosine is seen from the fact that tyrosine, $C_9H_{11}NO_3$, is indigo-blue, C_8H_5NO+2 molecules of water, in which one atom of hydrogen is replaced by CH_3. Its formation may be explained by supposing indican to split up into tyrosine indiglucin, acetic acid, and carbonic anhydride, $C_{26}H_{32}NO_{18}+3H_2O=C_9H_{11}NO_3+2(C_6H_{10}O_6)+2C_2H_4O_2+CO_2$.

In order to ascertain whether other indigo-yielding plants contain indigo-blue in the form of a glucoside as in *Isatis tinctoria*, or in the free state, the following experiments were carried out:—

Polygonum tinctorium.—The leaves of this plant which, are large, oval, and glossy, and of a lively green colour, contain a large quantity of the colour-yielding substance. On cutting them to pieces and rubbing with water to a thin

† From the *Chemical News*, 39, 119—120, 129—130, 143—144. Reprinted from the *Journal of the Chemical Society*, July, 1879.

paste, filtering through calico, and separting the chlorophyll, albumin, etc., from the filtrate by precipitating with lead acetate, a liquid is obtained which yields indigo-blue on the addition of sulphuric or hydrochloric acid and allowing the mixture to stand for several hours. The isolation of the colour-yielding substance is effected by the method formerly employed to extract indican from *Isatis tinctoria*, or by the following, which is preferable:—The leaves are dried in a stove, and while still warm, ground to a powder, and exhausted with alcohol in a percolator. The alcoholic extract is evaporated at the ordinary temperature, and the residue freed from chlorophyll and other impurities by precipitation with lead acetate. On adding basic lead acetate to the filtrate, a primrose-yellow precipitate is thrown down; this is washed with water and with alcohol, and finally suspended in absolute alcohol, and carbonic anhydride is passed through the mixture until the liquid assumes a yellow colour. On evaporating the filtrate at the ordinary temperature and adding water, a portion remains insoluble. This is separated by filtration, and the lead in the filtrate precipitated with sulphuretted hydrogen. The clear solution, evaporated at the ordinary temperature by means of a current of air, leaves a syrupy residue, from which the colour-yielding substance is obtained as a yellow syrup on treatment with absolute ether and evaporation. It shows no signs of crystallization, is soluble in water, alcohol, and ether, the aqueous solution possessing a more or less acid reaction. It assumes a deep yellow colour when treated with caustic alkalies, and gives a light yellow precipitate with lead acetate. When it is mixed with sulphuric or hydrochloric acid, indigo-blue separates out, and the filtered solution gives the characteristic test for glucose with Fehling's solution. If, however, the aqueous solution is allowed to stand or is boiled, or mixed with caustic alkali and allowed to stand, no indigo-blue is deposited on addition of acid. In all probability the substance analogous to indican undergoes a molecular change, resulting in the formation of a body which yields indirubin and resinous matters on treatment with acids.

By allowing a large quantity of the aqueous solution to stand in contact with acids, indirubin and indifulvin are deposited, besides indigo-blue, showing that a portion of the substance undergoes some change, which in all probability may also take place in the cells of the leaf: for from leaves gathered late in the season a substance is obtained which, when treated with acids, yields far less indigo-blue and more indirubin and other products than the substance obtained from the younger leaves.

From these experiments it is inferred that the leaves of *Polygonum tinctorium* contain a substance identical with the indican from *Isatis tinctoria*, and also that no colouring matter exists ready formed in the healthy living plant.

If the leaves of *Polygonum tinctorium* be crushed, and after a short time plunged into boiling alcohol, the bruised portion assumes an intense blue colour, whilst the other portion becomes white.

If the leaves be immersed in water and the water frozen, the portion of the leaves which have been frozen appears of a dark colour after complete thawing, and after steeping in boiling alcohol they assume a dark-blue colour, whilst the unfrozen portions become white. The fresh leaves, after being plunged in cold alcohol or ether, and extraction of the chlorophyll, appear blue; this was supposed to prove the pre-existence of the free colouring matter in the leaves; but by plunging them in boiling instead of cold alcohol, the colour-yielding substance is dissolved before it can decompose, and the leaves become of a pale yellow colour. Moreover, the alcoholic extract on evaporation does not deposit a trace of indigo-blue. The explanation offered for these phenomena is as follows:—The molecules of the glucoside, indican, are in a state of unstable equilibrium, and are enabled to preserve that equilibrium so long as they are contained in the cells of the living plant. As soon as that vitality ceases the indican begins to decompose, and the molecules arrange themselves as their chemical affinities predispose them; the result is, indigo-blue and indiglucin. This reaction takes place so rapidly that in some cases it would appear as if indigo-blue pre-existed in the living plant. By immersing freshly cut sprigs of *Polygonum tinctorium* in dilute hydrochloric acid for some days, and exposing them to the air, the acid is rapidly absorbed by the stalk, passing first to the lower leaves and then to the upper. The absorption of the acid is attended with a change of colour from dark green to dirty yellow, and after some time to dark blue, commencing at the base of the leaf, and gradually extending to the apex, which is reached only in the case of the lower leaves. When the change of colour begins to appear in the upper leaves, they are immersed in hot alcohol, whereby the chlorophyll is dissolved, leaving those parts which have changed colour, blue, and the other portions white.

All these experiments were performed when the plants were in a state of vigorous growth.

The leaves of the *Polygonum tinctorium*, after developing the blue colour, present certain characteristic appearances.

(1). The colouring matter is confined to the parenchyma of the leaves; the stem and ramifications in the coloured leaf may be traced as white veins on a coloured ground.

(2). The younger leaves show more intense coloration, although probably all the leaves contain the same amount of colouring matter; but in the lower leaves it is more widely spread.

(3). The colouring matter, when developed, is contained in the cells of the parenchyma in dots and parcels of various sizes, and in the amorphous state, the intensity of colour being determined by the crowding of the blue particles in the cells.

Bletia Tankervillæ.—Similar experiments, made with the leaves of the *Bletia Tankervillæ*, were attended with similar results, leading to the conclusion that these leaves contained a glucoside, similar to indican, which, on treatment with acids, yields a glucose and indigo-blue.

Indigofera tinctoria.—From want of material it was impossible to conduct experiments on this, the most important of all indigo-yielding plants; but according to P. Micheà, a glucoside exists in the indigoferas of India, similar and in all probability identical with the indican from *Isatis tinctoria*.

From the following plants, supposed to yield indigo-blue, all attempts to obtain a body resembling indican have failed, and they show no indication of the presence of a colouring matter like indigo-blue. They are:—

Galega officinalis,
Hedysarum Onobrychis (sainfoin),
Polygonum Fagopyrum (buckwheat),
Polygonum Persicaria,
Rhinanthus Crista Galli,
Sophora japonica,
Spelanthes oleracea.

THE PAPAW TREE.

The following letter from Mr. S. P. Oliver on the subject of the papaw tree appears in *Nature* for the 10th inst.:—

"In *Nature*, vol. xix., p. 447, is a paragraph relative to the singular qualities of the *Carica papaya*. I cannot but think that some of the properties attributed to this vegetable in British Guiana by the natives of that colony are exaggerated somewhat, *e.g.*, the tempering of steel by its sap, etc.

"Sir Wyville Thomson, in the first volume of 'The Voyage of the *Challenger*,' gives a capital representation of a group of these papaw-trees in the garden of the admiral commanding on the North American station at Clarence Hill, Bermudas, where they seem to abound; I do not know if these diœcious plants are indigenous to these islands or introduced from the West Indies and tropical America. From the cut above mentioned can be seen the quaint growth of these paradoxical trees, which must have been esteemed by the early voyagers, as they have been introduced into all parts of the tropics. The singular-looking straight stems (not unlike the gigantesque tree cabbage stalks of the Channel Islands) are crowned with a tuft of digitate leaves, somewhat at a distance resembling those of the *Aralia papyrifera*, under which the clusters of black purple fruit protrude. In the islands of Bourbon and Mauritius they make a passable *compôte* of these fruits, which are pulpy and full of black seeds when ripe, and the Creole children eat them raw, with what effect on their insides I know not; the birds, however, will not touch them, and as they fall they rot on the ground beneath. In Mauritius, where we lived principally on ration beef cut from the tough flesh of Malagasy oxen, we were in the habit of hanging the ration under the leaves itself, and if we were in a hurry for a very tender piece of *filet*, our cook would wrap up the undercut of the sirloin in the leaves, when the newly-killed meat would be as tender as if it had been hung for a considerable time. Whence are these deleterious effects causing rapid decomposition of animal fibre? and are there any other trees which possess similar properties?

"The Malabars, who were introduced into Mauritius as Coolies, would not sleep under tamarind trees, on account of their supposed noxious effects; but it is possible that superstition has something to do with their objection."

RECENT CONTRIBUTIONS TO THE HISTORY OF DETONATING AGENTS.*

BY PROFESSOR ABEL, C.B. F.R.S.

(*Continued from page* 50).

If compressed gun-cotton is diluted by impregnating the mass with a *liquid*, or with a solid which is introduced into the mass in a fused state, its susceptibility of detonation is reduced to a very much greater extent than by a corresponding quantity of a solid inert body, incorporated as such with the gun-cotton, the cause being the converse of that which operates in preventing a reduction of the sensitiveness to detonation of nitro-glycerine by its dilution with an inert solid. In this case, the explosive liquid envelops the solid diluent, and remains continuous throughout, occupying the spaces which exist between the solid particles; hence detonation is readily established and transmitted. But in the case of the solid explosive, the diluent, which is liquid, or at any rate is introduced into the mass in the liquid state, envelops each particle of the solid, so that a film of inert material surrounds each, isolating it from its neighbours, and thus opposing resistance to the transmission of detonation, which is proportionate to the original porosity or absorbent power of the mass.

While compressed gun-cotton, in the air-dry state, is detonated by 2 grains of mercuric fulminate imbedded in the material, its detonation by 15 grains, applied in the same manner, becomes doubtful when it contains 3 per cent. of water, over and above the 2 per cent. which exists normally in the air-dry substance. Specimens which had been impregnated with oil or soaked in melted fat and allowed to cool, could not be detonated by means of 15 grains of fulminate. These diluted samples of gun-cotton could only be detonated by adding very considerably to the power of the initiative detonation; 100 grains of confined fulminate generally failed to detonate gun-cotton containing from 10 to 12 per cent. of water, and if the amount reached 17 per cent., 200 grains of fulminate were needed to ensure its detonation.

But moist or wet compressed gun-cotton is decidedly more susceptible of detonation by (dry) compressed gun-cotton itself than by mercuric fulminate.

Thus 100 grains of dry gun-cotton, detonated through the agency of the ordinary fulminate fuze, suffice to detonate wet gun-cotton containing 17 per cent. of water, though this result is somewhat uncertain. If the diluting agent amounts to 20 per cent., detonation is not certain with less than 1 oz. of dry gun-cotton, and if the compressed material be completely saturated with water (*i.e.*, containing 30 to 35 per cent.), 4 oz. of the air-dry substance, applied in close contact, are needed to ensure its detonation.

Detonation is transmitted through tubes from dry compressed gun-cotton to a moist disk of the material with the same facility as to the dry substance; and this is also the case with regard to the propagation of detonation from one mass of moist gun-cotton to another, in open air, all the pieces being ranged in a row, in contact with each other, provided that the piece first detonated does not contain less water than the others to which detonation is transmitted. Some curious results, obtained in experiments on the transmission of detonation, with gun-cotton containing different proportions of water, appeared to indicate that the character or quality of detonation developed by gun-cotton is subject to modification by the proportion of water which the latter contains.

Gun-cotton containing 12 to 14 per cent. of water is ignited with much difficulty on applying a highly heated body. As it leaves the hydraulic press upon being converted from the pulped state to masses having about the density of water, it contains about 15 per cent. of water; in this condition it may be thrown on to a fire or held in a flame without exhibiting any tendency to burn; the masses may be perforated by means of a red-hot iron or with a drilling tool, and they may with perfect safety be cut into slices by means of saws revolving with great rapidity. If placed upon a fire and allowed to remain there, a feeble and transparent flame flickers over the surface of the wet gun-cotton from time to time as the exterior becomes sufficiently dry to inflame; and in this way a piece of compressed gun-cotton will burn away very gradually indeed. A pile of boxes containing in all 6 cwt. of gun-cotton, impregnated with about 20 per cent. of water, when surrounded by burning wood and shavings in a wooden building, was very gradually consumed, the gun-cotton burning as already described when the surfaces of the masses became partially dried. In two other experiments quantities of wet gun-cotton of 20 cwt. each, packed in one instance in a large, strong wooden case, and, in the other, in a number of strong packing cases, were placed in small magazines, very substantially constructed of concrete and brickwork. Large fires were kindled around the packages in each building, the doors being just left ajar. The entire contents of both buildings had burned away, without anything approaching explosive action, in less than two hours. This comparatively great safety of wet gun-cotton, coupled with the fact that its detonation in that condition may be readily accomplished through the agency of a small quantity of dry gun-cotton, which, through the medium of a fulminate fuze or detonator, is made to act as the initiative detonating agent, gives to gun-cotton important advantages over other violent explosive agents for purposes which involve the employment of more or less considerable quantities at one time, on account of the comparative safety attending its storage and the necessary manipulation of it. Moreover, it has been well established by experiments of many kinds carried out on a considerable scale, as well as by accurate scientific observations, that the detonation of wet gun-cotton is decidedly sharper or more violent than that of the dry material; a circumstance which affords an interesting illustration of the influence exerted by the physical condition of the mass upon the facility with which detonation is transmitted from particle to particle. In the determinations made by means of the Noble chronoscope, of the velocity with which detonation is transmitted along layers or trains of gun-cotton and nitro-glycerine,

* Lecture delivered at the Royal Institution of Great Britain, Friday, March 21, 1879.

the lecturer has included experiments with gun-cotton containing different proportions of water. When the material contained 15 per cent. of the liquid, some indications were obtained that the rate of transmission of detonation was a little higher than with dry gun-cotton; the difference was very decidedly in favour of wet gun-cotton, when the latter was thoroughly *saturated* with water. (With air-dry gun-cotton the mean rate of transmission ranged in several experiments between 17,000 and 18,900 feet per second; with gun-cotton containing about 30 per cent. of water, the mean rate of transmisson ranged between 19,300 and 19,950 feet per second.) The air in the masses of compressed gun-cotton being replaced entirely by the comparatively incompressible body, water, the particles of explosive are in a much more favourable condition to resist displacement by the force of the detonation, and hence they are more readily suceptible of sudden chemical disintegration. Moreover, the variations in the rate of travel of detonation in dry gun-cotton, resulting from differences in the compactness or rigidity of different masses of the material, are very greatly reduced, if not entirely eliminated, by saturating the disks with water and thus equalizing their power of resisting motion by a sudden blow.

Another striking illustration of the influence which the physical character of an explosive substance exercises over its susceptibility to detonation and the degree of facility with which its full explosive force is developed, is furnished by one of the most recently devised, and one of the most interesting of existing, explosive agents.

Twelve years ago, soon after the process of producing compressed and granulated gun-cotton had been elaborated by the lecturer, it occurred to him to employ these forms of gun-cotton as vehicles for the application of nitro-glycerine. A considerable proportion of the liquid was absorbed by the porous masses of gun-cotton, and a nitro-glycerine preparation analogous in character to dynamite was thus obtained. The absorbent was in this case a violently explosive body instead of an inert solid as in dynamite, but the quantity of nitro-glycerine in a given weight of the preparation (to which the name of *Glyoxilin* was given), was considerably less than in the Kieselguhr preparation; hence the latter was nearly on a point of equality with it, in regard to power, as an explosive agent.

Nobel has observed that if, instead of making use of the most explosive form of gun-cotton, or trinitrocellulose, a lower product of nitration of cellulose (the so-called soluble or collodion gun-cotton) is added to nitro-glycerine, the liquid exerts a peculiar solvent action upon it, the fibrous material becoming gelatinized while the nitro-glycerine becomes at the same time fixed, the two substances furnishing a product having almost the characters of a compound. By macerating only from 7 to 10 per cent. of soluble gun-cotton with 90 to 93 per cent. of nitro-glycerine, the whole becomes converted into an adhesive plastic material, more gummy than gelatinous in character, from which, if it be prepared with sufficient care, no nitro-glycerine will separate even by its exposure to heat in contact with bibulous paper, or by its prolonged immersion in water, the components being not easily susceptible of separation even through the agency of a solvent of both. As the nitro-glycerine is only diluted with a small proportion of a solidfying agent which is itself an explosive (though a somewhat feeble one), this *blasting gelatine*, as Nobel has called it, is more powerful not only than dynamite but also than the mixture of a smaller quantity of nitro-glycerine with the most explosive gun-cotton, as the liquid substance is decidedly the most violent explosive of the two. Moreover, as nitro-glycerine contains a small amount of oxygen in excess of that required for the *perfect* oxidation of its carbon and hydrogen constituents, while the soluble gun-cotton is deficient in the requisite oxygen for its complete transformation into thoroughly oxidized products, the result of an incorporation of the latter in small proportion with nitro-glycerine is the production of an explosive agent which contains the proportion of oxygen requisite for the development of the maximum of chemical energy by the complete burning of the carbon and hydrogen, and hence this blasting gelatine should, theoretically, be even slightly more powerful as an explosive agent than pure nitro-glycerine.

That such is the case has been well established by numerous experiments, but although this blasting gelatine may be detonated like dynamite by means of small quantities of confined detonating composition, when it is employed in strongly tamped blast-holes, or under conditions very favourable to the development of great initial pressure, it behaves very differently from that material, or other solid though plastic preparations of nitro-glycerine, if the attempt is made to detonate it when freely exposed to the air or only partially confined. It not only needs a much more considerable amount of strongly confined detonating composition than dynamite and similar preparations do, to bring about a detonation with it under those conditions; but when as much as 15 or 20 grains of confined fulminate are detonated in direct contact with it, although a sharp explosion occurs, little or no destructive action results, and a considerable portion of the charge operated upon is dispersed in a finely-divided condition. This dispersion appears to take place to some slight extent with dynamite also, when a small charge is detonated in open air, in consequence of its want of rigidity, though the amount of explosive which thus escapes detonation is very small as compared with the gelatine. (*To be continued.*)

RESIN OF PODOPHYLLUM.*

BY J. U. LLOYD.

Resin of podophyllum is found upon the market in colour ranging from light brown to deep yellow. Can these various shades be obtained from may-apple root without the use of foreign substances?

At first resin of podophyllum was prepared by distilling all the alcohol from an alcoholic tincture of the root and pouring the residue into cold water. It settled into a lump of dark brown colour; when pounded it was a little lighter.

In the present U. S. officinal process there is enough alcohol to cause the resin to separate in a finely divided form if the water be cold. Such an article has either a yellowish or slightly brown cast. The first portions of the percolate furnish the darkest shade. If it be dissolved in its weight of cold alcohol, filtered and precipitated in sixteen parts ice-cold water, it will be much lighter in colour, as impurities are thus separated which were mechanically carried down by the first precipitate. An article thus produced is a shade darker than powdered ipecac, usually of a faint yellowish shade. As a rule, the nearer resin of podophyllum approaches white the better.

If instead of water, or water acidulated with muriatic acid, we use an aqueous solution of alum for the precipitant, the colour before mentioned quickly changes, acquiring in a few hours a rich greenish yellow. The supernatant liquid also turns yellow; this shade cannot be obtained with water or water acidulated according to the Pharmacopœia. It results from a change in the resin, instead of the addition of another substance from the tincture.

Alum-water will scarcely produce an additional precipitate from the liquid after making officinal resin of podophyllum, but will change the powdered resin to greenish yellow, which shade, so frequently found in the market and so often demanded of manufacturers, I have never been able to obtain without the use of foreign substances. Almost any of the colours, excepting that just named, from deep yellowish brown to nearly white, can be produced with pure water for the precipitant, as the variations result generally from impurities carried down by the precipitate or from resins of different densities.

* From the 'Proceedings of the American Pharmaceutical Association,' 1878.

The Pharmaceutical Journal.

SATURDAY, JULY 26, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

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THE CO-OPERATIVE CRAZE.

THE reports of the evidence given before the Select Committee on Co-operative Stores, as they appear in the daily papers, afford but small reason for anticipating that the result of this inquiry will be much to the advantage of the retail traders who are damaged by the competition of these large trading organizations. On the contrary, we fear that the chief effect of the entire proceeding will be to give greater prominence to the stores, in fact to advertise them to the disadvantage of shopkeepers, and to induce imitation of their mode of doing business by large firms. That, we think, will be at least the more immediate consequence, and it is for this reason that we have always maintained that the less there was said about the stores the better. Co-operation is the whim of the day and "going to the stores," one of the most popular amusements of the leisurely and the idle; but like spelling bees, skating rinks, fat claimants, fancy bazaars, and even worship of Miss SARAH BERNHARDT, and many other popular whims which those classes bring into notoriety, the "store" craze cannot be expected to have any greater vitality than any other nine days' wonder which may acquire an inflated notoriety by being run after by the herd of sensation seekers.

But there is a further reason for believing the present craze after co-operative association will subside and perhaps die away altogether. Regarding this system as a means of obtaining ordinary necessaries without allowing the retail trader to perform for the general public the service of distribution, and as the purveyor of such commodities deriving from the performance of that service a remuneration which makes it worth his while to devote his time and energies entirely to that work, the extensive carrying out of the system involves such a disregard of the division of labour and such a violation of the principle of live and let live that it is scarcely possible to imagine its continuance for any long period without being productive of evils that will materially affect the classes which are for the time being benefited by doing for themselves the work of the retail trader and taking the bread out of his mouth.

We do not seek to question the right of a few individuals associating together to economize their means by purchasing a chest of tea and dividing it among themselves; they would be, we think, equally free to make their own coats and trousers or shoes, just as much as they would be entitled to dispense with the use of a carriage and pair, or the services of a footman in plush. If this kind of self-help by association were at all widely carried out, no doubt tailors, shoemakers and carriage builders, as well as other retail traders, would suffer to some extent by loss of business; but, on the one hand, they would not have any real reason to complain of being unfairly used, and, on the other hand, it is not probable that the advantages of such a system would be sufficient to make it so universal as to seriously damage retail traders.

The case is, however, very different when the individuals who have associated themselves together in this way for their own benefit proceed to make their organization a source of profit to themselves by inviting the general public to obtain their supplies of ordinary commodities through the same channel, and thus enter into competition with the retail tradesmen. The unfairness of such competition is in itself sufficient to condemn it, and the probable effect of it upon the trading community is a further reason for regarding it as a thoroughly ill-founded proceeding.

The evidence given last Wednesday affords some indication of what is expected to be the result of co-operative store trading. Mr. CHARLES J. COX, one of the principal clerks in the Admiralty, was asked what was to become of the small traders if stores were to go on increasing at the same rate that they have done in the past, and his answer was that some of them must go. He did not think the shopkeepers would soon become a relic of the past and could hardly give an idea of the time it would take to bring this about; but he was clearly possessed with the idea that some of them would have to go, and that this result would be to the advantage of themselves as well as of the public. In reference to the business of the chemist and druggist especially, he had not the least idea what people would do if they wanted to get medicine on Sundays when the druggists' shops were all swept away by the stores, but had no doubt some method of meeting the wants of the public would be found. It might have been worth while to ascertain from Mr. Cox what was his opinion as to the probable destination of those tradesmen who, to use his language, "would have to go;" also, whether their having to go would have any influence in augmenting the Queen's taxes or the parish rates; but perhaps the members of the Committee had their own views on this subject, and will be able in their report to indicate what may be naturally expected to result from a system of trading by which shares originally worth only £2 are now worth from £75 to £100. This is not a result of the commendable economy of Civil Service clerks, but it is one achieved by unfairly enabling the outside public to dispense with the services of the retail trader, who in the faith of being employed as heretofore has invested his capital in some one or other branch of the business of purveying.

But we do not believe the influence of the "stores" will extend so far as to bring about Mr. Cox's predictions. Considerable hardship and loss will, no doubt, be experienced by tradesmen while the stores remain in favour and while some of them are as prosperous as the one referred to above. That, however, is a precedent that is not likely to be imitated: "Stores" are already entering into competition with stores: the *exploitation de l'homme par l'homme*, under the ægis of limited liability, is being commenced upon the basis of "store" popularity, and we shall not be surprised to see before long some of the numerous schemes for providing every one with commodities for less than they are worth turn out to have their philanthropy limited to the promoters and others concerned in their inception. We have already seen the collapse of some of these literally speaking "too promising" concerns and we think it only requires some degree of patience and fortitude to arrive at a time when the seeds of weakness inherent in this co-operative store craze shall become thoroughly clear to all. That there is foundation for these opinions may be gathered from the evidence furnished by one of our contemporaries devoted especially to the interests of the Civil Service. Testimony from such an unexpected source against the mode in which "store" trading has been carried on is especially significant, and the treatment of the subject in a recent number of the *Civil Service Gazette* is so thoroughly to the point, so much more rational than most of the articles which have appeared in the daily papers—simply echoing the popular cry—that we think it desirable to publish the article *in extenso* as one of the best commentaries on the subject.

"We have often ventured to advise members of Her Majesty's Civil Service to be cautious in their chase after that wild sprite, the treacherous will o' the wisp, named co-operation; and warned them that, unless extremely careful, they would be led by it into a quagmire. Our admonitions were not, as the event has proved, unnecessary, for the mischance we apprehended has come to pass. By running heedlessly after this '*ignis fatuus' the servants of the Crown have got plunged into a bog*, extrication from which will not be easy. Had they strictly confined themselves to co-operation pure and simple, to the purchase at wholesale prices and distribution among themselves of articles of first necessity for their own use and that of their families, in classes or departments, there would have been no valid objection in principle to their economic combinations; but when they constituted themselves genuine traders and storekeepers for the sale of all kinds of commodities to the public at large, which they virtually did—*the ticket limitations being in practice a transparent sham*—they transgressed the limits of legitimate club or class co-operation, and laid their commercial adventures open to reasonable opposition from the regular trading community. To embark openly in trade and enter into competition with those who derived their living, supported their families, and contributed to the national taxation from the business of buying and selling, was not merely foolish but impolitic. The permanent and certain interests of the whole body of public servants were jeopardized for the temporary and uncertain advantage of a few members, *and a feeling of hostility was excited against the Service throughout the country among an active and influential class* previously disposed to be friendly towards it. Great Britain is truly, as it has been designated, a nation of shopkeepers, and to provoke the constituents of such a nation to vindictive antogonism was certainly unwise. Beyond requiring the habit of paying cash for whatever was wanted and inducing the reduction of credit prices by tradesmen to ready money rates, we do not see any present compensating advantages the great majority of Civil Servants have obtained; *but we foresee much injury looming in the future from the warfare which has been stirred up between them and a numerous body of the Queen's subjects.* For a season co-operation is a word to conjure with, and co-operative stores are *à la mode*; but the charm and the novelty will, we may safely predict, soon wear away, and the natural order of things will be restored. *Indeed, already the most fashionable stores are fast getting into disrepute, losing their character in more ways than one.* Scandalous tongues are busy denouncing them as places of assignation, flirtation, intrigue, pastime for the gay and idle, and broadly insinuating that the mob of carriage-people, of wonderfully-got-up girls, nice young men, elderly dandies, and frisky dames who flock thither to promenade, to chat to lunch, etc., are quite as much in search of pleasurable excitement as of cheap groceries and articles of domestic use at wholesale prices. However that may be, *it is to be regretted that servants of the Crown, Civil or Military, should have provoked the enmity of any considerable body of Her Majesty's subjects engaged in fighting the hard battle of life by entering into competition with them in trade, disguised or undisguised*; and we hope that some means may be found for removing the cause of anger and restoring the good-will and fraternal feeling which should subsist between all orders of hard-working men."

So far as Civil Service co-operation is concerned, the light here thrown upon it from a source that is not likely to be antagonistic, gives prospect of some mitigation at least of the injuries that have been inflicted upon retail traders, and as regards "stores" carried on or projected as limited liability companies we do not think there is much to fear.

POSTHUMOUS HONOURS TO A FRENCH PHARMACIST.

By a recent decree the mayor of Saint Omer has changed the name of a street in that town to "Rue Caventou," in honour of the celebrated pharmacist whose native place it was. Among the reasons for thus commemorating Caventou it is specially stated in the decree that he was the discoverer of sulphate of quinine, "by which he could have realized an immense fortune, but that in his love for science and humanity, he did not hesitate to publish his discovery."

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

July 9, 1879.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman, Southall and Taylor.

MAJOR EXAMINATION.

Eight candidates were examined. *Four* failed. The following *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Alcock, Frank Harris ....Burslem.
Allan, James Henry...............Stockton.
Betts, George ....Norwich.
Bird, Henry ....London.

MINOR EXAMINATION.

Eighteen candidates were examined. *Eight* failed. The following *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Atkins, Ernest ....Southampton.
Ballard, Frank English ....Aylesbury.
Beard, James Hogg...............Manchester.
Bennett, Frank William.........London.
Bourne, Chas. Matthew Kemsey...Wolverhampton.
Bown, John Quinton ....Nottingham.
Bridge, George Edward ....Maidstone.
Brook, Joe..........................Lofthouse.
Cambridge, John Underwood...Hartlepool.
Carter, Francis....................London.

MODIFIED EXAMINATION.

Four candidates were examined. *One* failed. The following *three* passed, and were declared qualified to be registered as Chemists and Druggists:—

Bemrose, Weightman ....London.
Capon, Charles William .. ..London.
Still, David Usborne ....Staplehurst.

July 10, 1879.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman, Southall and Taylor.

MAJOR EXAMINATION.

Eight candidates were examined. *Six* failed. The following *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Dutton, Hugh Odard ....Rock Ferry.
Grimble, Albert ....Boston.

MINOR EXAMINATION.

Twenty-one candidates were examined. *Twelve* failed. The following *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Cheers, Robert Salmon ....Northwich.
Clerke, William Burdett.........Leamington.
Crow, William ....Berwick.
Crowther, Arthur..................Tickhill.
Davies, Thomas ....Bridgend.
De Peare, John Thomas ....Spalding.
Dixon, William.....................Stratford-on-Avon.
Drew, Henry William............Southwark.
Feaver, William ....Truro.

July 11, 1879.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman, Southall and Taylor.

MINOR EXAMINATION.

Twenty-seven candidates were examined. *Nineteen* failed. The following *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Gibson, James Edward ....Sheffield.
Green, William James..........Yeovil.
Harburn, Alfred ....London.
Holland, Tom ....Lincoln.
Hope, Arthur Peach..............Uppingham.
Howell, Edmund ....Oxford.
Humphreys, Griffith ....Corwen.
James, Charles Frederick ......Highworth.

July 16, 1879.

Present—Mr. Sandford, President; Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman, Southall and Taylor.

Dr. Greenhow was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

Eleven candidates were examined. *Five* failed. The following *six* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Horton, Thomas ....Peterborough.
Lapthorn, George..................Taunton.
Mayger, William John ....Northampton.
Nowell, Barnes.....................London.
Pisani, Orestes Victoriano ......London.
Ratcliffe, Henry Norman ......Torquay.

MINOR EXAMINATION.

Eighteen candidates were examined. *Eight* failed. The following *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Llewellyn, David ....Cilcerin.
Lodge, Arthur William ....Merthyr.
Lupton, George Frederick ......York.
Macaulay, William Henry ......Rotherham.
Manning, Alfred ....Strood.
Morgan, John Daniel ....Swansea.
Morris, David ....Cardigan.
Olden, Loathan.....................Romsey.
Oldfield, Arthur ....Grantham.
Parkin, George Anthony.........Ripon.

July 17, 1879.

Present—Mr. Sandford, President; Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman, Southall and Taylor.

Dr. Greenhow was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

Ten candidates were examined. *Four* failed. The following *six* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Lomax, Alban Edward ....Liverpool.
Porter, Thomas.....................Fleetwood.
Remfry, Samuel Alfred ....London.
Shirley, Stephen Shillito.........London
Smithson, Thomas Henry ......Bradford.
Villar, Arthur ....Staplegrove.

MINOR EXAMINATION.

Seventeen candidates were examined. *Five* failed. The following *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Peck, Frederick William ......Cambridge.
Pickles, Walter.....................London.
Plattin, Henry Ramm...........Fakenham.
Powell, William ....Swansea.
Ratcliffe, George ....London.
Reddish, Augustus Frederick...Patricroft.
Rossiter, Thomas Edward ......Tiverton.
Roughton, William ....Loughborough.
Sagar, Hartley ....Nelson-in-Marsden.
Selleck, William Robert.........Bovey Tracey.
Shadford, Major ....Spalding.
Shrivell, Frederick Wm. Edwd.Hadlow.

July 18, 1879.

Present—Mr. Sandford, President; Messrs. Alkchin, Barnes, Benger, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman, Southall and Taylor.

MINOR EXAMINATION.

Twenty-six candidates were examined. *Ten* failed. the following *sixteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Smith, John Thomas ....Donington.
Stableforth, John William ......London.
Stedman, Walter ....West Malling.
Stevenson, David Archibald ...Chertsey.
Taylor, James Bennett ....Bedford.
Taylor, Philip Neville............Tipton.
Thompson, Arthur Stevens......Barking.
Topliss, Walter George ....Wainfleet.
Watson, Edward Arthur.........Cheltenham.
Wild, George Frederick ....Hyde.
Willis, Henry James ....London.
Willis, Joseph Darrington ......Northampton.
Wimshurst, Frederick ....Southborough.
Wise, Joseph Norman............Carlisle.
Wood, Robert ....Loughborough.
Wyatt, Charles Frederick ......Old Brompton.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's Examination:—

Certificates of the College of Preceptors.

Laffere, John Athanasius ......Hatherleigh.
Nicholls, Reginald E. ....Lee.

Certificates of the University of Cambridge.

Roberts, William ....Chester.
Wilson, John ....Wolverhampton.

Certificates of the University of Oxford.

Maillard, William Job............Brecon.
Patey, William James............Banbury.

Proceedings of Scientific Societies.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting was held at 32A, George Street, Hanover Square, on Wednesday evening, July 9th, Mr. Branson in the chair, when Mr. Naylor read a paper on "Explosions."

The author divided his subject into two great classes, those in which the explosion was the sole result of purely mechanical action and those in which the force exerted is the product of chemical decomposition. To the latter class more especial reference was made. An explosion was shown to differ from expansion merely in that the one takes place slowly, while the other is instantaneous. Boiler explosions were next considered and referred to one of two causes: either to furring or defects of repair. The manner in which these deposits act in producing an explosion was fully explained, accompanied by a reference to those substances which are used as "anti-foulers." The explosions resulting from the mixture of various gases with air, notably marsh gas and coal gas with air, received a large share of attention.

The Davy lamp was exhibited and the principles of its construction explained and illustrated by experiment.

Reference was next made to those explosions which have occurred during the manufacture of oxygen gas on the large scale from $KClO_3$ and MnO_2. These were said to owe their origin, with but few exceptions, to the admixture of small quantities of soot or sulphide of antimony with the MnO_2 used. Simple methods of detecting these contaminations were described and shown practically. Following this was a somewhat detailed account of the manufacture of gunpowder.

A number of beautiful specimens were exhibited in illustration of the different grain powders, including the various kinds of sporting powder, rifle powder, and blasting powders, and cubes of the kind used by Her Majesty's Government for loading the 100 ton gun.

Brief references were also made to the manufacture, uses, etc., of gun cotton and nitro-glycerine. Specimens of Abel's compressed gun cotton, lithofracteur and dynamite were handed round for inspection. A few remarks upon Abel's fuses and Robinson's universal fuse brought this very interesting paper to a close.

A discussion then followed in which several members took part, and a hearty vote of thanks was awarded to Mr. Naylor, on the proposition of Messrs. E. Cardwell and Robinson.

The president announced donations and subscriptions to the amount of £3 13*s.* 0*d.*

SOCIETY OF ARTS.

THE HISTORY OF ALIZARIN AND ALLIED COLOURING MATTERS, AND THEIR PRODUCTION FROM COAL TAR.*

BY W. H. PERKIN, F.R.S.

(*Continued from page* 59.)

LECTURE II.—DELIVERED MAY 22.

In the previous lecture I gave a brief account of the dye-stuff, "madder," and also of the chemical history of its colouring matters, alizarin and purpurin, their artificial production from anthracene, and of the new dyes which are allied to them, etc. I treated the matter, to some extent, from a purely scientific point of view, as I felt it necessary to do so before proceeding to give an account of the practical operations involved in the manufacture of these substauces.

I now propose bringing before you the history of the technical part of my subject; but before entering into this, I wish to mention that I had the good fortune of being associated with my brother, Mr. T. D. Perkin, in carrying out this manufacture, and to his business habits and skill in devising and erecting new plant, the rapid development and success of this new industry was to a great extent due.† Our works were at Greenford Green, near Harrow, and on the Grand Junction Canal. They were erected in 1857 for the manufacture of the the mauve dye, and afterwards also used for the production of various other coal tar colours. I mention this because we were able to employ some of our plant which had fallen into disuse for our preliminary operations, and thus a considerable amount of time was saved. Our manufacturing experiments for the production of artificial alizarin were commenced about the middle of 1869, and the first question which naturally came before us was that of the production of the raw material, "anthracene." At this period anthracene was unknown to the tar distillers, and, consequently, was not a commercial product. Experiments had, therefore, to be made upon its preparation, not only to obtain it, but also to get some rough idea of the amount that could be produced from coal tar, because, unless it were practicable to get it in quantity, artificial alizarin could not successfully compete with madder.

For the purpose of preparing anthracene for my experiments in 1855 I had employed coal-tar pitch, and distilled it in iron pots. I, therefore, naturally selected pitch as the scource of anthracene, and having a number of iron retorts ready for use, many tons were distilled. From the amount of anthracene we obtained in this manner, we felt assured there was no reason to fear there would be any lack of raw material.

When distilling pitch, we found it generally best not to allow the very last portions of the distillate to mix with the earlier ones, as they are sticky, and contain little, if any, anthracene. Sometimes we re-distilled the distillate; this improved it considerably. (Distillation of pitch in

* From the *Journal of the Society of Arts.*

† Our firm was known as Perkin and Sons.

pitch ovens destroys most of the anthracene.) The oily distillate, on being allowed to stand for some days, deposits the anthracene; this we separated, by draining the products in canvas bags, and then pressing out as much of the remaining oil as possible with a screw press. In July, we set up our first hydraulic press for this purpose. The crude anthracene was then washed with coal-tar naphtha, and afterwards distilled. The apparatus for distilling consisted of two retorts, set side by side, connected to each other by a large bent iron pipe, one retort being used as a still, the other acting as a receiver. The connecting-pipe was kept hot, to prevent the anthracene from blocking it by condensing. The distilled anthracene was partly in the form of a hard, yellow, crystalline mass, and partly in the form of a crystalline powder.

We obtained by this means about ¾ to 1 per cent. of pure anthracene from the pitch we employed. During the time we were carrying on these experiments we asked some large tar distillers, Messrs. Blott, of Poplar, London, to collect the last runnings of their tar stills, and set them aside to cool. These deposited considerable quantities of anthracene, which were collected in canvas bags, and it was soon found that by this means large quantities of anthracene could be obtained. Messrs. Blott then commenced to prepare this substance in quantity,* and to supply us with it. Other tar distilleries were then communicated with, in fact, nearly all the tar distillers in the United Kingdom were either visited or written to on the subject, and the result was that in a short time such quantities of anthracene came in that it was unnecessary for us to continue to distil pitch.

The anthracene obtained from the tar distillers was sent out in casks, and was in a thick pasty condition. It was pressed in hydraulic presses between thick linen sheets, in the same manner as paraffin is pressed when being purified, and was thus obtained in solid cakes, weighing about one-fourth of the unpressed product. Most of the tar distillers now press their anthracene before sending it into the market. The anthracene supplied at first was usually of a very good quality, much better than afterwards, when it was found to be an important product, because the distillers then endeavoured to extract all they could from their tar, and thus many other products were separated with it.

The pressed anthracene was at first purified, as above, with coal-tar naphtha, and then distilled, but it was found to be still far from pure; this was a great drawback, because, when converting it into anthraquinone, by oxidation with potassic bichromate and sulphuric acid, in the way we then conducted the process, a large quantity of the oxidizing mixture was used upon the worthless impurities as well as on the anthracene, thus adding greatly to the expense of the anthraquinone, and not only so, but rendering the purification of that substance more troublesome.

After making a number of experiments with different solvents, which were only partially successful in removing the impurities of the anthracene, I thought that, by distilling it with a caustic alkali, some good might be effected, as all substances of a phenolic character would be removed, and some of the high boiling and less stable products might be charred. In this I was not disappointed. A quantity of anthracene which had been purified with naphtha and distilled was re-distilled in a glass retort with solid caustic potash. The distillate was considerably less in weight than the anthracene taken, and in the retort there was a large quantity of a black carbonaceous residue. Although still not pure, the anthracene was immensely improved in quality, and, with but little treatment with solvents, yielded a chemically pure product, crystallizing in a most beautiful manner, superior to anything I had ever seen before.

The process was next tried on the large scale, caustic soda being employed in place of caustic potash, but I was surprised to find that no purification of any consequence was effected; on repeating it, however, with caustic potash, the same result was obtained as that in the laboratory.

After experimentally proving that anthracene is not destroyed when distilled with potash, this process was adopted on the large scale.

In purifying anthracene with coal-tar naphtha, a loss of anthracene was found to take place, on account of its solubility in that fluid. We found, however, that, by using petroleum spirit, this loss was, to a great extent, avoided; therefore, the use of naphtha was discarded.

After many experiments, the purification of crude anthracene was conducted in the following manner, the first operation, viz., the treatment with petroleum spirit, being conducted in a large, separate building. The crude anthracene was first thoroughly ground under edge-runners, which made most of the ordinary qualities of pressed anthracene into a very stiff, pasty mass. The ground anthracene was then put into boxes, and hoisted to the top floor of the building by means of a windlass. It was then introduced into the large iron cylindrical vessels, which had been previously half-filled with petroleum spirit, and the agitator also set in motion. About 1500 to 1830 lbs. of crude anthracene and about 300 gallons of petroleum were used in each operation, the proportion of petroleum, however, being varied according to the quality of the anthracene.

Steam was then turned on to the steam jacket, with which the cylinder is provided until the petroleum nearly boiled, the manhole being kept loosely covered, to avoid evaporation. The stirring was continued for an hour or two, after which the product was run into cooling tanks. These were not very large, and kept apart, so that the air might freely circulate around them. The principal object of the cooling was to allow any anthracene which had dissolved in the petroleum spirit to crystallize out. When cold, the wooden plugs which close the outlets of these tanks were removed and their contents run out into the filter tank. The filter consists of a perforated wooden floor, covered with coarse canvas. As the petroleum charged with impurities drained away, it was received in a large tank sunk in the ground. The anthracene on the filter was afterwards washed by pouring over it a little clean petroleum spirit.

When thoroughly drained, the anthracene was removed to a tank, provided with a still head, connected to a worm tub; some water was then added, and steam blown through the mixture, to volatilize the petroleum, which afterwards condensed in the worm, and ran into the tank.

In the bottom of the tank, there was a large tap connected with a pipe. When the operation was finished, this was opened to allow the water to flow out, and as this usually carried anthracene with it, it was passed through canvas bags. The front manhole was then opened, and the anthracene removed and placed in dry casks to further drain. In this operation, average qualities of anthracene usually lost about 30 per cent of impurities.

The dirty petroleum in the tank, was pumped into the still, and distilled by blowing steam through it; it then flowed into the tanks, and after the water which had condensed with it was run off sufficiently by the taps near the bottom of the tanks, so that only petroleum flowed from the two little taps placed higher up, it was pumped into the cylinders, and used for a fresh operation, and thus it was used over and over again.

The residue in the still was a dirty, thick, oily product mixed with water; it was run out into tanks, and on cooling became a semi-solid mass. This product was used as fuel under evaporating pans. For this purpose it was kept fluid, by being warmed in a boiler, it was then run through a pipe into a special jet supplied with steam, which converted it into spray. This was kept ignited under the pans by means of a small coke fire.

* July, 1869.

The next operation consisted in distilling the anthracene, thus far purified with caustic potash. For this purpose ordinary Montreal potash was used. This was usually found to contain considerable quantities of caustic potash, and answered the purpose perfectly. We found it necessary to use some caustic lime with it, otherwise the residue left in the retorts caked so hard that it was only with great difficulty that it could be removed.

The proportions used were usually in the ratio of 100 parts of washed anthracene, 30 parts potash, and 6 parts ground lime. These substances were thoroughly ground under edge runners, and introduced into iron retorts and distilled.

When we first distilled the anthracene with potash, we employed retorts with the outlets at the back bolted on, but we found it impossible to get joints to stand the constantly repeated heatings and coolings of the apparatus. We, therefore, had the necks cast on the retorts. It was also found necessary to keep the mouths of the retorts well over the dead plates, otherwise anthracene condensed on the retort door.

For some time we used large iron tanks as condensers, two or three retorts distilling into each, but as considerable quantities of hydrogen gas were given off, the operation of cleaning them out was dangerous, because, as the air mixed with the hydrogen, it became an explosive mixture, and if any part of the retorts had not cooled down sufficiently, this would be ignited; in fact, it was owing to an accident of this kind, that we first noticed the evolution of hydrogen. Afterwards we made experiments to see how small a receptacle could be used, and at last obtained reservoirs of a shape and construction that answered perfectly. They consisted of iron troughs fitted to the retort neck. The further end of the receiver was closed with a loosely-fitting piece of wood. The top consisted of loose iron lids, hinged on one side of the trough, and provided with long iron handles, so that they could be easily opened or closed.

Before the distillation was commenced, these lids were luted down, but this was scarcely necessary, as the sublimed anthracene soon stopped up the crevices. The hydrogen escaped at the back end of the trough. The retorts were set on fire lumps, to prevent their burning out. The distillation was commenced in the morning, after the previous day's residues had been cleaned out from the retorts, and they had been recharged.

Before the receivers were emptied, the lids were opened from below, so that any permanent gas might escape, and then the anthracene removed. This was found to be partly in the form of very pale primrose yellow crystalline cakes and partly as a light sublimate. As it contained some water locked up in its interstices, it was ground under edge runners and then dried. The black carbonaceous residue left in the retorts, when heaped together, easily catches fire and continues to burn for a very long time. The potash was recovered from this residue, causticized and again used.

When commencing the manufacture of artificial alizarin, we employed the process described in my first patent, in which anthraquinone is used. By this method we prepared large quantities of colouring matter. My second process, however, was found, especially at that date, to possess considerable advantages over the first. In this, it will be remembered, dichloranthracene is used, and therefore, as soon as the technical difficulties were mastered, we employed it in preference to the first, though sometimes we manufactured by both.

As most of the colouring matter manufactured by us was prepared by the dichloranthracene process, I have thought it best to describe it first, afterwards returning to our experiences with the anthraquinone method.

A large number of experiments were made upon the preparation of dichloranthracene, such as passing chlorine over anthracene suspended in solvents; or over anthracene which had been purified with petroleum spirit or bisulphide of carbon and then distilled; or anthracene which had been distilled with caustic potash.

The result of these experiments was, that it was found that the best process consisted in passing chlorine over anthracene which had been purified by distillation with potash, as, by this means, a beautiful product was obtained, which could be easily purified; whereas, anthracene which had not been distilled with potash usually gave a confusedly crystallized, sticky mass, very difficult to deal with.

As it was very important to produce colouring matter with the least possible delay, the manufacture of chlorine for the preparation of dichloranthracene was a matter requiring a good deal of consideration; because, if plant had to be erected to prepare it in the ordinary method from black oxide of manganese, a great deal of time would have been lost. We, therefore, thought that, until the ordinary plant could be erected, we might make it expeditiously by decomposing chloride of lime with hydrochloric acid; and we found this to answer our purpose. The apparatus we used was of a very simple nature. It consisted of a large well pitched wooden cask in which a hole was made near the bottom, and fitted with a plug, so that it could be easily emptied. In the top a square hole was cut, from which an earthenware jar was suspended by means of leaden straps. The square hole was closed with a perforated piece of wood, through which a leaden pipe was placed, reaching to the bottom of the earthen jar, the bottom of the pipe was partly cut away, so that liquid could run freely through it. A funnel was also fitted to the top of the pipe. Through another perforation in the top of the cask, a bent leaden pipe was fitted to serve as a delivery tube. This passed to a stoneware Woulfe's bottle. In using this apparatus, hydrochloric acid was poured into the cask. The necessary amount of chloride of lime was then mixed with water in a tub, so as to form a creamy fluid. This was then passed through the funnel into the hydrochloric acid by degrees, and, according as the chlorine was wanted in a rapid or slow current, the chloride of lime was added quickly or slowly. This process does not work well if the chloride of lime is placed in the cask, and the hydrochloric acid added, on account of the greater density of the chloride of lime. One advantage of this method of generating chlorine is that the amount can be easily regulated by the chloride of lime used. Of course, this is an expensive method of preparing chlorine, and we always intended putting down proper plant, with Weldon's arrangement for recovering the manganese; but our attention was then so taken up with other matters, that we kept putting it off, and continued to use chloride of lime until we gave up manufacturing. I should imagine this was the first instance of chlorine being prepared in large quantities in wooden tubs, and I have described it, as it might be useful to others who want a supply of this gas without loss of time.

For treating the anthracene with chlorine, leaden chambers were used, technically called "chlorine ovens." They were about 10ft. long, 4ft. 6in. wide, and 1ft. 6in. deep in the centre. The bottoms are flat until within about 1ft. 6in. of the end. They then gradually slope up about 6in., to the manholes at the ends. The doors of these manholes are slabs of wood covered with lead and held in their place by means of a cross-bar and screw. The lugs are connected with an iron frame, over which the lead is beaten. In the centre of the top are other openings for charging the ovens. They are provided with lids, made air-tight by means of hydraulic joints. The channels in these joints, however, were not filled with water, but by an impurity obtained in the manufacture, called "chlorine oils." At each end of these ovens, two lead pipes are inserted, one for the inlet of chlorine, and the other for the escape of hydrochloric acid and unused chlorine. These pipes are made to project into the ovens, to prevent the action of any "drip," which might otherwise injure the top of the oven. The top is strengthened by cross pieces of timber, fastened with leaden straps. The ovens were usually made of 20-lb. lead. The luting for the end manholes was made of china clay and chlorine oils.

When first made, these ovens were supported on solid brickwork, and it was found that by passing a good current of chlorine over the anthracene, sufficient heat was, by the chemical action, evolved to complete the process; if, however, the temperature was allowed to fall from an interrupted or slow supply of chlorine, the product partially crystallized, and the temperature could not be got up again sufficiently. The anthracene was, therefore, imperfectly chlorinated. To avoid this, a steam chamber was formed in the brickwork and covered by an iron plate, on which the oven rested, and in this way the temperature was always sufficiently maintained.

The hydrochloric acid gas which was formed in this operation, was condensed in coke towers, and the acid used again. The reaction may be written thus:—

$$\underbrace{C_{14}H_{10}}_{\text{Anthracene.}} + 4\,Cl = \underbrace{C_{14}H_8Cl_2}_{\text{Dichloranthracene.}} + 2\,H\,Cl.$$

It is, however, probably much more complicated. Chlorine when acting upon anthracene first forms a dichloride:—

$$C_{14}H_{10} + Cl_2 = C_{14}H_{10},\ Cl_2.$$

This substance is extremely unstable, and unless the temperature be kept near 0° C., decomposes as quickly as it forms, yielding monochloranthracene:—

$$C_{14}H_{10}Cl_2 = \underbrace{C_{14}H_9Cl}_{\text{Monochloranthracene.}} + HCl.$$

This substance, when meeting with fresh chlorine, is believed to combine directly, and form a dichloride of monochloranthracene:—

$$C_{14}H_9Cl + Cl_2 = \underbrace{C_{14}H_9Cl\ Cl_2}_{\text{Dichloride of monochloranthracene.}}$$

and, lastly, this, on decomposing, to yield dichloranthracene:—

$$C_{14}H_9Cl,\ Cl_2 = \underbrace{C_{14}H_8Cl_2}_{\text{Dichloranthracene.}} + H\,Cl.$$

Towards the end of the operation of chlorinating anthracene the chlorine is not all absorbed, and escapes into the air from the coke towers. This was not only a nuisance but also a loss. To avoid this the ovens were put up in pairs, and connected with a leaden pipe; both were charged with anthracene, but only one chlorinated. Any unused chlorine passing away with the hydrochloric acid over the anthracene in the second oven was thus absorbed. The next day the anthracene in the second oven was chlorinated, and the gases passed over the other one, which had been re-charged with anthracene.

The charge for each oven was usually about 400 lbs. of anthracene which had been distilled with potash, and of between 45 and 50 per cent. quality. On passing the chlorine gas into the charged ovens, the anthracene gets dark in colour and fuses,* hydrochloric acid being evolved in abundance. After a time, this fluid product begins to deposit crystals, and soon becomes a semi-solid mass. The operation occupies about five or six hours. When finished, the top manholes were removed, and a light wooden flue placed over them, and connected with the opening into the chimney shaft, the end manholes were then opened, and in a short time the excess of hydrochloric acid and chlorine in the ovens was drawn out. The crude dichloranthracene, which covers the bottom of the oven as a crystalline cake, was loosened by a wooden tool, and then drawn out with a wooden hoe into some convenient vessel. When broken up, the pieces of dichloranthracene appear as a mass of beautiful bright yellow interlaced needles.

* This is due to the chlorination of the impurities, the dichloranthracene being formed afterwards.

This product was next broken up with a wooden beater in tubs containing dilute caustic soda (it must not be ground, however), to remove adhering hydrochloric acid. It was then separated from the alkaline solution, and pressed between linen cloths in the hydraulic press, when a dark, thick, oily product separated out. This consists principally of chlorinated phenanthrene, holding in solution a little dichloranthracene and anthracene, and was called "chlorine oils." I shall have occasion to refer to these again presently.

After pressure, the dichloranthracene was obtained in hard yellow crystalline cakes, but not sufficiently pure for use. It was again broken, and allowed to soak in coal-tar naphtha* for some time, and pressed; this operation was again repeated. The adhering naphtha was then recovered by blowing steam through the product.

The dichloranthracene thus purified was afterwards placed on trays, and dried in a drying-room, and was then ready for the next process. It contains about 84 per cent. pure dichloranthracene.

The chlorine oils, and also the residue left after distilling the naphtha used for washing the dichloranthracene contains a certain amount of dichloranthracene and anthracene. This separates out to a considerable extent if the oils be cooled with ice, but the product is then so thick that it cannot be filtered or pressed.†

Experiments were made on distilling them alone, but owing to the copious evolution of hydrochloric acid, and the frothing of the product, it was not found practicable to treat them in this manner; but by previously mixing an excess of ground lime, and then distilling in iron retorts, a considerable amount of solid product came over containing about 25 per cent. anthracene, which only required to be treated with petroleum spirit to fit it for use. It is believed that the anthracene represents that which had not been chlorinated, the dichloranthracene being decomposed by distillation with lime.

The next process consists in converting the dichloranthracene into the sulpho acids of anthraquinone by treating it with ordinary concentrated sulphuric acid, and the ease with which this is effected was originally one of the advantages of the use of dichloranthracene over anthraquinone.

For this process iron pots were used, as they were found to answer nearly as well as glass, and, of course, were more manageable. As hydrochloric and sulphurous acids are evolved in quantity in the operation, special arrangements had to be made for conducting these away and condensing them. The apparatus used consists of a row of cast iron pots, capable of holding about 30 gallons. These are cast with half-covers, in which there is an opening for the escape of the acid vapours. Earthenware pipes are luted into these openings and connected with a large main, which leads to arrangements filled with coke and supplied with water for the condensation of the hydrochloric and sulphurous acids.

The pots are set in brickwork, and heated by a fire, the upper part being also surrounded by brickwork to prevent loss of heat, the open part of the pot is covered with a lid made of 20-lb. lead, which can be removed when they are emptied. In the centre of this lid an oblong hole, about 6 in. by 8 in., is cut, for the introduction of the dichloranthracene. This is covered by a piece of lead. There are also two small round holes in the lid; one for the introduction of a thermometer, the other as a testing-hole, and fitted with a wooden plug.

These pots were charged with 350 lbs. of sulphuric acid. This was then heated up to about 140° to 160°, and the dichloranthracene gradually added in small shovelfulls at a time, hydrochloric and sulphurous acid being evolved after each addition, causing frothing,

* Petroleum spirit does not answer well for this purpose.

† Perhaps a filter press might be used for this purpose successfully.

especially if the dichloranthracene be of a low quality or damp. The charge used was usually 70 lbs.

After all the dichloranthracene had been added, the temperature was gradually raised until it reached about 260° C., and then continued at this until a sample, taken out by a glass rod and diluted with water, formed a nearly clear solution, devoid of fluorescence. The fire was then drawn, and the product left to cool down until the next morning. It was then found to be still warm, of a brown colour, and the consistency of treacle. The lids being lifted off, it was ladled into copper pails, and carried away to be neutralized with lime.

In this process the following reactions take place:—First, disulphodichloranthracenic acid is formed by the union of the sulphuric acid with the dichloranthracene; and, secondly, this product is oxidized by the excess of sulphuric acid forming disulphanthraquinonic acid. These, however, are not the only changes. Anthraquinone is also formed, which becomes converted chiefly into monosulphanthraquinonic acid; some of it also sublimes, and then condenses in the earthenware main, through which the acid vapours pass.

When fuming sulphuric acid is used in place of the ordinary, no anthraquinone or monosulphanthraquinonic acids are formed.

Pure dichloranthracene, when treated with Nordhausen sulphuric acid, gives the theoretical yield of disulphanthraquinonic acid.

(To be continued.)

Parliamentary and Law Proceedings.

Alleged Death by Opium (?) Poisoning through eating Lettuces.

On Friday, July 19, Mr. C. Aspinall, Liverpool borough coroner, held an inquest on the body of John M'George, sixty-nine years of age. The deceased, who was said to have been a strong and healthy man, was seized with what appeared to be a bilious attack on Monday morning and died about two o'clock the same afternoon. On Sunday evening, at tea, the deceased partook of lettuce, of which the other members of the family had a share. After being taken ill on Monday morning he had some breakfast, but was found apparently in a fit at nine o'clock and was unable to speak afterwards. Dr. Fisher, Walton Road, Kirkdale, was called to the deceased on Monday morning, about half-past ten, and found him in a comatose state. The pupils of the eyes were much contracted, the face livid, the body cold, the mouth wide open, the limbs relaxed and the breathing difficult, all of which were symptoms of narcotic poisoning. The stomach pump was used and remedies prescribed, but without the desired result. Dr. Fisher said he had made a *post-mortem* examination of the body and found traces of opium in the stomach and enough of digested lettuce to account for the symptoms of opium poisoning. He was quite certain that the deceased had died from the effects of opium. In reply to a juror, Dr. Fisher said that the stomach would hold much more lettuce than would be sufficient to account for the traces of opium found. Dr. Anderson, who assisted the last witness in the *post-mortem* examination, said that in his opinion the deceased died from apoplexy, induced by narcotic poisoning. He thought it reasonable to attribute the presence of an opiate in the system to the lettuce deceased had eaten overnight. A very small dose of narcotic would affect an elderly person.

The jury returned a verdict that they were of opinion deceased had died from the effects of poison, but there was not sufficient evidence to show that it was attributable to eating lettuce.—*Liverpool Daily Post.*

Review.

Proceedings of the American Pharmaceutical Association at the Twenty-Sixth Annual Meeting, held in Atlanta, Ga., November, 1878. Also the Constitution, By-Laws, and Roll of Members. Philadelphia: Sherman and Co. 1879.

At an unusually late date the annual volume of the Proceedings of the American Pharmaceutical Association has come to hand. A partial explanation of its retardation is to be found in the postponement of the last annual meeting until November, in consequence of the prevalence of yellow fever in the Southern States last summer. The volume is very bulky, as it contains just one thousand pages, upwards of six hundred being occupied by the Report on Pharmacy, by Mr. Louis Diehl, which corresponds with the Year-Book of the British volume. This report is very copious. It is preceded by an Introduction and is divided into sections of "Pharmacy" (with subsections of "Apparatus and Manipulations," which is usefully illustrated, and "Preparations"), "Materia Medica," "Inorganic Chemistry" and "Organic Chemistry." The reporter has evidently spared no trouble to make his *résumé* of the history of pharmacy as complete as possible; in fact he has almost exceeded proper limits, for some of the authorities, which are carefully placed at the end of each quotation, date as far back as 1876.

The Reports of Standing Committees appointed by the Association to deal with special subjects always form an interesting feature of these volumes, and in the present one there are reports on the Drug Market, Legislation and the Revision of the Pharmacopœia. The last-named lays down the general principles which the Committee thinks should be followed in constructing the Pharmacopœia, and on a future occasion it is proposed to refer to them in this Journal in greater detail; it also contains a scheme for co-operative experiments on the fluid extracts.

The latter part of the volume is taken up with the papers read at the meeting, the discussions on them and the general business. The papers are many of them of much practical interest. As to the business, we regret that some embarrassment exists in the ways and means, due apparently to the commutation for life membership having been fixed at too low a rate at a time when the volume of proceedings, a copy of which is supplied free to each member, was not nearly so large and expensive as now. Several propositions were made, such as a kind of sliding scale of life subscriptions and a *per capita* tax, but after discussion the attempt to find a remedy was postponed until the next meeting, which is to commence in the city of Indianapolis, Ind., on the 9th of September.

Obituary.

Notice has been received of the death of the following:—

On the 4th of June, 1879, Mr. George Masson, Pharmaceutical Chemist, Grenada House, Torquay. Aged 30 years. Mr. Masson had been a Member of the Pharmaceutical Society since 1871, and on several occasions contributed papers to this Journal.

On the 8th of July, 1879, Mr. William Glencross, Chemist and Druggist, Kidwelly, Carmarthenshire. Aged 47 years.

On the 14th of July, 1879, Mr. William Powell, Chemist and Druggist, Bridgend, Glamorganshire. Aged 40 years.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

Replies.

[322]. "Anon" asks how I am able to make a "stable preparation" of tr. lyttæ, acid. sulph. dil., tr. lavand. co., and vaseline or prepared lard, as given in the formula by W. B., July 5? I enclose you two specimens of the ointment prepared with vaseline and lard. I need hardly say the mixture is mechanical, and the simplest way is to rub the tinctures, acid, and vaseline or lard together on a slab, using an ebonite spatula. The rubbing should be in one direction, as in making "Cold Cream." I have experienced no difficulty.

Northallerton. HY. BROWN.

[324]. In further elucidation of the question asked by "Gulielmus," and in reply to Mr. G. H. Wright, permit me to say I think the pharmacist is justified in dissolving such an alkaloid as morphine. It must be observed eight grains are ordered with one drachm of chloroform and three drachms of liniment of belladonna. Practically morphine is insoluble in chloroform, and cold alcohol dissolves only one in fifty. Now, Mr. Wright calls attention to the statement that the person who compounded the prescription first sent "twice the bulk." I observed that, but I had nothing to do with the fact. My object was to show that eight grains of morphine can be dissolved in three drachms of liniment of belladonna. I purposely leave out the chloroform at present. Sulphate of morphine is a very soluble salt, indeed the most soluble of the morphia series. Its solubility in boiling water is one in two. I must not enter into the molecular weight question, as it might be considered foreign; but I may observe that in my opinion it is more scientific to use a soluble salt of morphia than to apply morphine to the skin in the form of a fine powder, trusting to the acids of the sweat—formic, butyric, propionic, or sudoric—to combine with it so as to form an absorbable compound. Of course I cannot tell whether or not the prescriber knew the exact solubility of morphine. He evidently intended a strong solution, and one equal to eight grains of the alkaloid in four drachms of menstruum. I have shown how this can be accomplished without in any way interfering with the activity of the liniment, but rather increasing its curative properties.

If spirit, or water, or double the quantity of liniment of belladonna was added, so as to accomplish solution, by the first compounder, it is manifest the liniment would only be half the strength intended. I may inform Mr. Wright I did not overlook this point, but I had nothing to say upon it except that it was obviously wrong, and I therefore confined my remarks to "Gulielmus's" query.

HY. BROWN.

Queries.

[331]. Would some of your readers kindly tell me what should be the colour of the following when correctly dispensed?—

℞ Liq. Hydrarg. Perchlor., B.P. . . . ℥ij.
Liq. Arsenici et Hydrarg. Hydriod., (Donovan). . . . . ♏clx.
Infusi Gentian. . . . . ℥ij.
Aquæ . . . . ad ℥viij.
M.

W. R. ROBERTS.

[332].
℞ Acid. Tannic. . . . . gr. xx.
Gelatine . . . . gr. iv.
Aq. q. s.,
Glycerin . . . . ♏xvi.
M. ft. pess.

Will some of your readers kindly inform me if it is at all possible to make up the above as written; if not, how it should be dispensed?

It was written by a well-known London doctor, and has been presented at one of the co-operative stores to be made up. They refused to do it.

B. SAWYER.

Notes and Queries.

[615]. DENTIFRICE WATER.—
℞ Radicis Calami . . . . ℥ss.
Radicis Pyrethri,
Resinæ Guaiaci. . . . . āā ℥vj.
Ligni Santalini Rubri. . . . . . ℥ij.
Corticis Cinnamomi,
Caryophyllorum . . . . āā ℈iiss.
Foliorum* Cochleariæ Recentium . . ℥iv.
Spiritus Rectificati . . . . ℥xij.
Aquæ Destillatæ . . . . ℥vij.
Acidi Acetici Diluti . . . . . . ℥iij.

Sepone per dies octo, tum expressione cola. In collatura solve—
Acidi Salicylici . . . . ℈i.
Tum filtra.

Popp's Anatherine Dentifrice.

(Hager's 'Manuale Pharmaceuticum.')

℞ Caryophyllorum,
Ligni Santalini Rubri . . . . . āā ℥iv.
Ligni Guaiaci,
Corticis Cinnamomi . . . . . āā ℥ii ℈ij.
Myrrhæ . . . . ℥vi ℈j.
Olei Caryophyllorum,
Olei Cassiæ Cinnamomi . . . . āā gtt. xx.
Spiritus Rectificati . . . . ℥lij.
Aquæ Rosarum . . . . ℥xxvj.

H. W. LANGBECK.

[616]. SILVER PLATING LIQUID.—The *Chemiker Zeitung* gives the following prescription, which I myself have tried with success:—

Nitrate of Silver . . . . . 55 parts.
Solution of Ammonia . . . 60 „
Hyposulphite of Soda,
Precipitated Chalk . . of each 100 „
Distilled Water. . . . . . . 1000 „

H. W. LANGBECK.

[617]. CHERRY TOOTH PASTE.—
Cochineal in powder . . . . . . ℥iij.
Cream of Tartar . . . . ℥j.
Honey . . . . 2lbs.
Radix Ireos subtile pulverat. . . . ℥iv.

Mix in a stone mortar and allow to ferment in a warm place. After fermentation has ceased, add—
Glycerine . . . . ℥vj.
Tragacanth . . . . ℥ss.
Burnt Alum . . . . ℥iij.
Dried Carbonate of Soda . . . . . ℥j.

Precipitated chalk sufficient to make a suitable paste, which may be perfumed with—
Ol. Gaultheriæ . . . . ℈j.
Ol. Caryophyllorum . . . . . . ℈iv.
Ol. Geranii . . . . ℥iss.

H. W. LANGBECK.

* The leaves ought to be bruised in a stone mortar.

[618]. NICOTINE.—It is impossible to extract nicotine from tobacco without injuring more or less its quality. The tobacco should be either treated with dilute sulphuric acid or distilled in a current of hydrogen.

H. W. LANGBECK.

[619]. STAMPING INK.—One part of nigrosine (aniline black) dissolved in ten parts of rectified spirit, and mixed with eight parts of distilled water and two parts of glycerine (sp. gr. 1·260), gives a good black ink to use with india-rubber stamp on paper

H. W. LANGBECK.

Correspondence.

THE CONFUSION OF MEDICINE WITH PHARMACY.

Sir,—"The confusion of pharmacy with medicine which has come to the medical practitioners and the pharmacists of to-day is an inheritance from the apothecaries of last century. . . . . Therefore gratitude is due to any individuals or association that strive by any means to show the desirability of effecting, as far as possible, a separation of the duties of the dispenser from those of the prescriber."

The above quotation from your temperate and sensible "leader" in the Journal, July 12, cannot fail to arrest the attention of every one who sincerely desires to see the long vexed question set at rest, viz., shall chemists continue to be perpetually dragged into County Courts for an infringement of the Apothecaries Act of 1815?

The genus "homo," species "John Bull," is notoriously a physic-loving mammal. He has always preferred, and ever will prefer, to call at a "doctor's shop," no matter to him whether that establishment is under the jurisdiction of a L.A.S. of Blackfriars, or a M.P.S. of Bloomsbury Square, London, for help, advice and medicine in every little *malaise* that may befall him. No one can blame the man, and no sober minded person can find fault with the chemist who listens to a tale of suffering, proposes this or that dose, then makes it up and receives the money for his goods. If this is prescribing and violating the Apothecaries Act of 1815, the sooner such a condemnatory power is expunged from the statute book the better, for it is violated every hour of the year. A more unjust clause affecting the lower millions of our population could not exist.

As a veteran apothecary let me claim your gratitude if I point out briefly a ready method by which this frequent collision between the authorities at Blackfriars and the respectable chemists can be fully prevented in future.

The great increase in non-dispensing general practitioners throughout England, as shown by the Rochdale report of May 3, has tended to enable the lower classes to recognize only a "doctor's shop," by the presence of show bottles and nostrums displayed in the windows of our druggists, which were formerly the "sign posts" to the apothecary who dwelt within. Let the chemists seek to be legally permitted to prescribe behind the counter under the following restrictions—the xvii. and xviii. clauses of the Apothecaries Act will certainly aid them in the attempt.

After the Minor examination is over let the apprentice to the chemist devote two years of study, 1st to elementary anatomy and physiology with dissections; 2nd, to attendance on the out-patient practice of a recognized hospital, infirmary or dispensary throughout the country.

When such course is completed, let him present himself for the "assistant's licence" at the Apothecaries' Hall, where in addition to the present examination, his knowledge in visceral anatomy and the elementary principles of medicine shall be tested.

A short Bill in 1874 amended the Apothecaries Act (37 and 38 Vict. c. 34) and removed the apothecaries' apprenticeship. Let the pharmacist seek for a brief Act to acquire this privilege at the hands of the Executive at Blackfriars and all would be finally and amicably arranged.

The dental fee for special lectures and hospital practice required for L.D.S. is £31 10s. The chemist's outlay would not exceed £21.

The present law restricting the dispenser to work only in the premises would still remain untouched.

With these brief suggestions for the consideration of the large body of pharmacists and chemists in England, I would conclude by adding a quotation from clause xviii. of the Act of 1815:—

"Five apothecaries in any county or counties respectively throughout England and Wales, except within the said City of London, the liberties or suburbs thereof, or within 30 miles of the same . . . . shall have full power and authority and are hereby authorized and empowered to examine all assistants to apothecaries throughout the county or counties, in regard of which such apothecaries shall have been so appointed as aforesaid. . . . . The meetings shall take place monthly in some one of the county towns."

The whole wording of this clause xviii. sets forth the purpose of the Act to be one for the benefit of the public and of the dispenser also. AN APOTHECARY.

Sir,—In my humble opinion the time is fast approaching when pharmacists as a body should endeavour all in their power to wrest the dispensing of medicine entirely from medical practitioners, but it must be accomplished so that no loss shall be sustained by either side. In cases where doctors receive large fees for their advice, they are satisfied and do not require also the profit accruing from the sale of the medicine. In districts where they could only get small fees they would prefer not to give a prescription at all, but to vend their medicine and advice for one charge, as they do at present. I would suggest the following arrangement as regards the latter class of prescribing, viz., that the medical man should write his prescription and place a certain mark on it which would signify that when it had been dispensed it was to be returned to the writer of it or else destroyed, that in no case, unless otherwise specified, should the prescription be given back to the patient. By this means I do not think anyone would be at a disadvantage. The chemist would necessarily have to dispense these prescriptions at a very moderate rate, but he would gain by reason of the quantity. C. H. F.

GAS SUPPLY.

Sir,—I think we are all much indebted to Professor Redwood for taking up the very difficult subject of gas supply, inasmuch as we have found our gas account to increase a good deal without sufficient cause to show, and on a recent occasion I took the liberty of questioning the right of this increase. The result was that we disconnected our meter and sent it down to Westminster to be examined, the cost of which was only one shilling, and the meter was condemned for registering too fast.

I gather from this that it is quite within the province of any consumer to have his meter thus examined and tested, when, as in my case, the company would no doubt refund the difference and supply a new one.

I think, however, that there should be some more secure method, presenting less difficulty to the consumer, for correctly estimating the quantity of gas burnt, and thus in a simple manner to check the reading of the company's inspector at each quarterly visit. A. W. POSTANS.

R. Roberts.—1 and 2 are correctly named. (3) *Asplenium trichomanes.* (4) *Anthyllis Vulneraria.* (5) *Hypericum pulchrum.* (6) *Melica nutans.*

T. C.—(1) *Lithospermum arvense.* (2) *Echium vulgare*, white-flowered variety. (3) *Arctium* (*majus*?), not advanced enough to say what species. (4) *Valeriana officinalis*, white-flowered variety.

W. Maunder.—We should think not, as long as no claim is made to the title of dentist.

A. Mitchell.—*Hottonia palustris* and *Melampyrum pratense.*

G. A. Thompson.—(1) *Sanicula europæa.* (2) *Linum catharticum.* (3) *Vicia hirsuta.*

"*Gulielmus.*"—(1) *Galium palustre.* (2) *Galium verum.* (3) *Alchemilla vulgaris.* (4) *Aira composita.* (5) *Lolium perenne.* (6) *Hordeum pratense.* (7) *Phleum pratense.*

W. Green.—(1) We know of no periodical in which the information required will be found to a greater extent than this Journal. (2) Blyth's 'Manual of Practical Chemistry.,

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Hart, Pollard, Dallas, Story, Will, Price, Pulus, Nihil, Volo semper juvare.

MYRRH: ITS COMPOSITION AND IMPURITIES.*

BY R. H. PARKER.

The first market at which myrrh appears is Berbera—a small seaport town in Eastern Africa, nearly opposite Aden—where it is brought by the natives from the district about Hurrar and Somaliland. Here it is purchased by Aden agents (English and Indian goods being given in exchange) and shipped to Bombay. When sorted at the latter port, it is found to consist of all qualities of myrrh, together with opaque bdellium, foreign resins, such as juniper, and various other impurities (bark, stone, etc.).† The best selections are sent to Europe, the commoner to China, where it is probably used as incense.‡ Bales of bdellium also appear at Berbera, consisting the opaque and perfumed kinds (bissa bôl).

Since myrrh is collected by uncontrolled natives, who probably know very little and care less about the quality of the gums taken to Berbera, it is not surprising that spurious gum resins and foreign substances find their way into English markets.

The sorting at Bombay is by no means carefully conducted and leaves a great deal to be picked out by London wholesale houses and dealers. Here it is of course most efficiently done and the best parcels of "Picked Turkey Myrrh" contain but a very small proportion of impurity.

Myrrh is first sifted in order to remove the small fragments and is then sorted by hand; still, however, pieces of spurious gums will occasionally find their way into the best parcels. I will, therefore, first describe myrrh and afterwards individually the various substances which occur in bales of the drug as imported, viz.:—

1. Opaque bdellium.
2. African bdellium.
3. Bissa bôl (perfumed bdellium).
4. Indian bdellium.
5. Perfumed amyridaceous (?) gum resin.
6. Odourless amyridaceous (?) gum resin.
7. Opaque tasteless gum.
8. Bitter gum.
9. Transparent gum.

The relative preponderance of these varies considerably. Mr. E. M. Holmes found, in 1876, opaque bdellium in largest quantity, next, Indian bdellium, and third, bissa bôl. At the present time in one bale of unpicked myrrh I found African bdellium chiefly, next, opaque bdellium. Of the "spurious gums" picked out from another bale, opaque bdellium constituted about one-third, the remainder being opaque tasteless gum, transparent gums and odourless amyridaceous (?) gum resin. Very little bissa bôl or Indian bdellium occurred in any of the bales I examined.

The substances thus rejected are commercially valueless.

Myrrh and its impurities are readily distinguished by observing—

(1) The characters of the fracture,
(2) The odour, and
(3) The taste.

African Myrrh "Heera Bôl," the "Turkey Myrrh" of commerce.

Botanical source, *Balsamodendron Myrrha.** This may be divided into "soft or oily myrrh" and "dry or gummy myrrh."

"Soft myrrh" occurs in irregularly roundish masses, varying in size from small grains to pieces as large as a hen's egg and occasionally much larger; it has a dull waxy fracture, is readily impressed by the nail, and gives at the same time an oily exudation. The fracture frequently exhibits whitish markings, which in the more globular pieces appear in narrow curved streaks arranged concentrically to the side which was attached to the tree. They are often broad but do not then exhibit the straight interstices or cracks filled with transparent resin characteristic of bissa bôl. The fragrant odour of myrrh is too well known to need description and differs entirely from that of any of the impurities. The taste resembles the odour, it is aromatic and slightly bitter. The colour varies from deep reddish brown to light yellowish brown, some pieces are almost colourless. The paler kinds are to be preferred. Minute transparent resinous tears sometimes appear on the usually powdery surface, due to the exudation of oil which has resinified. Soft myrrh cannot be reduced to a fine powder; indeed if beaten in a mortar for some time it gives a greasy paste.

"Dry myrrh" occurs in masses having a very irregular surface, it is rarely rounded or globular. The fracture is conchoidal, shiny, resists the nail and gives no oily exudation. In odour and taste it agrees precisely with "soft myrrh," but the white markings usually present in the latter are absent. It contains a large percentage of gum (75 per cent.). From the description in 'Pharmacographia,' p. 129, this would appear to be identical with Arabian myrrh, but examination of the specimen in the Hanbury collection proves the latter to differ; it is in small grains or tears, dark coloured, with an almost glassy surface, the larger pieces being formed by agglomeration of the smaller ones. It also is wanting in odour and the powdery exterior of African myrrh.

The "meetiga" of the Bombay market, called Arabian myrrh by Dymock,† differs entirely from either "dry myrrh" or Hanbury's "Arabian myrrh." ‡

The "soft" and "dry" myrrhs, as above described, are very distinct and would almost suggest their being produced by different varieties of *Balsamodendron myrrha*; but since (1) the chemical characters of both resins and gums agree (as shown subsequently), (2) the odour and taste are identical, and (3) the relative percentage of gum is by no means constant, it seems more probable that they are products of the same variety, but from plants either of different ages, or existing under dissimilar climatic conditions.

It is possible that the same tree may, at different seasons of the year, give exudations as unlike as "soft" and "dry" myrrh.

That "soft myrrh" is not converted into "dry myrrh" by long exposure to air is proved as follows:—

(1) The "drying" consists in oxidation of the oil, which would give increased weight § and therefore a relative increment of *resinous* percentage. Now,

* Read before the School of Pharmacy Students' Association, June 26, 1879.

† Vaughan, *Pharm. Journ.* [1], vol. xii., p. 226.

‡ Dymock, *Pharm. Journ.* [3], vol. vi., p. 661.

* *Pharm. Journ.* [3], vol. viii., p. 893.

† *Pharm. Journ.* [3], vol. vi., p. 661.

‡ See 'Museum Catalogue,' 139c and 139f.

§ 3·325 grams of soft myrrh in thin shavings exposed to the air for three weeks weighed 3·506; an increase equal to 5·4 per cent.

"dry myrrh" has a very much higher *gum* percentage (*vide* subsequent table). The loss of water, if such take place, must be so small that the difference would in no way be explained by it.

(2). In a non-porous body like myrrh, oxidation would be confined to the surface. I have never found a piece of "dry myrrh" with a "soft" interior; on the other hand, a very small *tear* of "soft myrrh," not more than one-eighth of an inch in thickness, which must have been exposed to the atmosphere ever since its exudation, proved on fracture to be very soft and oily *close beneath the surface.*

"Spurious Gums" found in Myrrh as imported.

1. *Opaque Bdellium* (*Balsamodendron Playfairii?*).—Identical with the bdellium opaque, of Guibourt.* Dymock's specimen, however, of opaque bdellium, is *a very brittle* opaque gum, which agrees chemically with the "gum hotai" of Vaughan, but is rather darker coloured, Vaughan's specimen being white. The latter is identified in the Hanbury collection as the gum resin of *B. Playfairii.*

Opaque bdellium may be at once recognized by its *opaque*, yellow-ochre coloured, conchoidal fracture; it resists the nail. It is very hard and difficult to fracture (difference from "gum hotai"), almost odourless, and its taste bitter without acidity. Occurs frequently in large elliptical tears with a coarsely granular surface.

2. *African Bdellium* (*Balsamodendron Africanum*) is met with in large tears like opaque bdellium, but the granulation is less coarse and the surface is traversed by deep cracks. It is very hard; the conchoidal fracture appears slightly opaque, of a dull bluish stony hue, with a characteristic resinous margin; it is reddish and *translucent* in thin layers, almost odourless, and its taste feebly bitter.

3. *Bissa bôl* (*Balsamodendron Kafal ?*), is identical with the perfumed bdellium or "hăbăk hādee" mentioned by Dymock; the "hebbakhade" of the Somalis, and the *Myrrha Indica*, of Martiny. Bales of "bissa bôl" are shipped from Berbera to Bombay; probably a large proportion of it goes to China,† where it is used as incense and, according to Dymock, is mixed with the food of milch cows and buffaloes for the purpose of increasing the quantity and improving the quality of the milk.

"Bissa bôl" resembles myrrh much more closely than either of the bdelliums previously described. In external appearance it is very similar, the fracture is waxy, yields to the nail, giving an oily exudation like "soft myrrh;" yellowish white markings also appear, which, however, differ essentially from those of myrrh in being traversed by angular interstices filled with transparent reddish brown resin (or gum resin). It may be readily distinguished by its powerful aromatic odour, totally unlike myrrh, difficult to describe (perhaps because nothing resembles it), but easily recognized after one introduction to the olfactory nerve. It has been likened by Mr. Holmes to the taste of the spring mushroom (*Agaricus gambosus*), by Dymock to the odour of "lemon lollipop;" when diffused by evaporating the tincture on blotting paper, it is somewhat apple-like. The taste is aromatic and slightly bitter.

4. *Indian Bdellium* (*Balsamodendron Mukul* and *B. pubescens*), or "Googul," collected in Deccan.

* 'Histoire des Drogues,' tome iii., 515.

† A specimen of bissa bôl appears in Hanbury's collection of Chinese drugs.

Occurs in large irregular masses of a dark reddish brown colour. The fracture resists the nail and is covered with characteristic minute shiny points of resin, which also appear on the outer surface. The odour is feeble and cedar like; it appears to be developed on keeping. The taste is slightly acrid and devoid of bitterness.

5. *Perfumed Amyridaceous* (?) *Gum Resin.*—This substance does not appear to have been previously described,* but I have found a few pieces of it in parcels of myrrh obtained from different sources. In external characters it somewhat resembles olibanum or tacamahac, the colour varies from light yellowish brown to light yellow, more translucent than myrrh, some pieces being transparent in mass. It has a waxy fracture, and from the presence of minute cavities filled with oleo-resin of treacly consistence, numerous silky strings join the fractured portions as they are pulled asunder. It is cheesy to the nail, softens in the hand and is very sticky. The odour is powerful, resembling some samples of elemi, but is more pleasantly aromatic. The taste is slightly aromatic without bitterness or acridity. When crushed in a mortar it gives a very adhesive paste. It is not entirely soluble in ether, alcohol, turpentine or chloroform.

6. *Odourless Amyridaceous* (?) *Gum Resin.*—This I have found in considerable quantity; it has a bright yellow powdery exterior similar to the last mentioned gum resin, is very brittle, resinous and mostly transparent. It lacks, however, the cheesy character, the stringy fracture, and is odourless and almost tasteless.

7. *Opaque Tasteless Gum* occurs in irregular tears. It is very hard, fracture dull, somewhat opaque, nearly colourless, odourless and devoid of taste.

8. *Bitter Gum.*—This is more transparent than the last; the colour varies from reddish brown to almost colourless; its very bitter and acrid taste recalls ammoniacum.

9. *Transparent Gum.*—Very variable in appearance, but seems closely to resemble the inferior kinds of acacia gum in colour, taste and glassy fracture. Some pieces of white acacia gum frequently occur.

Composition of Myrrh.

The proximate constituents are—

(1). Resin (two according to Brandes).

(2). Two gums (one precipitable by both lead solutions, the other thrown out by subacetate only).

(3). Essential oil.

The very variable relative proportion in which these occur is best seen by reference to different authors.†

* The nearest approach to this substance is the *Tacamaque jaune huileuse*, of Guibourt, ('Drogues Simples,' 1870, tome iii., 483), the Luban Meyeti of the 'Pharmacographia,' p. 135; but this author says it contains no gum. Now, 42 per cent. of perfumed amyridaceous gum resin is insoluble in cold or hot S.V.R., and dissolves to a large extent in water; the latter solution, however, is scarcely precipitated by acetate or subacetate of lead.

† Planchon, 'Drogues Simples,' tome ii., 156.

		Brandes.		Bracannot.	Ruickholdt.
Huile essentielle		2·60		2·5	2·18
Résine . .	molle 22·24 sèche 5·56	27·80		23·	44·76
Gomme	soluble 54·38 insoluble 9·32	63·70	46 12	58·	40·81
Sels		1·36		—	3·65
Impuretés		1·60		—	3·86
Eau		—		—	1·47

Gum.—I have estimated the percentage of gum in different samples of myrrh, the results I have tabulated:—

	1. Myrrh.		2. "Soft Myrrh."		3. "Dry Myrrh."		4. Bissa bôl.		5. Amyridaceous perfumed gum resin.	
Filter and gum	6·73	6·95	5·45	5·54	9·15	9·11	6·13	6·01	6·05	6·03
Filter	2·09	2·33	1·50	1·55	1·65	1·60	1·80	1·72	1·82	1·77
	4·64	4·62	3 95	3·99	7·50	7·51	4·33	4·29	4·23	4·26
Gum, mean per cent	46·3		39·7		75·0		43·1		42·4	

Ten grams of the gum resin were powdered, exhausted with cold rectified spirit, the insoluble gum collected on a weighed filter and dried in a hot air chamber till the weight became constant.

In each case the figures were checked by duplicated experiments.

1. *Myrrh.*—A representative sample of a large parcel of myrrh, powdered and well mixed.

2. "*Soft Myrrh.*"—Very oily pieces selected, the outer portions rejected; was almost pasty when powdered.

3. "*Dry Myrrh.*"—Characteristic specimen with bright glossy hard fracture, easily reduced to a light yellow powder.

4. "*Bissa Bôl*" obtained from a parcel of myrrh, outer portion *not* removed, powder very yellow and oily.

5. *Perfumed Amyridaceous Gum Resin.*—Specimen picked from parcel of myrrh, formed a very sticky paste when crushed.

Equal weights of the dried gums from "soft" and "dry" myrrh were separately dissolved in equal volumes of water; the filtered solutions were precipitated by neutral acetate of lead, again filtered and solution of subacetate of lead added; the amount of precipitates in the parallel experiments were approximately identical.

Resin.—Brandes distinguishes two resins, (1) a soft resin, odorous, and (2) a hard resin (myrrhic acid), inodorous, both soluble in rectified spirit and insoluble in ether.

Unverdorben regards the soft odorous resin as a mixture of the hard resin with volatile oil.

Volatile Oil, sp. gr. ·988, b.p. 266° C.—Flückiger and Hanbury in working on 25 lb. of myrrh obtained only $\frac{2}{3}$ per cent. ('Pharmacographia,' p. 128); Bley and Diesel produced 3·4 per cent.

If the liquid which exudes on pressing "soft myrrh" with the nail be volatile oil, a much larger proportion than 3 per cent. must be present.

The following experiments were tried with the object of obtaining a greater percentage:—

(1). A sample of soft myrrh was made into a thin paste with water and distilled in a current of hydrogen. The result was similar to that obtained by distillation with water in atmospheric air, viz., a very small quantity of nearly colourless oil, lighter than water, together with white flocks of a substance of butyraceous consistence, also lighter than water, but becoming heavier than it by prolonged contact.

(2). Some soft myrrh was macerated in a small quantity of chloroform and the filtered solution distilled; the chloroform came over rapidly and the residue soon acquired an empyreumatic odour.

(3). Soft myrrh was treated with a small quantity of benzole and the filtrate allowed to evaporate spontaneously. The residue, however, soon became very viscid, proving that the solvent did not separate the oil from the resin.

(4). About twelve ounces of "soft myrrh" were selected, reduced in a mortar to a pasty consistence, and subjected to powerful hydraulic pressure; a reddish yellow liquid, of thin treacly consistence, heavier than water was expressed; it is probably volatile oil holding resin in solution, if so, the quantity obtained (about an ounce and three-quarters by weight) would indicate at least 10 per cent. of oil in the sample. I obtained a similar liquid some twelve months since in making an emulsion of myrrh:—One ounce of myrrh was powdered (the odour indicated contamination with bissa bôl) and rubbed with ʒij of water, the gum at once assumed a doughy consistence, from which ʒiij of liquid was readily expressed by the pestle. This mixture (of oil and resin) was reddish brown, heavier than water and very slowly distillable therewith; the distilled oil was lighter than water, but on prolonged contact became a heavier solid. Removed from the water and allowed to dry it formed a transparent brittle resin.

I have several times endeavoured to repeat this experiment with myrrh *free from bissa bôl*, but could in no case get any exudation.

The expressed liquid is possibly that mentioned by Pfaff* as being "heavier than water and not distillable therewith." Brandes describes a volatile oil also heavier than water and distillable therewith, but not with alcohol.

The specimen of oil of myrrh in the Society's museum, prepared at Plough Court (1873), is a light yellow mobile liquid.

Formic acid is said to be produced during distillation.

From the above it appears probable that a large quantity of volatile oil exists in myrrh, only a small proportion of which has, as yet, been isolated, on account of its high boiling point (266° C.) and the readiness with which it is decomposed or resinified by contact with air and moisture at a high temperature.

Probably distillation *in vacuo per se*, or distillation under reduced pressure in an atmosphere from which oxygen would be excluded might prove the correctness of this assumption. *The colouring matter of myrrh* is probably due to the presence of a small proportion of a deep reddish brown resin, which is almost absent from the paler specimens.

The action of nitric acid at once distinguishes true myrrh from any of the "spurious gums" that have been mentioned. It is best observed by saturating white filter paper with the freshly prepared tincture (1 of gum resin and 6 of sp. rectif.), and when the alcohol is almost entirely dissipated, drawing across the paper a glass rod previously dipped in nitric acid (sp. gr. 1·42). True myrrh gives an *immediate* deep yellowish-brown colour, rapidly becoming almost black. The margin soon acquires a red tint, passing through bright crimson to dull purple, which is permanent.

The presence of alcohol of course modifies the action of the acid; the latter should be applied when the alcohol has evaporated, and yet avoiding undue exposure of the dried resin to air, *i.e.*, when the paper begins to recover its stiffness.

The resins from bissa bôl and African bdellium

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* 'Gmelin,' xiv., 413.

are much less powerfully acted upon; those from the remaining impurities give scarcely any colour at all.

A few drops of the tincture evaporated on glass also give distinctive features. The residues from perfumed amyridaceous gum resin, opaque and African bdelliums, are *opaque;* those from myrrh and bissa bôl are *transparent.*

I cannot conclude without expressing my obligation to Mr. E. M. Holmes for much of the information given in this paper and a great deal of valuable assistance with reference to the history of authentic specimens of the gum resins in the Society's museum.

PHARMACEUTICAL EXTRACTS.*

CRITICAL CONSIDERATIONS UPON THEIR PREPARATION, CLASSIFICATION, GENERAL CHARACTERS, USES, ETC.

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The extracts are very important preparations, nevertheless but little is generally known concerning their *raison d'être,* their different modifications, the very diverse modes of their preparation, and their general or specific characters. I shall attempt in this paper to make a study of them under all these aspects, and in order to do so logically I shall proceed as follows: first, define an extract, then describe the origin and advantages of extracts, give the general rules of preparation, indicate the classification of the extracts and finish by giving their general characters.

I. An extract is the product of the evaporation of a natural or artificial juice to the consistence known as "the consistence of an extract," *i.e.,* a paste that is soft, but nevertheless sufficiently firm not to run like a liquid or adhere to the well dried fingers. This primitive definition can in the present day no longer be applied; the consistence of the extract is more variable; thus, the Codex indicates three different types, when it says, "The extract is the product of the evaporation to a soft, firm or dry consistence, of a solution obtained by treating a vegetable substance with a vaporizable menstruum, such as water, alcohol or ether."

Some operators define the extract in a manner more simple still: to them it is the product of the evaporation of aqueous, alcoholic, ethereal or acetic liquids to a pasty consistence. Whatever may be the definition adopted, the extract may be characterized by two essential conditions: the concentration of a medicinal liquid (a natural or artificial juice) and a special consistence to which I shall refer further on.

All the juices, and the juices of indigenous plants especially, contain within themselves germs of fermentation and destruction; they are besides exposed to a second alteration, due to external agents of decomposition. In concentrating the juices, their volume is diminished, the causes of internal decomposition are modified or destroyed and less access is permitted to external agents of fermentation; the causes of disorganization of the juice are thus diminished. Preservation is the primary object of the preparation of an extract; but it is not the only one, for the syrups, wines and tinctures answer to the same want. In concentrating the juice the pharmacist also, by successive operations, effects the removal from the liquid of useless and inactive matters, the albumenoid, pectic and amylaceous principles, for example. Lastly, the extract offers to the medical man a preparation that is active in a small volume, capable of reproducing immediately in a mixture or a syrup, the original juice with all its active elements and also lending itself with a marvellous facility to other pharmaceutical preparations, such as pills, pastes, pomades, etc.

To recapitulate, the extracts supply in a small volume the medicinal principles of plants and animals, and they include all the soluble elements of the plant or animal to the exclusion of inert principles. The active principles are moreover modified in such a manner that they can be better borne, and in higher doses, as has been demonstrated with the squill and digitalis. Further the extract is a good active preparation accommodating itself to all pharmaceutical forms. One single shadow there is to this picture: the preparation of an extract is a delicate operation and its preservation for any length of time is difficult.

II. We are thus led to study in a general way the preparation of extracts. Some among them,—the commercial extracts, aloes, catechu, kino, etc.,—are supplied by the druggists, all the others ought to be prepared in the laboratory of the pharmacist.

When operating with a natural juice it may be concentrated immediately or after clarification: we have thus two kinds of juice extracts, the extract from defecated juices and the feculent or non-defecated extracts, called also Storck's extracts. Sometimes there is incorporated with the fresh juice as much powder of the plant as there is real dry extract in the juice and evaporation is carried on to dryness at from 40° to 50° C., extracts being thus obtained under the form of grumous dark-green powders. In this way are prepared the narcotic extracts of the Belgian Pharmacopœia (aconite, belladonna, conium, lactuca, etc.). These extracts are very active, but are difficult to preserve, so that the pharmacist ought to renew them every year. The name of "rob" is given to the product of the evaporation of the juice of fruits; for instance the robs of buckthorn, juniper and elder.

The natural juices are rather rare: the questions of locality, collection and time interfering with their preparation. In order to obviate this inconvenience the pharmacist prepares artificial juices by treating the dry products with menstrua capable of dissolving their active principles. When the menstruum is vapourizable the artificial juice can be concentrated, and we have then a new series of extracts, the aqueous, alcoholic and ethereal. To these may be added the acetic extracts, of which at present there are but two representatives,—the acetic extract of colchicum and Lalouette's acetic extract of opium,—notwithstanding the efforts of Ferrari to extol the extracts prepared with vinegar. Finally there are the mixed extracts, in the preparation of which ether and alcohol and water and alcohol have been employed as menstrua successsively, as is done with the cubebine of Labélonye and the ergotine of Bonjean.

In all the extracts it is necessary to commence with the study of the juice, then its concentration. Let us commence with the aqueous extracts, which ought always to be supplied when the medical man does not specially indicate the alcoholic or ethereal extract.

Whatever may be the menstruum the substance ought always to be well divided, either by cutting or by coarse pulverization; it is necessary to eliminate carefully the fine powder which would interfere further on with the decantations and filtrations. Thus prepared, the primary substance is exhausted by maceration or digestion, infusion or displacement with distilled water, when that is ordered, or at any rate with water very poor in carbonate of lime. Maceration is effected between 10° and 20° C., for opium and gentian, for example; digestion between 35° and 40° C., for cinchona. Infusion is made with water at 70° C., for digitalis, the extracto-aromatic plants, and valerian root; but these extracts ought to be replaced by alcoholic extracts, which are very superior to them. Displacement is recommended for extract of liquorice, and with me it has succeeded very well for extracts of guaiacum and couch-grass. Decoction I reject, because it determines the coagulation of albumenoid matters in the substance itself, and prevents the solution of some prin-

* *Répertoire de Pharmacie,* vol. vii., p. 249.

ciples which, like astringent principles, form with vegetable albumen and starch insoluble compounds.

The product of these operations is thrown upon a cloth or hair sieve, and the liquid thus separated is reduced to one-third by evaporation; the evaporation can be conducted over the bare fire, ebullition being avoided and the liquid stirred continually. When reduced to one-third the liquid is removed to another vessel and placed in a cellar or some other cool place where it is left to stand two or three days, after which it is decanted or filtered if necessary. The juice is then ready for further concentration.

The alcoholic and ethereal extracts are prepared by maceration or displacement with 60° to 90° alcohol, ether, or ether containing alcohol. The clear tincture is introduced into a distillatory apparatus to collect the greater part of the alcohol or ether, and concentration is effected generally as with the aqueous extracts. The evaporation of all these liquids is carried on in a water-bath; the temperature ought not to exceed 80° C. for alcoholic extracts and 50° C. for ethereal extracts. It is advisable to operate in flat vessels having a large surface but of small capacity; to add the liquid in portions and in proportion as evaporation goes on, and to agitate constantly to favour the disengagement of vapour and to prevent the adherence of the extract to the bottom of the vessel. The action of heat is continued until the attainment of the proper consistence, which it is proposed to define more closely than in the Codex.

Formerly, only the "consistence of an extract" was known: the Codex only specified that the paste should be soft, firm, or dry. The following scale of consistence for extracts is now proposed:—

(1) "Soft or semi-fluid extract," the *mellago* of the Germans, of the consistence of fresh honey.

Examples: The ethereal extracts of male fern, mezereon, semen contra and cantharides; the alcoholic extract of thapsia and the "robs."

(2) "Firm extract," *extractum spissum*, of the true consistence of an extract, not capable of running, like the preceding, when cooled, but allowing threads to be drawn from it by the spatula. Examples: the extracts of cinchona, valerian and gentian.

(3) "Pilular extract," *extractum spissius*, much firmer than the preceding, no longer yielding threads and capable of being used in the manufacture of pills without the incorporation of powder.

(4) "Dry extract," *extractum siccum*, capable of being pulverized. Examples: the extracts of rhatany, monesia and cinchona (Lagaraye's "sel essentiel"). To these may be added the resinous extracts or resins (jalap and scammony), which are in fact alcoholic or mixed extracts, and should not be placed in the same category as Burgundy pitch, tar and the gum resins.

To bring the extract to the dry consistence it is evaporated to the point when the mass becomes friable upon cooling; it adheres no longer then to sized paper, and it may be spread while hot with the spatula upon sheets of paper having the edges turned up. The drying is finished in a stove at between 40° and 50° C. The product is then coarsely powdered and introduced into previously heated glass flasks, the mouths of which are closed with good corks.

The soft, firm and pilular extracts are also placed in flasks, or tall porcelain pots having narrow openings.

All extracts should be kept in a dry and cool place.

These general rules having been laid down some modifications of the *modus operandi* will be described.

Extract of opium is re-dissolved in water and again filtered. This fresh aqueous solution has for its object the elimination of fatty or aqueous matters, wax or substances analogous to caoutchouc, which have been taken up in the first treatment, partly on account of their abundance and partly through the presence of other principles, such as sugar, gum and extractive matter, which favour their solution.

The operator often desires to retain these resinous or resinified matters in the extract, but at the end of the operation they separate from the extractive (the total of the parts soluble in water) and the result is an extract of bad consistence and without homogeneity; the defect is corrected by incorporating in the mass, at the last moment, a little alcohol, as recommended in the Codex for extract of guaiacum, and in the Belgian Pharmacopœia for the dry extract of cinchona.

Dry extracts less alterable and more easy to preserve may be obtained by incorporating in the mass, while still hot, vegetable powders or dextrin and finishing the drying in a stove at between 40° and 50° C. Extracts containing dextrin are prepared principally in Germany from the narcotic juices and the quantity of excipient added equals in weight the amount of real extract. It is only necessary then in making up prescriptions to use of these extracts double the quantity prescribed by the physician.

A few words more upon mixed extracts requiring the employment successively of several menstrua. The cubebine of Labélonye and the ergotine of Wiggers are prepared by treating with alcohol the ethereal extracts of cubebs and ergot; the extracts are thus freed from waxy and fatty matters which are inert or even dangerous. Bonjean's ergotine is obtained by treating the aqueous solution of ergot with 90° alcohol, which precipitates gummy and albuminous matters and the salts insoluble in alcohol; the preparation is twice as active as the ordinary aqueous extract. Dausse has proposed the successive treatment with ether, alcohol and water for the exhaustion of the extracto-aromatic plants. Mohr also recommends this mixed treatment for the preparation of the narcotic extracts. According to this learned operator the purified juice ought to be evaporated to the consistence of a syrup, then treated with anhydrous alcohol, which precipitates the gums and insoluble salts; the alcoholic liquid should then be evaporated to the consistence of an extract. Mohr's extracts are very active and are easily preserved. The resins of jalap and scammony may also be included in the category of mixed extracts.

In the laboratory of the pharmacist the concentration of the juices is effected by the action of heat: to accelerate the preparation of the extract and prevent prolonged contact with the air it has been suggested to operate in a vacuum. The preparation of extracts, in consequence of the apparatus this would require, would then necessarily become industrial, which ought not to be encouraged. Extracts should be prepared by the pharmacist; they are very active medicinal agents upon which the medical man ought to be able to depend, and notwithstanding the authority of such names as Grandval, Berjot, Dausse and others, I always prefer the extract prepared in a pharmacy, for the following reasons:—The dry extracts prepared in a vacuum are very hygrometric; after a very short time and by simple contact with the atmosphere they form a mass more or less elastic and difficult to manipulate. Also, it is very easy for an isolated pharmacist to collect the two or three kilograms of the substance which he requires for the preparation of his extract, but would it be possible to find the hundreds and thousands of kilograms required for an industrial manufacture in good condition and of certain origin? The analysis of extracts is very little understood; the adulteration of commercial products is therefore too easy to execute and impossible to detect. Lastly, it has not been proved, so far as I know, that the extracts prepared in a vacuum have a therapeutic value superior to that of the extracts prepared by the ordinary method.

The following process appears to me to be preferable:—Quite recently an attempt has been made to substitute the action of cold for that of heat in the concentration of juices, and extracts have been prepared by congelation. This congelation may be effected by the cold of winter or by means of well-known apparatus, such as Carré's. It is advisable not to purify the juices of plants or fruits before proceeding to congelation, for the coagulation of the vegetable albumen takes up much of the active principle, which is then wanting in the extract. The juice is submitted to two or three successive congelations, the frozen juice is broken up, put into a linen or hair bag, and then strongly pressed. The concentration is such that the evaporation of the juice may be finished by putting it on plates in a stove heated to 30° C. The alteration of the juice is much less than by the ordinary processes, and extracts of rhatany, catechu and aloes are obtained which are perfectly soluble.

This process, employed by myself in the preparation of medicinal diastase, has given excellent results in respect of the yield as well as the quality of the product. Some milk after three congelations had lost 57 per cent. of its original volume; its density had increased from 1032 to 1108, and by exposure on a plate to the sun this milk gave a very fine dry extract.

The question of yield ought also to occupy the attention of the pharmacist; this is treated of in the Codex, p. 433, in a table very well drawn up. I would only wish to add to this table a column in which the figures 1, 2, 3, 4, should indicate to the operator the degrees of consistence, from the semi-fluid to the dry extract. The consistence is moreover strictly correlative to the yield, without which it has no practical value.

I should like to see the preparation and employment of dry extracts more extended. Whether prepared by immediate desiccation, or by incorporation of vegetable powders or of dextrine, these extracts are better for preservation and they are more certain from a posological point of view. The German Pharmacopœia orders several extracts to be dry which in French pharmacies are kept soft. For example, take the extract of opium: in Germany it is the powder of opium which should contain 10 per cent. of morphia, and the dry extract 20 per cent. These requirements are certainly very reasonable; in the Codex it is absolutely indispensable to indicate the amount of water which opium and its extract may contain. The same remark applies to all the extracts of soft or firm consistence. In Germany, besides opium, the dry extracts are those of aloes, colocynth (simple and compound), campechy, calumba, myrrh, nux vomica (aqueous and alcoholic), rhatany, compound rhubarb and senega. The narcotic extracts dry and containing dextrine are often demanded; they are besides necessary for the preparation of the compound powders.

I have intentionally omitted to speak of the fluid extracts, the use of which has spread so rapidly in England and America. I think, and I hope to prove subsequently, that the fluid extracts ought to be excluded from medicinal use.

It now remains to treat of the general constitution of the extracts, their classification, and their general characters.

(*To be continued.*)

RECENT CONTRIBUTIONS TO THE HISTORY OF DETONATING AGENTS.*

BY PROFESSOR ABEL, C.B., F.R.S.

(*Concluded from page 70.*)

In comparing the effects of these nitro-glycerine preparations with each other and with compressed gun-cotton and preparations of it, by detonating equal quantities quite unconfined upon iron plates, the results appear to establish great superiority, in point of violence of action or destructive effect, of the more rigid explosive agents (the gun-cotton preparations). Thus, employing iron plates 1 inch thick (supported upon an anvil with a central cavity), and 4 oz. of each material unconfined, the charges being all about the same diameter, exploded by detonators of equal strength, and simply resting upon the upper surface of the plate, compressed gun-cotton produced a considerable indentation of the upper surface of the plate, and long cracks in the lower surface; a species of nitrated gun-cotton, called tonite, produced a much shallower indentation, though still a very marked one, but did not crack the lower surface. Dynamite produced only a very slight impression upon the plate, and none could be detected by the eye on the plate upon which the blasting gelatine was exploded. The difficulties, brought out by past experience, which attend the contrivance of really comparative tests of the explosive power of such substances as those under discussion, is well exemplified by the foregoing results, which were influenced to the maximum extent by the physical characters of the several substances when applied, as they were upon these iron plates, in a perfectly unconfined condition, so that the particles were free to yield to the force of the initiative detonation in proportion to their mobility. But, for this very reason, these experiments afford excellent illustration of the extent to which the development of detonation and the sharpness of its transmission through the mass is influenced, not only by the inherent sensitiveness of the substance to detonation (or by its chemical instability) but also by the degree of proneness of their particles to yield mechanically to the force of a blow as applied by an initiative detonation. Thus, although in comparing two substances of similar physical characters, compressed gun-cotton and compressed nitrated gun-cotton or tonite, the superiority of the pure compound over the mixture, in point of sharpness and violence of action, is well illustrated, a comparison of the result furnished by the weakest of the four explosive agents tried, viz., tonite, with that of the substance which should be superior to all the others in explosive force (*i.e.*, the blasting gelatine) demonstrates the important influence which the comparatively great rigidity of the mass in the one case exerts in favouring the completeness and sharpness of its detonation in open air, and the great disadvantage under which the other explosive is applied, arising out of the plastic and therefore readily yielding nature of the material. But if, by exposure to a moderate degree of cold, this plastic nitro-glycerine preparation is made to freeze (for it partakes of the property of the liquid itself of freezing at a temperature above the freezing point of water, and becomes thereby converted into at least as rigid a substance as the two descriptions of gun-cotton) its detonation upon an iron plate produces an indentation, as well as a destructive effect upon the lower surface of the plate, very decidedly greater than those furnished by the corresponding amount of pure compressed gun-cotton. Similarly, the effect produced by the detonation of dynamite upon a plate of the kind used, is but little inferior to that of gun-cotton, and decidedly greater than that of tonite, if it is employed in the frozen condition.

A series of experiments has been made with cylinders of lead having a central perforation 1·3 inch in diameter extending to a depth of 7 inches, and leaving solid metal beneath of a thickness ranging from 3·5 to 5·5 inches, according to the size of the cylinders used. These furnished results of considerable interest as illustrating the action of these several detonating agents. Charges of 1·25 oz. of each explosive substance were used throughout the experiments, and were placed at the bottoms of the holes. By the detonation of the charges the cylindrical holes in the lead were enlarged into cavities of a pear shape (and sometimes approaching the spherical form), of various diameters; in some instances the metal was besides partially torn open in a line from the bottom of the charge-hole to the circumference of the lower face of the cylinder; and in the case of some of the gun-cotton charges, the fissure in the metal in this direction was complete, the base of the block being separated from the remainder, in the form of a cone. In the first place the portions of the holes above the charges were simply left open; in the subsequent experiments they were filled up to a level with the upper surface, with dry, fine, loose

* Lecture delivered at the Royal Institution of Great Britain, Friday, March 21, 1879.

sand, or with water. The dimensions of the cylinders were increased in successive experiments until, in the case of every one of the explosives used, the mass of metal was sufficiently great to resist actual fracture at the base of the cylinder. Under the conditions of these experiments, more or less considerable resistance being opposed to the mechanical dispersion of the plastic explosive substances, their detonation was greatly facilitated, though even then, the holes in the lead blocks being left open to the air, some amount of the blasting gelatine evidently escaped detonation; the widening of the upper part of the charge-hole, in experiments of this nature made with the gelatine, indicated that detonation was transmitted to small portions dispersed in the first instance and in the act of escaping from the block. In all the experiments, whether the holes were left open or filled with sand or water, the effect produced upon the base of the block by the detonation of compressed gun-cotton was considerably more violent than with the other explosive agents, indicating a sharpness of action which was only shared by the blasting gelatine when used *in a frozen state* in one of these experiments. The dimensions of the cavities produced by the gelatine were, at the largest part, considerably greater than those produced by the dynamite and nitrated gun-cotton (tonite), and slightly greater than those of the gun-cotton charges; but in the latter, the fracture of the base of the cylinder gave rise in most of the experiments to an escape of force, so that in these cases the effects of the detonation could not be well compared by measurements of the cavities. When the gelatine was converted by freezing into a rigid mass its superiority in explosive force even over compressed gun-cotton was well illustrated; the base of the lead block was all but blown out, the cavity produced was considerably the largest, and the suddenness and violence with which motion was imparted to the water tamping caused the top of the block also to be blown off in the form of a cone. An excellent illustration was obtained, by comparing this result with those furnished by the gelatine in its normal plastic state, of the influence exercised by the physical condition of an explosive substance upon the rapidity and completeness with which detonation is transmitted through its mass.

The difficulties attending the application of blasting gelatine, in some directions in which explosive agents are applied, on account of the uncertainty attending the development of its explosive force, even with the use of a comparatively powerful detonator, unless it be very strongly confined, has led to attempts to reduce its non-sensitiveness to detonation by mixing it with materials intended to operate either by virtue of their comparatively great sensitiveness, or of their property, as solids, of reducing the very yielding character of the substance, or in both ways.

Some of these attempts have been attended with considerable success. Thus the incorporation of about 10 per cent. of the most explosive form of gun-cotton or trinitrocellulose, in a very finely divided state, with the gelatine, renders it so much more sensitive that it can be detonated with certainty in the open air by means of the strongest detonating cap now used for exploding dynamite. This effect appears to be less due to the comparative sensitiveness of gun-cotton to detonation than to the modification effected in the consistency of the material, which, though still plastic, offers decidedly greater resistance to a blow than the original gummy substance. The particles of hollow fibre of the gun-cotton appear also to have the effect of absorbing small quantities of nitro-glycerine which are less perfectly united with the soluble gun-cotton than the remainder, and which, existing as they do in somewhat variable proportions in the gelatine, have occasionally an objectionable tendency to exudation, if the incorporation of the ingredients has been less perfect than usual. The substance, when modified as described, has no longer that great adhesiveness which is exhibited by it in the original state, and which renders it less easy to manipulate.

Lastly, its explosive force appears to be in no way diminished by this modification of its composition; on the contrary, its superiority in this respect to compressed gun-cotton becomes more manifest, as demonstrated by some of the experiments with lead blocks, while its action partakes of that sharpness peculiar to the detonation of the rigid gun-cotton, as indicated by the fissure of that part of the metal situated beneath the charge. Finely divided cotton fibre has a similar effect to trinitrocellulose in modifying the physical character and increasing the sensitiveness to detonation of the blasting gelatine, but its explosive force is, of course, proportionately reduced with its dilution with an inert substance.

Nobel has made the interesting observation, that an addition to the blasting gelatine of small proportions of certain substances rich in carbon and hydrogen, which are soluble in nitro-glycerine, such as benzol and nitro-benzol, increases to a remarkable extent the non-sensitiveness to detonation of the original material; and this observation has led to experiments being conducted by engineer officers in Austria, with a view of endeavouring to convert the blasting gelatine into a material which should compete, as regards some special advantages in point of safety, with wet gun-cotton in its application to military and naval purposes, and especially as regards non-liability to detonation or explosion by the impact of rifle bullets. If boxes containing dry compressed gun-cotton are fired into from small arms even at a short range, the gun-cotton is generally inflamed, but has never been known to explode; the sharpness of the blow essential to the latter result, which the bullet might otherwise give, being diminished by its penetration through the side of the box before reaching the explosive. It is scarcely necessary to state that wet gun-cotton, containing even as little as 15 per cent. of water, is never inflamed under these conditions. On the other hand, dynamite is invariably detonated when struck by a bullet on passing through the side of the box, and blasting gelatine, though so much less sensitive than dynamite, behaves in the same way in its ordinary as well as in the frozen condition. The Austrian experiments indicated that the gelatine when intimately mixed with only 1 per cent. of *camphor*, generally, though not invariably, escaped explosion by the impact of a bullet, but that when the proportion of camphor amounted to 4 per cent. the material was neither exploded nor inflamed, though, in the frozen state, it was still liable to occasional explosion. These results were considered indicative of a degree of safety in regard to service exigencies, approaching that of wet compressed gun-cotton. The camphoretted gelatine still labours, however, under the disadvantage of being readily inflammable, and of burning fiercely, and consequently, of giving rise, like dynamite and dry gun-cotton, to violent explosion, or detonation, if burned in considerable bulk; a result which was explained by the lecturer in his discourse delivered at the Royal Institution in 1872. Moreover, the camphoretted blasting gelatine is so difficult of detonation by the means ordinarily applied that a large initiative charge of a very violent detonating mixture consisting of pure specially prepared trinitrocellulose and nitro-glycerine is prescribed, by the Austrian experimenters, as being indispensable to its proper detonation.

The action of camphor and of other substances rich in carbon and hydrogen in reducing greatly the sensitiveness to detonation of the preparation of soluble gun-cotton and nitro-glycerine, is not to be traced to any physical modification of that material produced by the addition of such substances, and no satisfactory theory can at present be advanced to account for it on chemical grounds.

The camphoretted gelatine, like Nobel's original gelatine itself, may be kept immersed in water for a considerable time without any important change; the surface of the mass thus immersed becomes white and opaque, apparently in consequence of some small absorption of water, but no nitro-glycerine is separated, and on re-exposure to the air the material gradually assumes once more its original aspect. It has consequently been proposed to render the storage of blasting gelatine comparatively safe by keeping it immersed in water till required for use, but the test of time is still needed to establish the unalterableness of the material under this condition.

There can be little question that this interesting nitroglycerine preparation, either in its most simple form, or modified in various ways, by the addition of other ingredients, promises, by virtue of its great peculiarities as a detonating agent, to present means for importantly extending the application of nitro-glycerine to industrial purposes; and it is not improbable that, through its agency, this most violent of all explosive agents at present producible upon a large scale may also come to acquire special value for important war-purposes.

It has been pointed out that the complete solidification, by freezing, of plastic preparations containing nitroglycerine, such as dynamite and the blasting gelatine, has the effect of facilitating the transmission of detonation throughout the mass, and of thus developing or increasing the violence of their action, under certain conditions of their applications, *i.e.*, when they are either freely exposed to air or not very closely or rigidly confined. But while, under circumstances favourable to the detonation of these substances, when in the frozen state, their full explosive force is thus much more readily applied than when they are in their normal (thawed) condition, the frozen substances are less sensitive to detonation by a blow or an initiative detonation. On the other hand, if subjected to the rapid application of great heat (as for example by the burning of portions of a mass of the explosive substance itself), a detonation is much more readily brought about with the frozen material than if it be in its normal condition. Thus a package containing 50 lbs. of cartridges of plastic dynamite, when surrounded by fire, burned away without any indication of explosive action; on submitting 10 lbs. of frozen dynamite to the same treatment, that quantity also burned without explosion, though at one time the combustion was so fierce as to indicate an approach to explosive action; but when the experiment was repeated on the same occasion, with 15 lbs. of frozen dynamite a very violent detonation took place after the material had been burning for a short time, a deep crater being produced in the ground beneath.

The following is offered as the most probable explanation of this result. When a mass of dynamite, as in these cartridges, is exposed to sufficient cold to cause the nitroglycerine to freeze, it does not become uniformly hardened throughout, partly because of slight variations in the proportion of nitro-glycerine in different portions of the mixture composing the cartridge, and partly because unless the exposure to cold be very prolonged the external portions of the cartridges will be frozen harder or more thoroughly than the interior. It may thus arise that portions of only partially frozen or still unfrozen dynamite may be more or less completely enclosed in hard crusts, or strong envelopes, of perfectly frozen and comparatively very cold dynamite. On exposure of such cartridges to a fierce heat very rapidly applied, as would result from the burning of a considerable quantity of the material, some portion of one or other of the cartridges would be likely to be much more readily raised to the igniting or exploding point than the remaining more perfectly frozen part in which it is partly or completely imbedded. If the ignition of this portion be brought about (which it will be with a rapidity proportionate to the intensity of heat to which the cartridge is exposed), the envelope of hard frozen dynamite by which it is still more or less completely surrounded and strongly confined, will operate like the metal envelope of a detonator, in developing the initial pressure essential for the sudden raising of the more readily inflammable portion of the dynamite to the temperature necessary for the sudden transformation of the nitro-glycerine into gas, and will thus bring about the detonation of a portion of the cartridge, which will act as the initiative detonator to the remainder of the dynamite. On igniting separately, at one of their extremities, some dynamite cartridges which had been buried in snow for a considerable period, the lecturer has observed that, as the frozen material gradually burned away, very slight but sharp explosions (like the snapping of a small percussion cap on a gun nipple) occurred from time to time, portions of the frozen dynamite being scattered with some violence. He did not succeed in obtaining actual detonation by thus burning frozen cartridges surrounded by others in a similar condition, but he has been informed by Mr. McRoberts, of the Ardeer Dynamite Works, that he has more than once detonated a small heap of hard-frozen cartridges weighing altogether one pound, by igniting one cartridge which was surrounded by the remainder. These facts appear to substantiate the correctness of the foregoing explanation. They point to the danger of assuming that, because dynamite in the frozen state is less sensitive to the effects of a blow or initiative detonation than the thawed material, it may therefore be submitted without special care to the action of heat, for the purpose of thawing it. Instances of the detonation, with disastrous results, of even single cartridges of frozen dynamite, through the incautious application of considerable heat (as for example by placing them in an oven, or close to a fire), have been, and are still, of not unfrequent occurrence, even though Mr. Nobel has insisted upon the application of heat through the agency only of warm water, as the sole reliable method of safely thawing dynamite cartridges.

While the sensitiveness to detonation of air-dry gun-cotton remains unaffected by great reduction in temperature of the mass, and while in this respect it presents advantages over nitro-glycerine preparations, wet gun-cotton becomes very decidedly more susceptible to detonation when frozen. Thus the detonation of gun-cotton containing an addition of from 10 to 12 per cent. of water is somewhat uncertain with the employment of 100 grains of strongly confined fulminate, and 200 grains are required for the detonation of the substance when containing 15 to 17 per cent. of water; but the latter in a frozen state can be detonated by means of 30 grains of fulminate, and 15 grains are just upon the margin of the amount requisite for detonating, with certainty, frozen gun-cotton containing 10 to 12 per cent. of water. The deadening effect of solid water upon the sensitiveness of gun-cotton to detonation is, in fact, intermediate between those of a liquid and of inert solid substances.

The effects produced and products formed by the explosion of gun-cotton in perfectly closed spaces, both in the loose, and the compressed form, and by its detonation in the dry and wet state, have been made the subject of study by Captain Noble and Mr. Abel, the method of research pursued being the same as that followed in their published researches on fired gunpowder; results of considerable interest in regard to the heat of explosion, the pressures developed, and the products of explosion of dry and wet gun-cotton have been obtained, which are about to be communicated to the Royal Society.

In may briefly be stated that the temperature of explosion of gun-cotton is more than double that of gunpowder (being about 4400° C.); that the tension of the products of explosion, assuming the material to fill entirely the space in which it is fired, is considerably more than double that of the powder-products under the same conditions; that the products obtained by the explosion of dry gun-cotton are comparatively simple and very uniform under different conditions as regards pressure; that the products of *detonation* of *dry* gun-cotton do not differ materially from those of its explosion in a confined space, but that those furnished by the detonation of *wet* gun-cotton present some interesting points of difference. Messrs. Noble and Abel are extending their investigations to the nitro-glycerine preparations.

The great advance which has been made within the last twelve years in our knowledge of the conditions which determine the character of the metamorphosis that explosive substances undergo, and which develop or control the violence of their action, finds its parallel in the progress which has been made in the production, perfection, and application of the two most prominent of modern explosive agents, nitro-glycerine and gun-cotton. Discovered at nearly the same time, less than forty years ago, the one speedily attained great prominence, on account of the apparent ease with which it could be prepared and put to practical use; a prominence short-lived, however, because the first, and somewhat rash, attempts to utilize it preceded the acquisition of sound and sufficient knowledge of its nature and properties. Even many years afterwards, when the difficulties attending its employment appeared to have been surmounted, the confidence of its most indefatigable partisans and staunchest friends received a rude shock from which it needed the support of much faith and some fortitude to recover.

Meanwhile, the other substance, which now shares with it the honours of important victories won over gunpowder, continued to be generally regarded as a dangerous chemical curiosity, even for some time after its present position as one of the most important industrial products and useful explosive agents was being gradually but firmly secured for it, step by step, by the talent and untiring energy of a single individual.

Almost from the day of its discovery, the fortunes of gun-cotton continued to fluctuate, and much adversity marked its career, until at last its properties became well understood, and its position as a most formidable explosive agent, applicable on a large scale, with ease, great simplicity, and with a degree of safety far greater than that as yet possessed by any other substance of this class, has now become thoroughly established. Since the lecturer last discoursed on the properties of gun-cotton, seven years ago, this material has attained a firm footing as one of the most formidable agents of defence and offence. For all military engineering operations, and for employment in submarine mines and torpedoes, compressed gun-cotton, stored and used in the wet condition, has become the accepted explosive agent in Great Britain; within the last five years upwards of 550 tons have been manufactured for this purpose, and are distributed over our chief naval stations at home and abroad. Germany some years since copied our system of manufacture and use of gun-cotton; France has provided itself with a large supply for the same purposes, and Austria, where the acquisition of bitter experience of the uncertainty of gun-cotton in the earlier stages of history, naturally gave rise to a persistent scepticism regarding its present trustworthiness, appears now also about to adopt wet gun-cotton for military and naval uses.

But while the usefulness and great value of compressed gun-cotton in these important directions has been established, its technical application has made but slow progress as compared with that of the simple nitro-glycerine preparation known as dynamite, which, in point of cost of production and convenience for general blasting purposes, can claim superiority over compressed gun-cotton. Already in 1867 a number of dynamite factories, working under Nobel's supervision, existed in different countries; in that year the total quantity manufactured amounted to eleven tons; in another year the produce had risen to seventy-eight tons; in 1872 it had attained to 1350 tons. Two years afterwards the total production of dynamite was nearly trebled, and in 1878 it amounted to 6140 tons.

There are as many as fifteen factories in different parts of the world (including a very extensive one in Scotland) working under the supervision of Mr. Nobel, the originator of the nitro-glycerine industry, and some six or seven other establishments exist where dynamite or preparations of very similar character are also manufactured.

How far the rate of production of dynamite will be affected by the further development of the value of Nobel's new preparation, the blasting gelatine, it is difficult to foresee, but there appears great prospect of an important future for this very peculiar and interesting detonating agent.

It is hoped that the subjects dealt with in this discourse afford interesting illustration of the intimate connection of scientific research with important practical achievements.

TINCTURE OF KINO.*

BY R. ROTHER.

The tendency which many tinctures, fluid extracts, and other solutions have to deposit a bulky sediment; of ointments to rancidify, and even of syrups to ferment and otherwise change, cannot compare in point of annoyance with the disposition of tincture of kino to gelatinize. It would be idle to relate the numerous inefficient devices that have been resorted to in order to circumvent this change. The writer once entertained the theory that the cause of the transformation resides in a septic movement transmitted by a soluble septase originally present in the gum, or imparted to it by some extraneous organism. To exclude this or nullify its action, the writer proposed the application of the strongest alcohol, and also by increasing the material strength of the tincture. Owing to the fact that the different varieties of kino do not possess the instability in a like degree, the writer for a time believed he had found the true remedy. But on a later occasion, a concentrated tincture (1 in 4) solidified with surprising rapidity, and thereby demonstrated that neither strong alcohol nor a high degree of concentration can obviate the change. The writer then thought that to light might, perhaps, be ascribed the cause of the phenomenon, especially since a dark bottle partially filled with officinal tincture, whilst remaining in a closet protected from light, had for a long time retained its contents intact, but on being removed to another receptacle and exposed to diffused daylight, the tincture speedily gelatinized. It was, however, proposed to test this thoroughly, and in order to ascertain what possible influence the atmosphere might also exert, the writer on the 12th day of January, 1878, prepared eight fluid ounces of U.S. officinal tincture of kino, by maceration and filtration through starch. Four fluid ounces of this was poured into a pint bottle, and set away, exposed to diffused light, this was marked No. 1. No. 2 was a half-ounce phial filled with the tincture and tightly corked. No. 3 was a two-ounce phial, loosely corked, containing one fluid ounce of the tincture. No. 4 was the same as No. 3, with the addition of one grain of benzoic acid. No. 5 was a two-ounce phial containing half a fluid ounce of the tincture and half a fluid ounce of water. No. 6 was a duplicate of No. 3, kept in a dark closet, preserved from light. Nos. 2, 3, 4 and 5 were so situated that, during part of every day when the sun was shining, they were exposed to the direct rays.

On the 23rd of May, 1878, the contents of No. 1, which had in the meantime been occasionally shaken and given fresh air, showed signs of becoming viscid. To find what effect ammonia would have on it at this stage, half a fluid ounce was mixed with three drops of aqua ammoniæ. It gelatinized instantly. The remaining tincture of No. 1 now gradually thickened, and by the end of July had set to a firm jelly.

At the 10th of April, 1879, no change had yet occurred in No. 2. No. 3 was barely fluid. No. 4 was a thick jelly. No. 5 was quite fluid, showing a slight tendency to viscidness. No. 6 was a thick jelly.

In the course of observing these indications, it was decided, on the 5th of February, 1879, to make a second experiment, and to this end eight fluid ounces of tincture of kino was prepared by maceration; double the officinal strength in kino, but with a menstruum composed of one part by measure of strong alcohol and three parts water.

* From *New Remedies*, July, 1879.

One-half of this, marked No. 7, was placed into a twelve-ounce wide-mouthed bottle, loosely stopped, and so disposed of as to stand, at intervals, in direct sunlight. The other half, marked No. 8, was diluted with an equal measure of its menstruum, and stored away in a pint bottle under similar conditions to No. 7.

Both No. 7 and 8 were frequently shaken and exposed to fresh air by removing the stoppers of the bottles. At the 18th of May, 1879, No. 7, which had for some time back been thickening by imperceptible degrees, became firmly gelatinous. But No. 8, at the present writing, shows no signs of viscid tendency. No. 2 has also remained *in statu quo*. No. 5 has now became quite syrupy, and all the others have become more firmly solid.

Now, on reviewing these results, it appears that No. 2, although having been freely submitted to the action of light, but securely shielded from the access of air, has remained in prime condition. Nos. 1, 3, 4, 6 and 7 prove that the contact of air has caused their alteration. No. 4 indicates that benzoic acid hastens the change. No. 6 gives evidence that air without light is as active as with it, and, in conjunction with No. 2, confirms the non-intervention of light. Nos. 5 and 8 plainly point out that a tincture weak both in kino and alcohol is the most permanent in the presence of air. No. 7, together with the strong tincture first cited (1 in 4), demonstrate that a concentrated tincture of kino, especially when prepared with a strongly alcoholic menstruum, is the most unstable form.

It appears, therefore, that the gelatinous condition is due to an oxidation product. The ramifying propensity of this insoluble substance causes it to pervade the liquid with invisible filaments and thus produce the impression of homogeneity. On the appearance, however, of the slightest trace of viscidity, the addition of water precipitates the gelatinous body in purplish flakes, which rapidly subside, leaving a red supernatant solution.

The abundant supply of air in the large bottles has promoted the transformation at a higher rate, as will be seen from the experiments, the tinctures in the smaller phials requiring a proportionately longer time to undergo decomposition. When the tincture is yet homogeneous, the liquid adhering to the walls of the vessels, after agitation, all runs down again, but after the alteration has begun, much of the liquid permanently adheres, the insoluble matter, owing to its uneven contraction, giving the residue after drying a peculiar veined appearance. The partially gelatinized tinctures cannot be filtered, the viscid body retaining the liquid portion. The semi-congealed fluid, however, on drying, yields a compact residue, from which alcohol or water readily removes the soluble parts. In fact, it seems as though much of the kino of the market is the residue of a partially gelatinized juice, and it is probable that the instability of some tinctures is partly chargeable to this altered gum. The success that is claimed to attend the U.S. officinal method of preparing the tincture, that is, the percolation through sand, may be accounted for by the fact that this very faulty operation sacrifices a large proportion of the gum by agglutination amidst the sand, and thus yielding a weak percolate, such a solution having, according to the writer's experiments, elements of more stability. A trial of oxidation with potassium permanganate was made, but since this agent in contact with organic matter always gives a precipitate of manganese dioxide, its effect in this instance was not easily judged. Still a weak solution of permanganate acidulated with acetic acid poured into the tincture produced a precipitate which, although it may have been contaminated with dioxide, yet had great resemblance to the curdy, flesh-coloured mass thrown down by water from the tincture in an advanced state of change. In conclusion, the expression for the sum of the foregoing results is, that tincture of kino is best prepared by maceration with a weak alcohol and then preserved in small phials, well filled and securely stopped, so as to exclude the action of the air.

ASPHALTUM AND AMBER FROM VINCENTOWN, NEW JERSEY.*

Mr. E. Goldsmith reports that he had received from Col. T. M. Bryan a specimen of asphaltum, a mass of which, weighing about 100 pounds, had been found in the ash marl, a layer above the green sand proper, about 16 feet from the surface, in the neighbourhood of Vincentown. It seems that this peculiar hydrocarbon had not been observed in the State of New Jersey before; at least no mention of it is made in the geological reports up to 1868. The specimen presented to the Academy had attached on one side a layer of the marl in which it was found.

As the material in question is properly considered a mixture of various hydrocarbons, it seems to be obvious that the properties vary according to the predominance of one or the other substance contained therein. This kind is very brittle, black, with a resinous lustre. Its fracture is uneven, inclined to conchoidal; the streak and powder appear brown. It melts easily in the flame, like wax, and burns with a yellow smoky flame, leaving, after burning, a voluminous coal and but little ashes. In water, alcohol and solution of caustic potassa, it is not soluble. It dissolves in chloroform and in oil of turpentine. In ether it dissolves with difficulty, forming a yellowish-brown solution by transmitted and a dirty greenish solution by reflected light. Oil of vitriol dissolves it into a black liquor, which, when poured into water, shows that a part of the substance is retained in solution, whilst another subsides as a dark-coloured powder. Nitric acid reacts on the substance at an elevated temperature, forming therewith soluble products of oxidation.

Not far from the pit from which the asphaltum had been obtained a specimen of yellow mineral resin was found. It occurs frequently in the marl of the cretaceous formation, but not regularly; sometimes hundreds of tons may be looked over without finding a single piece; at other times enough has been found to fill a barrel within a day. It is usually known under the name of amber or succinite.

It differed in several particulars from the typical amber found at the bottom and on the coast of the Baltic Sea. Our specimen is lighter than water, whilst the amber from the Baltic is specifically heavier. The latter fuses into a thick sluggish fluid, the Vincentown amber into a very fluid mobile liquid; the cohesion of the Baltic product is stronger than in the specimen in question. These differences indicate its analogy to the variety of succinite called Krantzite by C. Bergeman, who reported its occurrence near Neuberg, Germany.

It melts on heated platium foil into a brown liquid, which runs like water. It takes fire easily, and burns with a yellowish, strongly-smoking flame, leaving but little coal, which rapidly burns away and leaves a small quantity of dark-coloured ashes as a residue. Heated in a closed tube it melts and vaporizes into a grey cloud, which condenses easily into an oily liquid and some small crystals, which are probably succinic acid. The odour of the fumes is strongly penetrating, like acrolein. In water, alcohol or ether it seems to be but sparingly soluble. In chloroform, bisulphide of carbon and in oil of turpentine it dissolves freely. Oil of vitriol makes with it a red solution. Cold nitric acid seems not to affect it much. On warming, the yellowish powder becomes orange-red. It is partly dissolved by caustic potassa. In this yellowish-brown Krantzite Mr. Goldsmith noticed on a fresh fracture a row of white crystals, arranged in radiating groups. The crystals were too small for mechanical separation, but the opinion was expressed that they were succinellite.

* From the *Proceedings of the Academy of Natural Sciences of Philadelphia*, February 25. Reprinted from the *American Journal of Pharmacy*, July, 1879.

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MEDICAL LEGISLATION AND ITS RELATION TO PHARMACY.

To those who have followed the proceedings of the Select Committee on the Medical Acts Amendment Bill it will probably be no surprise that this inquiry is still without any definite result. It is true the Committee has concluded its proceedings and has agreed to its report, but at the same time it has decided that, taking into consideration the conflict of evidence and the impossibility of completing the investigation of the subject during the present session of Parliament, much yet remains to be done. Consequently, the Committee has determined to report on the evidence taken up to the present time without comment and to recommend that the inquiry be renewed in the next session of Parliament.

So long as the settlement of the questions raised by the Medical Bills now before Parliament remains unachieved, chemists and druggists will naturally feel some considerable interest in the progress of the measure by which it is sought to ameliorate the position of medical practitioners. It would be unwise for them to ignore the fact that certain members of the medical profession are desirous of imposing restrictions upon the chemist and druggist which could not be enforced in regard to other members of the community, and therefore any expression of opinion upon the relations between the two classes is deserving of careful consideration.

The recent decision of the Birmingham County Court Judge, in the case of the Society of Apothecaries *v.* HARRISON, has furnished the *Medical Press and Circular* with an opportunity of reverting to the subject of counter prescribing and medical dispensing, and in the main the conclusions arrived at are far from being such as to justify dissatisfaction on the part of the chemist and druggist. The view expressed at the outset of the article that chemists and druggists had been transported into a fool's paradise by the result of the SHEPPERLEY case is, however, one we cannot concur with, and we regard it rather as the indication of a habit of mind than as having any more important significance. The representation of the decision in the SHEPPERLEY case as being "half favourable" to the right of chemists and druggists to prescribe across the counter is at best unsupported by any foundation of fact. If it was a decision having reference to the question whether chemists and druggists possess such a right, it was unquestionably a decision in their favour altogether. But we have always looked upon this unhappy case as being one that could not possibly decide anything. The unquestionable fact that the complaint for which the pretended patient in that case sought prescription from the chemist and druggist was a "bogus" complaint entirely destroyed any value the case might have had as a test case, and the evidence of Mr. SHEPPERLEY as to his impression respecting DEATH's ailment sufficiently shows that he suspected being trifled with.

It seems, therefore, absurd to say, as the writer in the *Medical Press and Circular* does, that by the decision given in the SHEPPERLEY case, chemists and druggists were lulled into a "gratifying sense of security" as regards counter prescribing. Allowance may fairly be made for the representations of those more immediately connected with the conduct of the defence, and all things considered they may well be excused for indulging in a blast of trumpets, and the proclamation of a great victory. All this may be tolerated as akin to the loud voiced laudation with which a showman proclaims the wonders of the objects to be seen within his booth. But after all this had been got over, it was still obvious that in any case of prosecution under the Apothecaries Act the real question would be first, whether the individual prosecuted had acted as an apothecary, and second, whether in so acting he had kept within the privileges secured to chemists and druggists by the 28th section of the Act.

As regards the first question it appears that juries no less than judges are disposed to be guided in their decision by their estimate of the nature of the case treated. If that was of a "trivial" nature the decision would be in favour of the defendant. In SHEPPERLEY's case the decision was in this direction, because no disease was treated. If, on the other hand, the nature of the case treated was serious, or what is still more important if the ultimate issue of it was fatal, the tendency of jury and of judge has been to regard its treatment as coming within the terms "acting as an apothecary," and on that ground to give a decision against the defendant.

And then in considering the further question whether the particular instance of "acting as an apothecary" was within the privilege of chemists and druggists according to the 28th section, the vagueness of the terms of that section and the uncertainty what was to be comprised in the exemption it gave would be in most cases likely to result unfavourably to the defendant.

The decision in the Birmingham case is distinctly of this latter kind; it does not in reality touch the question whether a chemist and druggist or any other man has or has not a right to administer or recommend to others medicine for the relief of their ailments; but it simply decides that the case treated was of a serious if not dangerous nature, and that consequently the defendant was infringing the Apothecaries Act by acting as an apothecary.

It seems therefore mere idle assertion to state that by this decision "the gratifying sense of security" created by the decision given in the SHEPPERLEY case "has been rudely broken." No sense of security was ever called into existence by the decision of the SHEPPERLEY case and the decision in the Birmingham case does not in any way differ in its effect from the views expressed as to the Apothecaries Act by the judges upon other occasions.

But in the *Medical Press and Circular* the decision of the Birmingham County Court Judge is represented as being conclusive as to the chemist and druggist never having had any legal right to advise or prescribe, and satisfaction is expressed in the same unfounded way that the decision in the SHEPPERLEY case was held by the opposite party to be a victory. The true foundation of the County Court Judge's decision is, however, too apparent to be overlooked, and consequently the satisfaction to be derived from its assumed significance is considerably less than it might have been if the assumption were correct.

The limitation of illegality to such instances of prescribing as relate to serious cases, is so obviously and clearly the ruling principle of the decision given by the Birmingham County Court Judge that even the writer in the *Medical Press and Circular* cannot avoid saying the decision affords reason for inferring that a chemist and druggist may legally advise and prescribe for any patient who at the time is not "seriously" ill. The possibility of such an inference may be "altogether unsatisfactory" to some medical men who hold the views of the writer in the *Medical Press and Circular*, but all the judicial dicta concerning the Apothecaries Act agree in furnishing ground for the same inference. According to their views it is only the "serious" nature of the ailment treated, and to some extent also the mode of procedure for its treatment, that determines whether the treatment comes within the term "acting as an apothecary," and whether it is to be dealt with as a breach of the law.

We cannot therefore agree with our contemporary that the decision of the Birmingham County Court Judge is a *reductio ad absurdum* because it was based upon a consideration whether the case prescribed for was "serious" or of a "trivial" nature. On the contrary, that is the very essence of the distinction between what may and may not be done. The line of demarcation may not be very definite, but that is one of the difficulties of the matter that is to be faced and dealt with by the exercise of individual discretion, no less on the part of those who seek to prevent improper exercise of medical functions, than by the chemist and druggist who is called upon in the ordinary exercise of his business to be useful in recommending his wares for the relief of his customers' ailments.

We are glad, however, to find our medical contemporary looks hopefully forward to the entire severance of pharmacy and medicine as the best remedy for the discord and ill feeling that have prevailed between medical practitioners and chemists and druggists as to counter practice. Speaking of the recent proceedings of the Rochdale Chemists' Association they are characterized as constituting a decided advance in that direction, and with the view of giving some strength to the movement it is pointed out that the complete separation of pharmacy and medicine is working with perfect success in Ireland. There it is stated very few practitioners in the large towns ever think of dispensing their own medicines, and even in country places no one does so who can possibly supply his patients with their medicines in any other way.

The result is that the time and freedom of mind gained by the practitioner by tabooing personal connection with dispensing more than compensates in earning power for the profits he would derive from making up mixtures, lotions and pills, while at the same time he enjoys the advantage of getting his fees paid in cash at once and avoids the keeping of books, the furnishing of bills at Christmas or Easter.

We entirely join our contemporary in hoping that in this country also the medical practitioner will eventually devote his energies to the use of the tools which the pharmacist places in his hands, and that the pharmacist may be able to content himself with producing medicines of the best attainable quality so as to render the republic of medicine a co-operative compact for the mutual benefit of the parties who have been injuring themselves and each other by an unmeaning contention.

SALE OF POISONS IN INDIA.

WE learn from the *Delhi Gazette* that an attempt is being made to obtain legislation to regulate the sale of poisons in India. The movement has been originated by Mr. BILNEY, chemist to a firm of druggists in India, who proposes the establishment of a Pharmaceutical Society, one of the rules of which should be that no medicine shall be dispensed or poison sold by other than legally qualified men, who shall have been examined by a Board appointed by Government. The *Delhi Gazette* in wishing Mr. BILNEY success in his enterprise expresses an opinion that some law of this description is certainly needed.

BRITISH ASSOCIATION.

THE meeting at Sheffield will commence on the 20th inst., and as we learn from a circular issued by the local secretaries, arrangements are being made for a number of attractive excursions to places of historical and scientific interest. Facilities will also be afforded to visitors attending the meeting for seeing various interesting manufacturing operations, such as the rolling of armour plates, BESSEMER steel making and electroplating. In this respect the present meeting will have especial interest.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN EDINBURGH.

July 22, 23 *and* 24, 1879.

Present on each day—Messrs. Ainslie, Borland, Gilmour, Kemp, Kinninmont, Stephenson and Young.

Professor Maclagan was present on the 22nd on behalf of the Privy Council.

MAJOR EXAMINATION.

July 22.

Three candidates were examined. *Two* failed. The undermentioned passed, and was declared qualified to be registered as a Pharmaceutical Chemist:—

Russell, James Lawson ....Edinburgh.

MINOR EXAMINATION.

July 22.

Thirteen candidates were examined. *Seven* failed. The following *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Bain, John..........................Edinburgh.
Bottomley, Albert Frederic ...Halifax.
Burrell, Thomas ....Montrose.
Clark, Adam Douglas ....Kelso.
Greig, James........................Glasgow.
Jones, John ....Liverpool.

July 23.

Thirteen candidates were examined. *Eight* failed. The following *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Jones, James Lewis..............Bangor.
Kelly, Hugh ....Kilmarnock.
Macdonald, Robert ....Edinburgh.
Palmer, Edwin Thomas ....Hammersmith.
Pigott, Samuel ....Manchester.

July 24.

Twelve candidates were examined. *Five* failed. The following *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Ramsay, David Robertson ......Dundee.
Robson, William Stubbs.........Scarborough.
Scott, John ....Newcastle-on-Tyne.
Simpson, Robert George.........Stowmarket.
Thomas, Thomas Gratton ......Bagillt.
Tidswell, Frederick ....Bradford.
Wilks, Charles Frederick ......York.

MODIFIED EXAMINATION.

July 24.

Three candidates were examined. *All* passed, and were declared qualified to be registered as Chemists and Druggists:—

Carter, John ....London.
Greenwood, Samuel ....Bradford.
Manners, John ....Newcastle-on-Tyne.

Proceedings of Scientific Societies.

SOCIETY OF PUBLIC ANALYSTS.

At a general meeting of this Society held at Burlington House, Piccadilly, on Wednesday, June 4th, the following papers, among others, were read:—

Note on the Examination of Spiritus Ætheris Nitrosi.*

BY A. DUPRÉ, PH.D., F.R.S.

Having at various times been asked for explanations as to the method I use for estimating the amount of nitrous ether contained in a sample of spiritus ætheris nitrosi, I take this opportunity of describing the method once for all. The principle of the method will be found in Duflos' 'Apothekerbuch,' edition 1867, p. 251, and I have simply worked out the details a little more fully. For the present I confine myself to the analytical method, and must leave many points of interest connected with the subject to some future time.

Spiritus ætheris nitrosi, as is well known, is directed to be prepared ('Brit. Pharm.') by distilling a mixture of spirit, nitric and sulphuric acids and copper, and mixing the distillate obtained with a certain proportion of spirit. If all the nitric acid employed were used up in the formation of nitrous ether, the proportion of such contained in the finished product, if two pints of spirit are added to the 15 ounces of distillate, would amount to about 6·5 per cent. In practice this result is, however, never obtained; and, according to my experience, we may consider a product containing 3 per cent. of nitrous ether as fairly representing the B.P. preparation.

In judging of the purity, or otherwise, of any given sample of spiritus ætheris nitrosi, B.P., the particular method of manufacture adopted in the preparation of the sample is, of course, perfectly immaterial; as long as it fairly corresponds in strength to the B.P. standard it must be considered as of the nature, substance and quality demanded, however produced.

Characters. B.P. Transparent, very slight tinge of yellow. Specific gravity, 0·845. Effervesces feebly, or not at all, when shaken with a little bicarbonate of soda. When agitated with a solution of sulphate of iron and a few drops of sulphuric acid it becomes olive brown or black. If it be agitated with twice its volume of saturated solution of chloride of calcium in a closed tube, 2 per cent. of its original volume separates in the form of nitrous ether, and rises to the surface of the mixture.

Further Tests of Purity. Should give no precipitate with nitrate of silver; absence of hydrocyanic and formic acids. A small quantity poured on a little water, and ignited, should leave an aqueous solution, which gives no precipitate with nitrate of silver; absence of hydrochloric ether, chloride of ethylene, etc.

The chloride of calcium test is not of much value. Firstly, because only those samples respond to it which are nearly of the proper strength, and no information is gained as to the composition of those samples, from which nothing separates, except of course that they are below the proper strength. Secondly, because the substance separating though chiefly, is not by any means only, nitrous ether. The iron test may be used as a rough quantitative test by using a sample of known strength for comparison, and it offers a very ready means, before a magistrate for example, to show the character of any impugned sample.

Estimation of Nitrous Ether. Ten cubic centimetres of the ether are introduced into a small flask already containing about 1·5 gram of solid potash hydrate. The flask is closed with a well-fitting cork, gently agitated from time to time to promote solution of the potash, and left standing over night. Next day the contents of the flask, more or less yellow according to the amount of aldehyde present, are washed into an evaporating basin with 50 c.c. of water, and the mixture evaporated on a water-bath to about half or one-third. The remainder is allowed to cool, filtered through a little glass wool into a beaker, made up to 300 c.c. with water, 50 c.c. of diluted sulphuric acid (1 in 4) are added, and the nitrous acid present determined by a standard solution of permanganate. This standard solution is prepared by dissolving 8·475 grams of pure permanganate of potassium (or its equivalent) in one litre water; 1 c.c. of this solution is equivalent to 0·01 gram of nitrous ether, and therefore indicates 0·1 per cent. of nitrous ether, if 10 c.c. of ether have been taken. The decoloration of the permanganate is rapid at first, gradually becoming slower. As soon as this is perceived not more than 0·5 c.c. are added at a time, and the process must be considered as at an end if the solution

* Reprinted From *The Analyst.*

still shows a distinct pink or red coloration two minutes after such addition. For every cubic centimetre of permanganate solution then used, the spiritus ætheris nitrosi contains, at a maximum, 0·1 per cent. of nitrous ether. The solution still continues to decolorize permanganate, though but slowly, and much more will have to be added before the coloration becomes permanent. I have however convinced myself, by many experiments, that all nitrous acid present is oxidized when the above indicated point is reached. No doubt other substances are oxidized as well, and the process indicates more nitrous ether than is actually present; but as the error is on the side of leniency, it is perhaps an advantage rather than otherwise. By following out strictly the directions here given, it will be found that duplicate analyses of a sample rarely differ more than 0·1 per cent. from each other; while, with poor samples, the agreement is even more perfect. Should a sample require much permanganate, and the solution, instead of becoming colourless, remains brown or yellow, more sulphuric acid must be added.

If, instead of evaporating and filtering the alcoholic solution, it is at once diluted, acidified, and permanganate added, more of the latter will be required than in the former case. In good samples the difference is sometimes great, but in most poor samples it is but slight, and in such case this more rapid process may be adopted. I have also tried the process of adding at once an excess of permanganate, letting stand five minutes and estimating the excess remaining, but the results given are decidedly too high. Various other methods have been proposed for the estimation of the nitrous ether, but I do not propose to enter into such, as the process given fulfils, I believe, all necessary conditions.

It is stated in most works on the subject that nitrous ether is rapidly decomposed and becomes acid. The latter statement is correct, as far at least as ordinary spiritus ætheris nitrosi is concerned, but the former is not in accordance with my experience. Spiritus ætheris nitrosi becomes acid mainly on account of the oxidation of the aldehyde it contains, while the nitrous ether present suffers but slow decomposition, at least when dissolved in spirit of sufficient strength. The following analyses will illustrate this. Sample I. was prepared by myself on February 21st, 1872, and has been kept ever since in a glass stoppered bottle (white glass) of one litre capacity, which it filled about half at first. About one half of the neck of the bottle was broken off early in 1872, so that the stopper does not fit very tightly since. The bottle stood on a shelf in the laboratory exposed to ordinary diffused daylight, but never to direct sunlight. On the bench below, and near to where the bottle stands, a Bunsen gas burner is frequently in use. Sample II. was bought as a sample of spiritus ætheris nitrosi ('Brit. Pharm.') from a well known wholesale house on December 2nd, 1873. It was contained in the ordinary pint bottle of green glass, and stood ever since in a cupboard of the laboratory, or in other words chiefly in the dark. Both bottles were frequently opened, and small portions of ether taken out in the intervals between the analyses given:—

No. of sample.	Date of examination.	Specific gravity.	Corresponding alcoholic strength.	Total acid free as acetic acid.	Real nitrous ether.
			Per cent. b. w.		
I.	Feb. 21, 1872	·836	84·8	0·10	2·00
I.	Nov. 15, 1873	·839	83·6	0·90	1·98
I.	April 23, 1879	·844	81·7	0·85	0·89
II.	Dec. 2, 1873	·824	89·5	1·19	1·35
II.	April 15, 1879	·847	80·5	1·38	0·96

We see, therefore, that even under somewhat unfavourable conditions the decomposition of the nitrous ether proceeds but slowly, and the plea sometimes advanced by chemists that the sample of spiritus ætheris nitrosi obtained at their shops, and found wanting, had been kept for some time and had decomposed, may safely be set aside as untrue.

In conclusion, I give the analyses of a number of samples, every one of which was bought as spiritus ætheris nitrosi ('Brit. Pharm.'), and should therefore have had a sp. gr. of 0·845, and contained about 3 per cent. of nitrous ether. All, except the last, were, however, bought before the present Sale of Food and Drugs Act came into operation. The last sample was supplied to the Westminster Hospital early in April, 1879. The bottle containing it, a Winchester quart, was labelled "Spiritus Ætheris Nitrosi, Brit. Pharm., sp. gr. 0·845." The bottle was quite full, and had not been opened at the Hospital, the stopper being still tied over with bladder when I took the sample on April 23rd, 1879.

Specific gravity.	Corresponding alcoholic strength. per cent. b. w.	Total free acid as acetic acid. per cent.	Real nitrous ether. per cent.
0·908	54·05	0·42	0·23
0·913	52·0	0·39	0·19
0·851	79·	0·09	0·06
0·892	61·5	0·32	0·38
0·854	77·7	0·47	0·44
0·936	41·8	0·41	0·10
0·851	79·	1·14	1·30
0·928	45·6	0·33	0·25
0·852	78·5	0·28	0·07
0·848	80·	1·28	1·40
0·849	79·7	0·96	0·52

Mr. Hehner suggested that the direct addition of iodide of potassium would give a much fairer measure of the quantity of nitre present. He would add acetic acid and iodide of potassium, which both Dr. Muter and Mr. Wigner said they thought was a very good idea.

The Estimation of Ethyl Nitrite in Spiritus Ætheris Nitrosi B.P.

BY JOHN MUTER, PH.D., F.C.S.

I have been in the habit of using a saponification process for this spirit, but I work in a manner somewhat different from that used by Dr. Dupré, which I think possesses several advantages. The solutions I use are:—

(1). Decinormal solution of hyposulphite of soda (sodium thiosulphate), made exactly according to the directions of the British Pharmacopœia, each c.c. of which =·0127 free iodine.

(2). Solution of potassium permanganate, containing 3·175 grams per litre, and checked to balance the "hypo." solution, by adding excess of saturated solution of potassium iodide to 100 c.c., and then seeing that the iodine set free exactly requires 100 c.c. of "hypo." for complete decolorization, starch paste being added as an indicator towards the end of the process.

I first take the specific gravity of the sample at 60° Fahr., and I then measure out 10 c.c. of the spirit for analysis. This I digest with sufficient potassium hydrate in a small strong glass flask, closed by a cork, through which passes a bent delivery tube, dipping under a column of mercury in a test tube, of such a height as will enable me to heat gently on a water-bath under pressure without bursting the flask. This point is ascertained by a blank experiment, during which the flask is wrapped in a cover to prevent accident; and once arrived at, the same flask and mercury column are always employed. After digestion under pressure with frequent agitation for some time (an hour being usually ample), water is added, and the contents of the flask evaporated in a basin until no smell of spirit is perceptible. The residual liquid having been rendered *just neutral* with sulphuric acid, is filtered into a flask containing 75 c.c. of permanganate solution, previously diluted to 200 c.c. with water and acidulated with 20 c.c. dilute sulphuric acid (1 in 3), and the flask having been corked is left for half an hour. At the end of that time excess of saturated solution of potassium iodide is added (which should produce a clear deep orange solution), and the whole brought under a burette containing the hyposulphite solution and titrated. The number of c.c. of "hypo." used is deducted from the number of c.c. of permanganate put in, and the difference multiplied by ·00375 gives the amount of ethyl nitrite in the 10 c.c. taken for analysis, and if this be multiplied by 100 and divided by 10 times the specific gravity of the original spirit, the answer will be the percentage of ethyl nitrite by weight. In working with spirits of unknown strength it is advisable to put only 20 c.c. of permanganate into the flask at first, diluted and acidulated as directed, and then if all the colour disappears under five minutes, to add 5 c.c. more at a time, until a permanent colour is obtained, lasting five minutes, when the addition of another 5 c.c. will suffice before setting aside for the half hour. In a good spirit it is sufficient to take 5 c.c. for analysis, and to use 35 to 38 c.c. permanganate.

I am the more inclined to believe in the accuracy of this method, because I have found, by experiment, that the action of potassium nitrite on permanganate is not thoroughly trustworthy under half an hour. Ethyl nitrite is, however, much more rapidly affected, and I am at present engaged on a process whereby saponification is entirely avoided, and the whole thing does not occupy more than ten minutes. Until I publish this, I reserve my results on the actual constitution of the spirit, and the loss it undergoes by keeping. I am not at all clear that we should depend entirely on the ethyl nitrite alone for the real value of this medicine, and my other method depends on the estimation of the aldehyd and other bodies present in the article when properly made according to the official process.

The following are some analyses of pure spirits (specially made for me by Mr. Phillips—of Messrs. Knowles and Phillips—strictly by the B.P. process, and answering the gravity and separation tests of that authority), which were recently performed by one of my advanced students, Mr. Luther Scammell:—

Sample	No. 1	contained	3·05	ethyl	nitrite
"	" 2	"	2·91	"	"
"	" 3	"	2·96	"	"
"	" 4	"	2·85	"	"
"	" 5	"	2·89	"	"
"	" 6	"	2·93	"	"

I always prefer to do a blank experiment, using 20 c.c. pure rectified spirit, and the same weight of potassium hydrate as I use to the ether, and check it side by side with the sample experiment. In practice I use about two grams KHO and add 10 c.c. of rectified spirit, which aids its solution and helps saponification of the ethyl nitrite. I have also often used for the saponification a small flask fitted to a well cooled upright condenser, and worked at the boiling point; but I find the simple arrangement above stated does just as well.

SOCIETY OF ARTS.

The History of Alizarin and Allied Colouring Matters, and their Production from Coal Tar.*

BY W. H. PERKIN, F.R.S.

(*Continued from page 78.*)

We see, then, that when ordinary sulphuric acid acts upon dichloranthracene, that we get a mixture of the mono and disulpho acids of anthraquinone; the latter, however, greatly preponderates. The product also contains a considerable quantity of free sulphuric acid, which it is necessary to remove; this is done by means of slacked lime, with which it forms a nearly insoluble sulphate, and at the same time neutralizes the sulpho acids, forming soluble lime salts. We conducted this operation in the following manner:—

The crude sulpho acids from the iron pots were diluted in a large wooden tank, and boiled by blowing steam into it. Slacked lime in a wet state was then added by degrees, with constant stirring, until the product was neutralized. Wooden tubs, with mechanical stirrers, were afterwards substituted for the tanks, but by using Korting's steam jet air injectors all stirring arrangements may be dispensed with.

The neutral product was then run into the vacuum filters, to separate the sulphate of lime, the clear filtrate passing into the exhausted receivers. The filters consisted of large shallow wooden tanks, on the bottom of which bricks were laid about three inches apart, so as to form channels, and on the top of these some more bricks, placed side by side so as to form a floor. A layer of about three inches of small pebbles was spread upon this, and then about three inches of washed sand. This filtering medium was protected by a coarse canvas, kept in its place by a wooden framing.

Two iron reservoirs, in which a vacuum could be produced by means of an air pump, were connected with these filters, and so arranged with stopcocks that the filtrate might be passed either into the one or the other. One receiver was kept for the first, and, therefore, the strong filtrate and the first washings of the sulphate of lime. These were made with weak liquors from a previous operation. The further washings were made with boiling water, and were drawn into the second receiver. To get all the useful product out of the sulphate of lime, it was necessary to remove it after it had been well washed, boil it with water and again pour it into the filter. It should always be tested before it is thrown away. A great number of these filters were arranged side by side.

The strong lime salts of the sulpho acids in the first receiver thus obtained were concentrated in iron pans, heated either over a fire or by steam, until they contained about 15 per cent. of lime salts. Soda crystals (sodic carbonate) were then added in sufficient quantity to precipitate all the lime as carbonate, and thus to produce sodic salts of the sulpho acids. These were syphoned off from the carbonate of lime, and concentrated until they contained about 30 per cent. of sodic salts.

This product, which is technically called "soda salt," consists of at least three compounds, by far the principal one being the β disulphanthraquinonate, which yields anthrapurpurin. On standing, the α disulphanthraquinonate separates out with some of the β. The third salt is the sodic salt of monosulphanthraquinonic acid; but, curiously, this salt, which, when pure, is difficultly soluble in water, remains in solution. There is undoubtedly a small quantity of other salts present, some of which are probably derived from sulpho acids of the impurities of the dichloranthracene, but are of no interest to the colour maker. The three salts just mentioned are also formed when anthraquinone is used instead of dichloranthracene. They are sometimes separated, so that the different colouring matters they produce may be obtained in a more or less pure state.

The next operation consists in the conversion of the product just described, and called "soda salt," into colouring matter. This, it will be remembered, is effected by heating it strongly with caustic alkali. This operation we found difficult to perform on the large scale. First of all, it was necessary to keep the heating within certain limits. If too high a temperature were employed, the product was destroyed; if too low, the colouring matter was not formed, or only partially, and, consequently, a small yield resulted.

In the laboratory the experiments on this subject were performed in an air-bath, the products being heated in metallic dishes, a mixture of "soda salt" in a dry state with a saturated solution of the alkali being taken, caustic potash, caustic soda and mixtures of these alkalies being used, and it was considered that caustic potash gave, on the small scale, the best yield of colouring matter.

* From the *Journal of the Society of Arts.*

A mixture of caustic alkali and "soda salt," when heated to about 180° C., soon changes in colour, becoming blue, violet and then appearing as a black mass. As the water evaporates it also becomes pasty. On testing this, it is found to have decomposed so far as to form sulphoxyanthraquinonic acid. To complete the reaction the heating has to be continued for a considerable time.

To carry this process out very many experiments were made, and often with only partial success. One method we tried consisted in employing a long chamber, heated with flues to the requisite temperature, and arranged on the same principle as the ovens used for the continuous baking of fancy biscuits. It was hoped that by introducing shallow iron trays, with the mixture of soda salt and alkali in thin layers, and gradually working them forward to the other end of the oven, that by the time they had arrived there the decomposition would be complete, and thus a continuous method might be established.

This succeeded in a measure, but the time required to keep the mixture in the oven was too long to make it work continuously; moreover, it was found difficult to keep the temperature sufficiently uniform, and local overheating at times occurred, destroying the product.

Another apparatus we tried consisted of a large wrought iron cylinder, which was made to revolve inside a second, but fixed, cylinder of thick cast iron, sufficiently large to allow of an air space of several inches between it and the interior cylinder. This was heated so as to form a hot air chamber, the temperature being carefully regulated and observed with a thermometer. The axis of the revolving cylinder was hollow and perforated with small holes, so that the steam, evolved from the mixture of caustic alkali and soda salt with which it was charged, could freely escape. In this arrangement the heating was very satisfactory, but the operation took a considerable time, especially if the charge were large. Iron cannon balls were afterwards introduced, to keep the mass well mixed; but, curiously, they did not answer the desired purpose, as they became coated to such an extent with the alkaline mixture that when the operation was over they were found to be three or four times as large as when put in. Anthraquinone was found to sublime from this apparatus, and in a smaller one, which was overheated, anthracene was obtained.

This apparatus, although a considerable improvement, was not perfect, a good deal of sulphoxyanthraquinonic acid being often found in the product. However, some considerable quantity of colouring manner was manufactured in it.

Experiments were then made in closed iron tubes, with the products mixed with water. It was assumed that if an excess of alkali were used and a sufficiently high temperature that the presence of water would not interfere with the result. Curiously, this was found not to be true, or only partially so, and it was found that if the caustic alkali and soda salt were in a considerably diluted condition very little colouring matter was formed; the mixture, instead of becoming violet, was of a brown, or chocolate colour, and contained, as we now know, chiefly intermediate products, such as isoanthraflavic acid. On using less water, however, so that the mixture would contain about 25 per cent., or more, of caustic alkali, colouring matter was readily formed.

After experimenting for some time in closed iron tubes, capable of holding ten or fifteen gallons, some larger apparatus was set up. As it was necessary that this should bear a very considerable pressure, we selected sections of Howard's patent safety boilers, which were made of 10-inch drawn iron tubes. At the end of the horizontal tube of this arrangement there is a hole, about four inches in diameter, fitted with a cap, fastened on with screws, and made tight with a vulcanized washer. This hole was used for cleaning out the apparatus. At the other end there is a smaller hole, into which a pipe was screwed and connected with the necessary stop valves and pipes. It was charged and discharged through this aperture. At the top it is provided with a pressure gauge, safety valve and steam cock.

To heat these "pressure tubes," as they were technically termed, we employed a hot air chamber, in which flues passed underneath and at the sides. A thermometer was suspended through a hole in this chamber, and, in case of the temperature rising too high, iron doors in the side were provided, which could be opened so as to quickly admit cold air.

The pressure tubes were charged by gravitation from the floor above, and when the operation was completed their contents were forced up, by the pressure of steam in them, into iron tanks on the top floor of the building, so that all succeeding operations could be performed by gravitation.

The product thus obtained is an intense purple fluid, becoming thick on cooling. It consists chiefly of colouring matter, in combination with soda, of sodic sulphite, and a large quantity of caustic soda. To separate the colouring matter from this purple solution it is first diluted and then acidified.

We performed this operation in large wooden tanks, lined with lead, and called "precipitating tanks;" these were provided with steam pipes; three cocks were also inserted into the front sides of them. A quantity of sulphuric acid being first diluted in these tanks, the purple solution, when gradually run in, becomes orange in colour, owing to the separation of the artificial alizarin as a yellow precipitate; it also froths up, from the evolution of sulphurous acid, which was carried into the atmosphere by means of wooden funnels. If too little acid had been put into the tank some more was afterwards added.

When the operation is thus far completed, the steam should be turned on and the product in the tanks well boiled for about an hour, the object being to make the colouring matter more granular than it is when freshly precipitated, so that the next operation may be facilitated.

After being allowed to cool and settle during the night, the yellow supernatant liquor* can be run off from one of the side cocks. For these liquors we provided large tanks on the ground floor; some water was then run into the precipitating tanks, and then their contents were allowed to flow out on to the filters on the first floor.

These "colour filters," as they were termed, were fitted up in a similar manner to those employed in filtering the lime salt of the sulpho acids of anthraquinone, and were also provided with an exhausted receiver, so that the colouring matter could be washed rapidly. As the first drainings always passed quickly through the filters, they were run into the tanks on the ground floor.

The object of these tanks was that any colouring matter which might have run away mechanically, or separated out on the further cooling of the liquors, would be saved. These tanks were emptied when necessary to within about a foot of the bottom, the colouring matter being removed from time to time, when sufficient hasaccumulated to make it worth the trouble. But to return to the colouring matter on the filters. To fit it for the market, it must be repeatedly washed until nearly perfectly free from saline matter, and neutral to test paper. It is then allowed to drain for some time and afterwards removed to the stock tub.

As we collected the artificial alizarin from the filters, we used to transfer it to a truck, capable of holding several hundredweight of this product, and running on rails. It was weighed before being filled, and again afterwards. It was then wheeled over the large stock tub,

* Herr Glaser has separated from these an acid which has been examined by Graebe and found to consist of a sulpho acid of alizarin.—*Deut. Chem. Ges. Ber.*, 1879, p. 571.

capable of holding several tons, and emptied into it by withdrawing a plug. It was then again re-weighed, filled, weighed and emptied, and this process continued until the stock tub was suffiiciently full. The sum of the weight of the colouring matter from the truck gave the amount s tocked.

The colouring matter then requires to be thoroughly mixed, either by hand or other agitators, and, when perfectly homogeneous, a sample is taken out and tested. As the artificial alizarin is always put into the stock tubs in a concentrated state, when its strength is known, water is added, to reduce it to the proper standard. As a precaution it is then re-examined, and if found of the proper strength, is drawn off into casks and sent to the consumer. There are always several stock tubs, the number greatly increasing where many shades of artificial alizarin are produced.

Instead of the "colour filters," for washing and draining the colouring matter above described, filter presses are now very frequently employed, as they act much quicker. In these the artificial alizarin can be concentrated, until it contains thirty or forty per cent. of dry colouring matter; but this is not necessary, as it is usually sent into the market with about ten or eleven per cent., these being convenient strengths for the dyer. The value of the colouring matter may be determined by evaporating a weighed quantity in a dish, and when dry, again weighing. As it usually contains a little inorganic matter, the ash should be determined and weighed, but the more reliable method is to dye pieces of mordanted cloth, as in madder testing.

It will now be necessary to go back again a little to the formation of the colouring matter from the soda salt.

I have mentioned the various changes through which the monosulpho and disulpho compounds of anthraquinone go when being converted into colouring matter. In the case of monosulphoanthraquinone, it will be remembered that monoxyanthraquinone is first produced; and in the case of disulpho acids, anthraflavic and isoanthraflavic acids are produced before the colouring matters.

As I have already shown, these substances, when converted into colouring matter by heating with caustic alkali, cause nascent hydrogen to form, which reacts upon other portions of them, reducing them to anthraquinone and hydroanthraquinone. The presence of this latter substance in the purple alkaline product from the pressure tubes is easily seen by exposing some of it to the air, when a film of anthraquinone will rapidly form.

As I mentioned before, this formation of anthraquinone and hydroanthraquinone represents loss of valuable products, which should have been converted into colouring matter, and it was, therefore, an important problem to solve as to whether it could be avoided. Success attended the experiments in this direction, and all that was found necessary was to introduce a quantity of potassic chlorate, containing enough oxygen to unite with the nascent hydrogen. The sodic monosulphoanthraquinonate theoretically requires 13·2 per cent; the sodic disulphoanthraquinonates, 10 per cent. In practice, three or four per cent. more is usually employed, but any large excess must be avoided. This improvement was discovered by J. J. Koch.*

By employing chlorate of potash in this operation, the yield of colouring matter is very materially increased, as would be expected from the foregoing experiments. From experiments I have made, it is doubtful whether it acts upon the sodic sulphite at all. The conversion of monoxyanthraquinone, isoanthraflavic acid, and anthraflavic acid, or their sodic derivatives, into colouring matter, may by this modification be represented thus—

$$\underbrace{C_{14}H_7(ONa)O_2}+NaOH+O=$$

Sodic monoxyanthraquinonate.

$$\underbrace{C_{14}H_6\left\{\begin{matrix}ONa\\ONa\end{matrix}\right\}O_2}+OH_2$$

Sodic alizarate.

$$\underbrace{C_{14}H_6\left\{\begin{matrix}ONa\\ONa\end{matrix}\right\}O_2}+NaOH+O=$$

Sodic isoanthraflavate or anthraflavate.

$$\underbrace{C_{14}H^5\left\{\begin{matrix}ONa\\ONa\\ONa\end{matrix}\right\}O_2}+OH_2$$

Sodic anthrapurpurate or flavopurpurate.

It is also found to be an advantage to use less water and more caustic soda. As this makes a very thick mixture, the pressure tubes previously described are not suitable for the operation, and instead of them very strong double rivetted boilers are used, about 11 or 12 feet long and 4 feet 6 inches wide. These are fitted with a stirrer, which is kept moving during the operation, and are fitted up practically in the same manner as the pressure tubes. They are, however, charged through the top manhole. The mixture with which they are charged is about as follows, the amount, of course, being in proportion to the size of the boiler.

A quantity of the soda salt previously described, and representing 100 parts of dry salt, is mixed with about 400 parts of caustic soda, dissolved in as little water as possible, and 15 parts of potassic chlorate. The mixture is best made in the boiler, the stirrer being kept moving all the time, to render it homogeneous.

If sodic monosulphanthraquinonate be used instead of the above soda salt, a little more potassic chlorate may be used, and somewhat less caustic soda, as a smaller amount of the latter substance is used up in the chemical reaction. The preparation of sodic monosulphanthraquinonate will be described further on.

The temperature used is about 170° to 180°, some manufacturers using somewhat lower and others higher temperatures. When the charge contains chiefly sodic disulphanthraquinonate, the operation is carried on for several days and nights, not unfrequently a week; but if it contains sodic monosulphanthraquinonate, two or three days will be found sufficient.

I have often noticed, on heating a mixture of the mono and disulpho compound with caustic alkali, that by stopping the action early, only alizarin is produced, the decomposition of the disulpho acid, and consequent formation of anthrapurpurin, requiring considerably more time.

The products formed in these boilers are treated just in the same way as those from the pressure tubes previously described, *i.e.*, they are blown into iron tanks, diluted, acidified, and the precipitated coloured matter well washed.

I wish now to draw your attention to the first process we used for the preparation of artificial alizarin, viz., the process in which anthraquinone is employed. The anthracene we first used for this purpose was obtained from pitch. We then employed that from the tar distillers. In our earlier operations it was purified simply by treatment with naphtha and subsequent distillation, but afterwards by distillation with potash.

The purified anthracene was ground very thoroughly with water under edge-runners. It was then placed in a lead lined tank, with twice its weight of powdered potassic bichromate dissolved in water. About 3 parts of sulphuric acid, previously diluted, were then added. After well stirring, a very energetic reaction set in, the mixture boiling up to near the top of the tank. When this had been moderated, steam was turned on, and the mixture well boiled for an hour or two. The yellow granular crude anthraquinone was then separated from the chrome alum solution, well washed, and after it

* *Moniteur Scientifique*, April, 1879; p. 419.

had drained, though still wet, was purified by sublimation. At first we used two iron retorts, with openings at the top, and connected with a wide bent iron tube for this purpose, the one acting as a sublimer, the other as a receiver. Afterwards we employed retorts, with an outlet from the end connected with a large sheet-iron cylinder, having one end closed with canvas only.

The wet crude anthraquinone, when heated, gave off a considerable amount of steam, this helped to carry the vapour of the anthraquinone forward, which condensed as an impalpable powder. As the sublimation proceeded, and less steam was given off, small crystals of anthraquinone deposited. On opening the retorts after the operation, magnificent hard yellow crystals were often found suspended from the roofs of them.

The sublimed anthraquinone was then dried, and finally purified by crystallization from high-boiling coal-tar naphtha. The crystallized product was collected on canvas bags, drained, washed with a little clean naphtha, pressed, and then dried.

The amount of pure anthraquinone we obtained from pitch anthracene was, speaking from memory, about 20 to 25 per cent. The yield from ordinary anthracene from the tar distillers, was, of course, much greater. The use of potash in the distillation of anthracene we did not adopt until after we had ceased using the anthracene from pitch, otherwise better results would have been obtained with this product.

Since these early operations were made, a great deal of attention has been and is still being given to the preparation of anthraquinone. A number of experiments were made in my laboratory on the use of peroxide of manganese as the oxidizing agent, but I never succeeded in obtaining such a satisfactory yield as when potassic bichromate was employed. Anthraquinone is now usually prepared in the following manner:—The crude anthracene is first washed with coal-tar naphtha. In employing this as the purifying agent, it is used cold, and well agitated with the anthracene, until every particle has been brought in contact with it. If the crude anthracene contains 20 or 30 per cent. of pure anthracene, it is treated with its own weight of naphtha.

The naphtha is then well drained off from the anthracene, which is afterwards pressed as dry as possible by means of a hydraulic press. If the quality is lower than 20 per cent., it is first treated with about one-fourth its weight of naphtha, and afterwards as if of a quality over 20 or 30 per cent. The adhering naphtha, which is generally about one-tenth the weight of the pressed anthracene, is then removed by steaming, and thus recovered, or it is allowed to evaporate away.

The naphtha which has been used is purified by distillation, and thus rendered fit for a fresh operation. An arrangement of apparatus, such as that described for treating anthracene with petroleum spirit, answers equally when naphtha is used, omitting the cooling tanks. Horizontal stirring machines are now preferred to the vertical ones, as in the latter, the anthracene and solvent, after a short time, move round together with the stirrer, and therefore do not get well mixed. This, however, can be avoided by fixing a few blades to the sides of the machine.

(*To be continued.*)

Parliamentary and Law Proceedings.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION OF GREAT BRITAIN.

Prosecution of a Chemist by the Excise Authorities.

At the Sunderland Police Court on Wednesday, July 23, 1879, before Mr. Alderman Potts, and Andrew Common, Esq., Mr. John W. Gillies, chemist and druggist, High Street, Sunderland, was charged at the instance of the Excise authorities, "That on May 17, 1879, at Sunderland, he not being a distiller or rectifier of spirits or other person duly authorized or specially licensed by the Commissioners of the Inland Revenue to mix and make methylated spirit, sold a certain quantity, to wit, one gill, of methylated spirit without having in force a licence on that behalf, granted under the authority of the Act, contrary to the terms of the statute in that case made and provided."

Mr. W. A. Young, district supervisor of Excise, conducted the prosecution, and Mr. Henry Glaisyer, of Birmingham, solicitor to the Chemists and Druggists' Trade Association of Great Britain, appeared for the defendant.

Mr. Young said the information was laid under the 5th section of the 24th and 25th Victoria, c. 91, which enacted that every person not being a distiller or rectifier of spirits or other person duly authorized or specially licensed by the Commissioners of Inland Revenue to mix and make methylated spirits, who shall sell any such spirits in any quantity without having in force a licence on that behalf, granted under the authority of this Act, shall forfeit the sum of £50 over and above all other penalties to which he may be liable under any other Act or Acts in force. The authorities, he said, had had complaints made to them that Mr. Gillies was selling methylated spirits, and an officer of the Inland Revenue visited his shop on May 17 last. He asked for a gill of methylated spirits, with which he was supplied; Mr. Gillies stating at the time that he had no licence to sell it and must put something in it. There was an article sold under the regulations of the Board without a licence called "finish," which was methylated spirit, to every gallon of which had been added three ounces of gum resin or shellac. Part of the sample purchased from Mr. Gillies was sent to the laboratory at Somerset House for analysis. It did not contain sufficient gum resin to constitute what was called "finish" by the Board's regulations.

E. Lewthwaite, an officer of Inland Revenue, stated that acting on instructions he visited the defendant's shop on May 17 last, and asked for a gill of methylated spirit. Mr. Gillies supplied him. He said there had been a great deal of bother about that sort of thing and he must put a little of something in it before he could sell it as he had no licence. Fivepence was paid for it. Witness took the spirit home and kept it till he gave it to Mr. Young the supervisor.

Cross-examined by Mr. Glaisyer: When I went into the shop I asked for a gill of methylated spirit, and the defendant replied that he had no licence to sell it and must put something in it before he could sell it. Defendant did not say that he did not sell it. I did not suggest that he had it in stock. Defendant did not say that he kept it only for making his preparations. Defendant did not ask me what I wanted it for. I did not say my son was making experiments and I wanted it for burning. I did not say anything about burning it or making experiments. Defendant did not say he was making "finish." He said he would do something to it. I did not ask whether that would destroy its burning power. I did not see what he put in it. I did not see him put anything in it. I have not seen much methylated spirit; what I bought had a yellowish tinge. I did not see him put any resin into it. I did not shake it up. I kept it a few days and then handed it to the supervisor. It was put in my own bottle.

By the Bench: The defendant went into the back shop to fill the bottle and handed it to me over the counter. He told me before going into the back shop that he would have to put this stuff into it.

William Anthony Young, supervisor, said: I received this sample of methylated spirit from Lewthwaite. It looked about the same as it does now. The bottle contained a gill. I sent about half of it to the laboratory at Somerset House for analysis. I secured the sample myself in the box (produced), addressed it, and sealed it with the Revenue seal. It was addressed, "The Principal, Laboratory, Inland Revenue, Somerset House." It was sent off on June 11. I could not be positive when Lewthwaite gave me the spirit. He got it on May 17, and it was two or three days after I packed it up and sent it to London on June 11. I shook it up when I received it from Lewthwaite, and at the time I divided it I shook it thoroughly.

Henry James Helen said: I am one of the analysts to the Board of Inland Revenue at Somerset House. I remember receiving a parcel from Sunderland on June 12. The box produced is the one in which the bottle was enclosed. The seal was perfect, I analysed it and found it to be methylated spirit containing 429·8 grains or rather less than one ounce of gum resin to the gallon. Methylated spirit to be what the Board of Inland Revenue call "finish" must have dissolved in it three ounces of gum resin.

By Mr. Glaisyer: There was an earlier regulation of the Board which required less. On April 23, 1837, the Board issued an order allowing it to be sold with one ounce of gum resin. If the resin was not thoroughly dissolved, the liquid taken from the top of the bottle would contain less resin than that at the bottom.

This was all the evidence produced.

Mr. Glaisyer (addressing the Bench) said: The charge against the defendant is for selling methylated spirit without a licence. The answer I am instructed to make is that he sold the article known as "finish." If this is proved to your satisfaction the summons must be dismissed. I think I am entitled to go further and say, that in construing this very penal statute, most ample proof is required on the part of the prosecution before the defendant can be convicted, and if there exists a doubt in your minds, the defendant is entitled to the benefit of that doubt, and the charge against him should be dismissed. There is no doubt that the sale of methylated spirit as "finish" is allowed without a licence, and there are the two general orders of the Board of Inland Revenue on that subject which have been mentioned to you to-day. Perhaps I may be allowed in passing to call the attention of the Bench in a few words to the law which sanctions the manufacture and regulates the sale of methylated spirit. In the first place I may tell you that methylated spirit is not spirits of wine. The sale of spirits of wine has been for many years regulated by statute and prohibited except under a wine licence. But for the purposes of art and manufacture it has become requisite that a preparation of spirits of wine should be sold much more generally than is allowed by this provision; and therefore, in the year 1855, an Act was passed by which a mixture of spirits of wine with wood naphtha or methylic alcohol was permitted to be sold under another licence, and that mixture is called methylated spirit. It cannot be sold in its pure state except by persons who have taken out a licence; and the penalty for selling it without a licence is £50, the amount claimed in the present proceedings. Under an Act passed in the reign of Geo. IV. the magistrates have power to diminish that penalty to £12 10s., or one-fourth of the amount; though they cannot make a greater reduction they have power to recommend the Commissioners of Inland Revenue to further remit the penalty, and these recommendations I am glad to say receive the very careful consideration of that Board. Spirits of wine as methylated spirits can therefore be sold with a licence, but the use of methylated spirit as medicine or an ingredient in medicine is most strictly prohibited, and it is chiefly needed in the manufacture of furniture polish and varnish in making various liniments and for burning in spirit lamps. The use of methylated spirit in art and manufacture has constantly called for modifications in the restrictions in its sale, and in consequence the general orders, to which allusion has been before made, have been published by the Inland Revenue Board, and the article known as "finish" is the outcome of these modifications in the law. "Finish" is made by the addition to a gallon of methylated spirit of three ounces of gum resin; thus whilst preserving its utility in art and manufacture it is rendered so nauseous and unpalatable that no one will drink it, and that is really the object with which the resin is added, for nauseous as methylated spirit is, people have been found who had such a craving for spirits that they had actually drunk it. No other alteration is allowed in the constitution of "finish," except the addition of more gum resin or a little colouring matter, and any alteration in other respects incurs a liability to a very heavy penalty—£200 if I recollect correctly. The defence is that the defendant has really sold the article "finish." He would tell you if his mouth were not closed that when this informer came into his premises he told him he did not sell methylated spirit, and had no licence for the purpose. The informer asked if he did not keep it in stock. He said he did, and the informer said he might let him have a gill, and the defendant again replied that he could not sell him methylated spirit, but he could sell him "finish," and proposed to sell him that article, and asked him for what purpose he wanted it. The informer replied that his son was making experiments, and required it for burning, and also inquired if the "finish" which the defendant proposed to sell would burn in a lamp. The defendant said he believed it would, and on those terms he sold him the article "finish." As he measured it out he added to the half pint of spirit at least half an ounce of gum resin, or more than was actually required by the general order. The general order authorized him to sell "finish," and he was under the impression that he had sold it. He would further tell you that he never keeps more than half a gallon of methylated spirit on his premises at one time, that quantity being quite sufficient for the requirements of his business for four months, his sole use for it being the manufacture of certain liniments. He is never asked for methylated spirit, and therefore takes out no licence for its sale. For twelve years he has been carrying on the business of a chemist and druggist in High Street, and this is the only charge that has ever been made against him. On this occasion he says he had sold "finish," and had therefore not infringed the law. I hope you will take that view of the case and discharge the summons.

After some remarks from Mr. Young, the Bench retired to consider the case, and on their return shortly afterwards,

The Chairman (Mr. Alderman Potts) said: The Bench find that the law has been clearly violated, and we cannot do otherwise than convict. We impose the minimum penalty £12 10s. and recommend a reduction to £5. This is the first case, so far as we know, that has arisen in this town, and the defendant, we think, may not have been aware of the order of 1867.

Mr. Young: I will forward the recommendation.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

Reply.

[328]. In reply to this query I think C. B. obtained the correct result. Probably the tinc. hyoscyami used by the London firm was made from leaves of the annual plant instead of biennial.

VOLO SEMPER JUVARE.

Queries.

[333]. How is extract. bela. liquid usually dispensed, as a clear dark-brown liquid or as an opaque syrupy liquid with an abundant precipitate? In the directions for its preparation in the B.P. no notice is given as to it being filtered after the addition of the spirit.

Norwich. W. W. WILL.

[334].

℞ Calomel powd. . . . .
Bals. Copaib. . . . . ℥ss.
Spts. Æth. Nit. . . . . ℥j.
Aqua. Menth. Pip. . . . . Oss.

℥ss. ter die.

Can any reader of the Journal inform me the best mode of dispensing the above?

AN APPRENTICE.

[335]. A prescription was presented to me the other day ordering "Emp. Iodinii." I shall be glad of the opinion of your readers as to what I ought to have used, there being no preparation of that name in the B.P. The prescription was written at Birmingham and had been previously dispensed seventeen times in the south of England, but the patient remarked that he could not get "the right stuff" in the north, and on my asking him what had been the colour of the previous plasters he instantly took the prescription out of my hand and left the shop remarking that I did not know my business. NIHIL.

[336]. Can any one inform me what is the use of the following?—

Take of—

Extract of Bark	15 grains.
Extract of Rhatany	8 grains.
Extract of Burdock	2 drams.
Fixed Oil of Nutmegs . . .	2 drams.
Camphor	15 grains.
Beef Marrow	2 ounces.
Olive Oil	1 ounce.
Citron Juice	½ dram.
Bergamot	10 drops.
Otto Rose	2 drops.

Mix and make into a pomade.

EDWARD PRATT.

[337]. Can any of your readers inform me how to dispense the following prescription without separating?—

R Liq. Ferri Dial. (Hyth.) . . . . . ℥iij.
Syr. Aurant. . . . . ℥j.
Aquæ . . . . ad ℥iv.

M. f. m. ℥j three times a day.

G. W. W.

Notes and Queries.

[618]. NICOTINE.—Nicotine is extracted from the tobacco leaves by exhausting them with a mixture of equal parts of rectified spirit and water, evaporating the liquid to one-third of the original bulk, when cold shake up with strong caustic lye and ether, decant the ethereal solution and expell the ether by the addition of a gentle heat, mix the residue with freshly prepared sleaked lime and distill in a stream of hydrogen, when the nicotine passes over at a temperature of 365° Fahr.

Norwich. W. W. WILL.

[620]. NICKEL PLATING.—Will some correspondent kindly state a reliable mode of depositing nickel on dental and other small instruments?

Parade, Canterbury. GEO. A. STORY.

[621]. SULLIVAN'S AMALGAM.—I wish to learn the process for the above amalgam, my difficulty being to cause the copper (sulphate precipitated by zinc) and mercury to amalgamate thoroughly.

Parade, Canterbury. GEO. A. STORY.

[622]. "Aqua" wishes address of an importer of rad. glycyrrh. exot.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

SPIRITUS ÆTHERIS NITROSI.

Sir,—The subject of the above compound has lately been one of deep interest to me as it no doubt has to many others.

I am persuaded that it is very gratifying to many that spiritus ætheris nitrosi is again occupying the attention of chemists, and trust that something more definite and satisfactory will be arrived at respecting this very remarkable compound.

I have read Mr. Rimmington's paper in your issue of the 19th ult. with much care and attention. There are, however, one or two peculiarities in the results obtained by him that are somewhat difficult to comprehend.

He remarks at the outset that all that is said in this paper "has reference to a spirit that corresponds with that described in the British Pharmacopœia in nature, substance and quality." That I understand to mean, that the sample tested, on being agitated with twice its volume of the saturated solution of calcic chloride, 2 per cent. of nitrite of ethyl will float on the surface; and yet in the analysis of his best sample the per cent. given is 1·72 as being the total amount it contains.

Another peculiarity in Mr. Rimmington's results is that the amount of nitric peroxide obtained is only a little more than one-third of the amount contained in the quantity of nitric acid used. What has become of the other?

I am sure this subject needs further investigation and probably if the contents of the retort were carefully examined after the operation of nitre making is concluded, some further information would be obtained.

Wakefield. WM. POLLARD.

T. S. W.—(1) *Epilobium montanum.* (2) *Potentilla tormentilla.* (3) *Helianthemum vulgare.* (4) *Lychnis vespertina.* (5) *Erodium cicutarium.* (6) *Asplenium trichomanes.* (7) *Polypodium vulgare.* (8) *Asplenium adiantum nigrum.*

T. Hope.—(1) *Vicia Cracca.* (2) *Lathyrus pratensis.* (3) *Lotus major.*

Dulcus.—(1) *Cruciferæ.* (2) There is some mistake about the spelling of this name. (3) *Umbelliferæ.*

R. Roberts.—(1) *Lysimachia nummularia.* (2) Correct. (3) *Ligustrum vulgare.* (4) *Melilotus officinalis.*

"*Fugam.*"—To obtain the information you desire we should advise you to apply to the proprietors or to analyse the preparation.

Caution.—A correspondent writing from Handsworth wishes to caution chemists and druggists against the wiles of an enterprising individual who, under the pretence that he is a medical man, orders goods to be procured for him and sent to a place where he obtained possession of them by a device which left the vendor without payment.

Fredk. H. Fairweather.—(1) *Triodia decumbens.* (2) *Aira caryophylla.* (3) Not British, cannot say without fruit. (4) *Acer campestre.*

Jno. Hutchinson.—"Cleistogamous." This term is applied to flowers fertilized by their own pollen without the petals unfolding. "Proterandrous." When the anthers are mature before the stigma. "Proterogynous" signifies that the stigma matures before the anthers. See Lubbock's 'British Wild Flowers in Relation to Insects,' or Thome's 'Text Book of Structural and Physiological Botany.'

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. S. Atkins, A. Strachan, O. H., F. E. Rimmington, A. H., H. Sparshott, J. T. Robinson, Herbert Chambers, Novice, Hy. Brown.

NOTES ON SOME JAPANESE DRUGS.

BY E. M. HOLMES, F.L.S.,
Curator of the Museum of the Pharmaceutical Society.

ROOTS.

(*Continued from page* 23.)

BOTAN (59) :—*Pœonia Moutan*, Dec.

Syn. MAU-TAN, Porter Smith, Chinese Mat. Med. p. 169, Phonzou Zoufou, vol. ix. p. 14.

This drug consists of the root bark, which occurs in half quills, from one to three inches long. Externally the pieces are of a dark lilac-brown colour and moderately smooth; internally, pinkish-white and starchy, but hard, or in some pieces horny and darker coloured. The taste is aromatic and pungent and the odour is very similar to that of *Hemidesmus indicus*, but more powerful.

In China this bark is largely used for congestion, hæmorrhages and menstrual disorders, and, according to Dr. Martin, is often prescribed by the Japanese physicians. It is forbidden to be used by pregnant women, being considered abortive. Analysed by Iago* at the pharmaceutical laboratory, at Tokio, it yielded an aromatic crystalline substance, which was apparently a fatty acid allied to caprinic acid, but had a higher melting point. The crystals are very soluble in alcohol and ether, and are precipitated from the alcoholic solution by a large quantity of water. They melt at 45° C. and sublime at a higher temperature. This plant is quite a favourite with florists in Japan and China, who make more than thirty varieties of it. A large number of varieties were exhibited at the last Paris Exhibition, some of them having the delicate perfume as well as the blush tint of the cabbage rose.

REW-TANG SOH (20) :—*Gentiana Buergen*, Miq.

Syn. RINDO, Sô mokou Zouss. vol. iv. fig. 47; SASA RINDO, Fr. et Sav. vol. i. p. 323; Phonzou Zoufou, vol. viii. p. 5.

This drug consists of a short rhizome, giving off a number of brown roots about the thickness of a crow quill, and three or four inches long; these are strongly furrowed longitudinally. The transverse section of the rhizome is pale and spongy, the taste is bitter and resembles that of gentian in character. It corresponds well with the specimens of "Gentian" (Lung-tan-ts'au) in the collection of Chinese drugs presented to the Society by Dr. Porter Smith, but does not answer to his description of the drug. He refers it to *Gentiana asclepiadea*, and other species. *G. Buergeri* was, however, identified from the Japanese description in the Sô moukou Zoussetz by Mr. Takemura as being identical with Rew-tang sau. *Gentiana Buergeri* is found in damp grassy places in Japan, and flowers in September and November.

The name both in Chinese and Japanese has the same meaning, viz., Dragon's-gall-herb, and is given by the Chinese, according to Dr. Porter Smith, to any intensely bitter plant.

SANG-YAK (41) :—*Dioscorea japonica*, Th., Fl. Jap. p. 151.

Syn. YAMA-NO-IMO, JIJENJO; Sô mokou Zoussetz, vol. xx. fig. 56; DSOJO, IAMMA IMO, Kœmpf. Amœn. p. 828.

Sang-yak occurs in white cylindrical tapering pieces, varying from one-half to one inch or more in diameter, and four or five inches long. The outer surface owes its whiteness to being decorticated; the transverse section is also white and presents a uniform appearance. It has no taste or smell. It is probably used, like the Hwai-san-yoh of the Chinese, in diarrhœa. Kœmpfer states that the root is edible.

The word Yak means "medicinal" in Japanese, so that it may be inferred from the name of the drug that it is also used as a medicine, probably in the same way that arrowroot is used in this country. The plant is frequent in shrubberies in Japan, and flowers in September. The leaves much resemble those of the black bryony in shape, but the fruit is capsular.

SEKI-SHO KUNG (3) :—*Acorus gramineus*, Ait. Sô mokou Zoussetz, vol. vii. fig. 10; Phonzou Zoufou, vol. xxxiii., p. 17; Fr. et Sav. vol. ii. pt. 1, p. 10.

This drug consists of a slender rhizome, two to four inches long, and about a quarter of an inch in diameter, sparingly branched and marked with numerous leaf scars like that of *Acorus Calamus*, to which it bears a strong general resemblance, but differs in taste, which in *Acorus gramineus* is pungent and faintly bitter, and in the absence of aroma. The rhizome has been compared with that of specimens of the plant in the British Musenm, and corresponds well with it.

The drug described under this name in Dr. Porter Smith's 'Materia Medica' is not that of *A. gramineus*.

According to Mr. Takemura, the article on this plant in Sô mokou Zoussetz, states that *A. gramineus* is more used in China than in Japan. The name Sekisko appears to be derived from *seki*, meaning a stone (it is the same character as the Chinese Shih), and *sho*, acorus, probably in allusion to the plant growing in damp stony places instead of in the water. It flowers in April.

SENG-KIU (7) :—Sô mokou Zoussetz, vol. v. fig. 1; *Conioselinum univittatum*, Turcz, Fr. et Sav. vol. ii. p. 375.

Sen-kiu is a hard, somewhat rounded, very knotty rhizome, one or two inches in circumference, and apparently formed at first by swellings of the internodes, which are distant about half an inch from each other. These swellings seem to be formed into a rounded mass in the course of development of the rhizome. This mode of growth appears evident from the portions of the cylindrical stem which may be found attached to some of the specimens, and which have smaller knobs at the nodes. The rhizome is greyish-brown externally, and greyish and horny, and slightly marbled with white internally, and has an aromatic taste, recalling that of fenugreek or lovage seeds. Seng-kiu grows in shady places in mountainous woods, and flowers in July.

SENG-KOOTZ (11) :—*Nuphar japonicum*, D. C. (Nymphæaceæ).

Syn. Nymphœa lutea, L.; Thunb. Fl. Jap. p. 223. KAWAHONE, Sô mokou Zoussetz, vol. x. fig. 10; FEISO, KAWAHONE, Kœmpf. Amœn. p. 880.

This drug occurs in flattish pieces, three to six inches long or more, and about one inch broad, and half an inch in thickness, consisting of the rhizome cut in half longitudinally. On the outside the pieces are of

* *Archiv der Pharmacie*, October, 1878, p. 334.

brown colour, marked with round blackish scars where the leaves were attached, and present a swelling beneath each scar where the rootlets have been given off. The cut side and indeed the whole inner surface is of a yellowish or dirty white tint, and very starchy. The substance is soft and tough, and under a lens is seen to be as full of minute holes as a piece of coral. The taste is insipid, and the odour resembles that of marshmallow root.

The name *seng* signifies a river, and *kootz* a bone, possibly in allusion to the colour and porosity of the root.

SEE-YOH-BEI (29):—*Geum japonicum*, Th. (Rosaceæ).
Syn. DAIKONSO, Sô mokou Zoussetz, vol. ix. fig. 41; Thunb. Fl. Jap. p. 220; Fr. et Sav. vol. i. p. 128.

This root consists of a short central woody portion, about half-inch long and one-third of an inch in diameter, almost concealed by a dense tuft of slender slightly furrowed rootlets, which are two or three inches long, and about the thickness of ordinary twine.

The root is pale brown internally, with a darker horny centre (not purple as in *Geum urbanum*). The taste is astringent and has the same peculiar clove-like character as that of *Geum urbanum*. The odour also faintly resembles cloves. It was this characteristic that led to its identification, which was confirmed by a comparison of the Japanese characters with those in the Sô mokou Zoussetz, by Mr. Takemura.

The properties, judging from the taste, must be aromatic and astringent. See-yoh-bei grows by roadsides and margins of fields, and flowers from August to October.

SHAU-BOOKUNG (37):—*Acorus spurius*, Schott, Ann. Mus. Lugd. Batav. 1 p. 284; Araceæ.
Syn. SHOBU, Sô mokou Zoussetz, vol. vii. fig. 9; Phonzou Zoufou, vol. xxxiii. p. 17; KAWA SOB, KAWA SOBU, Kœmpf. Amœn. p. 912.

This drug, except in being split longitudinally into two halves, and in its smaller size, differs in nothing from the *Calamus aromaticus* rhizome obtainable in this country.

As a species it is chiefly distinguished by the shortness of the spathe, which near the apex is only about four lines broad, the spadix being three or four lines thick. Judging from the taste alone, it appears to be only a small variety of *A. Calamus*, L.

TENG-MA (38):—*Urtica tuberosa*, Roxb.(?); Porter Smith, Chinese Mat. Med. p. 225, *Pouzolzia tuberosa*, Wight, Icon. Pl. Ind., vol. ii. t. 697.

This drug consists of flattened shrivelled tubercules about two inches long, one inch broad and one-fourth to one-third of an inch in thickness. Externally they are of a greyish-brown colour and internally present a blackish-brown shining fracture. The tubercules appear to have been hollow inside. The taste is sweet and mucilaginous. The odour is somewhat smoky. In China, according to Dr. Porter Smith, the plant is prescribed in rheumatism, neuralgia, palsy and lumbago.

The Japanese drug closely resembles both in appearance and taste the Chinese specimens presented to the Society by Dr. Porter Smith.

The Chinese name T'ien-ma, or Teng-ma as it is pronounced in Japanese, means *teng*, heaven, *ma*, nettle. Heaven, being the idea of excellence, seems almost an equivalent for good; so that the name seems to imply a nettle possessing unusually good qualities. The root is edible.

TAK-SHA (2):—*Alisma Plantago*, L. (Alismaceæ).
Syn. SAJI-OMODAKA, Sô mokou Zoussetz, vol. vii. fig. 33; TOKUSA, SASI-OMODAKA, Thunb. Fl. Jap. p. 153.

This drug consists of the dried corms. They are somewhat conical in shape, the wide upper end presenting traces of the stem, while the lower tapering portion is covered with the bristly remains of rootlets. The transverse section presents a yellowish-white uniform appearance, sparkling by reflected light, with bright points. The taste is sweetish and the odour aromatic and slightly ammoniacal. It is used in China for dropsy and similar complaints.

Thunberg states that Sasi-omodaka means spoon-like, and that this name is probably given from the shape of the leaves.

TENG-MONG-DAU (26):—*Asparagus lucidus*, Lindl. (Liliaceæ).
Syn. KUSASUGIKADZURA, Sô mokou Zoussetz, vol. vii. fig. 6; Phonzou Zoufou, vol. xxviii. p. 3; TEEN-MUN-TUNG, Hanbury 'Science Papers,' p. 257; KE MUNDO, TEN MONDO, Thunberg, Fl. Jap. p. 257; T'IEN-MEN-TUNG, Dr. Porter Smith, Chinese Mat. Med. p. 145, Tomo-roki, Ten mada, Fr. et Sav. vol. ii. p. 1, p. 59.

This drug consists of spindle-shaped brownish horny looking tubercules, showing traces of a pale thin longitudinally furrowed skin which has evidently been eaten away by insects; the tubercules vary in thickness from one-fourth to one-third or even half-an-inch in diameter in the centre. The taste is sweet and mucilaginous at first with a distinct but somewhat sickly flavour and afterwards a bitter taste. They do not possess a marked odour. The horny portion of the tubercules is not attacked by insects. The tubercules of *Melanthium cochinchinense* in the collection presented to this Society by Dr. Porter Smith agree exactly in taste and appearance with the Japanese drug, and the written character for the Japanese and Chinese drug is identical, although pronounced differently.

The above identification is given on the authority of Sô mokou Zoussetz, but not without some hesitation on my part, since the asparagus flowers in July and the Japanese native name *mong dau* means gate of winter, implying a plant flowering (or fruiting?) late in autumn. Hanbury and Porter Smith both refer it to *Melanthium cochinchinense*, but several other writers to asparagus.

TAU-HOONG-SO (16):—*Veratrum album* (?)
Syn. BAI-KAI-SO, Fr. et Sav. vol. ii. pl. 1. p. 91.

This root presents all the appearance of the *Veratrum album* of commerce, and gives the same orange-red tint when the root is touched with strong sulphuric acid. It consists of a central portion, about two-thirds of an inch in diameter and about one inch or more long, crowned with the membranous bases of leaves and furnished with numerous brown rootlets about a line in thickness and two or three inches long. These rootlets have the numerous transverse wrinkles so characteristic of the roots of *Veratrum album* and *viride*. The taste is bitter at first, but afterwards a burning sensation is produced. The Japanese name does not, however, correspond to that of either *Veratrum nigrum* or *V. viride*, which are figured and described in the Sô mokou Zoussetz, vol. xx. fig. 62, 63. The central axis of the root shows the same crenated ridge where it joins the root bark, which Professor Bentley has shown to be characteristic of the *Veratrum album* of commerce. *V. album* is is, however, a native of Japan, although not described in the Sô mokou Zoussetz.

TO-KEE (8):—*Ligusticum acutilobum*, Sieb. et Zucc. *Syn.* TOKI, Sô mokou Zoussetz, vol. v. fig. 4; Fr. et Sav. vol i. p. 186.

To-kee root bears a strong external resemblance to angelica root, both in size and shape, but the rootlets are less furrowed. It consists of a tap root about one inch in diameter near the top, tapering down to a quarter of an inch, and surrounded by a number of stout rootlets from one-fourth to one-third of an inch thick. The side roots are marked with numerous transverse slightly warty scars; internally the roots present a dark brown colour, with a darker ring around the meditullium and a soft waxy section with very few and small oil vesicles. The taste is sweet and mucilaginous and very faintly pungent. The odour has a faint resemblance to fenugreek.

TO-SAI-SHIN (1):—*Asarum Sieboldii*, Miq. *fol. coriaceis* (Aristolochiaceæ), Sô mokou Zouss. vol. ix. fig 5; Phonzou.Zoufou, vol. viii. p. 8.

The rhizome of this plant is very similar in appearance to serpentary root, consisting of a slender rhizome crowned with numerous crowded discs marking the base of the leafy stems; from this rhizome the rootlets depend in a dense tuft three or four inches long. The roots are of a pale brown colour, cylindrical, quite smooth and unbranched. The transverse section is white and starchy with a slender yellow woody thread in the centre. The taste is aromatic, at first somewhat resembling that of nutmeg or sassafras, then powerfully pungent and causing a flow of saliva like pellitory. The odour is slightly aromatic, but not at all camphoraceous like serpentary.

This variety of *Asarum Sieboldii* is found in copses and woods on the sides of hills, and flowers in April and May. It is not often cultivated in Japan.

(*To be continued.*)

RESEARCHES ON ALBUMIN.*

BY SCHÜTZENBERGER.

It having been observed that albuminoid substances when submitted to the action of baryta under suitable conditions appear to be transformed entirely into crystallizable or into definite principles, it seemed reasonable to suppose that a carefully conducted and complete study of this reaction would be likely to materially contribute to a knowledge of the proximate composition of these bodies, if it did not ultimately solve the question respecting their constitution.

With this end in view, the author instituted and has carried out an extended series of experiments upon the action of baryta solution at high temperatures on coagulated egg-albumin and other nitrogenous principles, the results of which investigation form the subject of the present memoir.

The albuminoid under experiment was placed with the alkaline solution in an iron silver-lined autoclave, and heated to a definite temperature for some hours. After cooling, the contents of the cylinder, consisting of an amber-coloured liquid and a solid deposit, were transferred to a large flask, and the ammonia (1) distilled off into hydrochloric acid and estimated; the residue (2) in the flask was brought upon a weighed filter, washed with boiling water until the baryta was removed, then dried and weighed. The filtrate from the latter was precipitated by a current of carbonic anhydride, the barium carbonate removed, and the baryta remaining in the liquor exactly precipitated by sulphuric acid and its weight ascertained. The acid thus set free, which proved to be acetic acid (3) with traces of formic acid, was distilled off in a vacuum and again determined. The residue remaining from the distillation of the acetic acid, which the author terms *fixed residue* (4), is of a clear yellow colour, friable and easily removable from the vessel; it contains all the fixed principles, such as leucine, tyrosine, etc., which are formed at the expense of the organic substance, in the proportions in which they are produced.

Determination of the Ammonia.—Having proved that coagulated albumin, washed with ether and dried at 140°, contained 16·5 per cent. of nitrogen, the effect of boiling it with three times its weight of baryta under ordinary pressure was ascertained. 1·2 per cent. of nitrogen was evolved in the form of ammonia within the first half hour, the disengagement proceeding slowly, until after one hundred and twenty hours' boiling 2·2 per cent. had been eliminated: this number was never exceeded. At 120° in the autoclave, 2·2 per cent. of nitrogen was evolved by digestion during six or eight hours; at 150°, with only twice its weight of baryta, 3·1 per cent. was obtained; whilst between 150° and 180°, with three parts of baryta for twenty-four hours, 3·95 per cent. was disengaged, and the limit of 4·0 per cent. was not exceeded even by heating with six parts of baryta for six or eight days. These three limits indicate clearly three successive and different stages of decomposition.

Insoluble Barium Salts.—The quantity of this deposit, like the ammonia, varies with the temperature and with the proportion of baryta used: in composition as well as in weight it undoubtedly bears a direct relation to the quantity of ammoniacal nitrogen disengaged. It consists mainly of barium carbonate and oxalate, with a certain amount of barium phosphate and sulphate; the proportions of the two former, the only important elements in the mixture, were as follows: From 100 grams of albumin—

		N.	$BaCO_3$.	BaC_2O_4.
With 200 grams of BaH_2O_2	at 100°	2·1	3·6	3·4
,, ,, ,,	at 120	2·3	4·7	4·3
,, ,, ,,	at 150	3·1	10·5	5·0
,, 300 grams ,,	at 180	4·0	10·8	8·0
,, ,, ,,	at 200	3·95	11·0	8·6
,, 600 grams ,,	at 180	3·79	11·2	18·2
,, ,, ,,	at 250	4·41	12·5	24·2

Acetic Acid.—The proportion of this acid is always relatively small, it varies with the temperature and the proportion of the baryta, as in the previous instances, the smallest quantity obtained being 2·7 per cent., and the greatest 5·4 per cent.

Fixed Residue.—The total weight of this residue, obtained as before mentioned (including 6·53 per cent. of organic matter carried down by the barium carbonate), amounted in one experiment to 95·83 per cent., and in another to 96·5 per cent. of the albumin used; it is evident therefore that the decomposition under the influence of baryta is accompanied by a fixation of the elements of water, inasmuch as the separate weights of the components being added together, there is always an excess varying from 10 to 14 per cent. The ultimate analysis

* From the *Ann. Chim. Phys.* [5], 16, 289—419. Reprinted from the *Journal of the Chemical Society*, July, 1879.

of the fixed residue gave very constant numbers, which did not vary greatly even under different formative conditions, the mean numbers being $C=48{\cdot}16$; $H=8{\cdot}2$; $N=11{\cdot}03$; $O=30{\cdot}75$ per cent.

Volatile Oil.—There is formed, during the decomposition of albumin in the manner under discussion, a very small quantity of a volatile oil, about 1 or 2 per cent., which could not be obtained in sufficient quantity for analysis under ordinary conditions. An operation on the large scale with 10 kilograms of albumin enabled about 50 or 60 grams of the oil to be collected and an examination to be made. It had no fixed boiling point; on account of the small quantity at disposal it was not possible to separate its constituents by fractional distillation: it was therefore divided into four portions boiling from 113° to 120°; 120° to 140°; 140° to 180°; and above 180°, and an analysis of each portion made. From the results of these analyses the author is of opinion that the oil is a mixture of two substances, one, the more volatile, containing oxygen but not nitrogen; the other, nitrogen but not oxygen. The presence of pyrrol in the oil was clearly established by means of its well-marked reactions. The formula, $C_{16}H_{23}NO_3$, calculates very nearly to the percentage obtained, from which if the formula of pyrrol be deducted (C_4H_5N) there remains 3 (C_4H_6O), which may be considered to represent approximately the composition of the remainder. A small quantity of a sulphuretted body is also contained in the oil. The quantity of this albuminol obtainable is so small that it is impossible to assign to it any important part in the constitution, or in the reactions representing the decomposition of albumin.

The proximate analysis of the fixed residue was a work of very great difficulty, and every method that could be devised was tried with only partial success. It was eventually found that the best method was to treat the residue with neutral solvents, and to separate the constituents as far as possible by means of fractional crystallization. The identification of the various principles was afterwards effected by means of ultimate analysis, which, in the absence of any well characterized reactions, was found to be the only sure or practicable means of arriving at satisfactory results. More than 500 combustions were thus made.

The two terms which were the easiest to isolate from the fixed residue, on account of their slight solubility, were *tyrosine* and *leucine*, the former, which is produced to an extent varying from 2·3 to 3·5 per cent., was recognized by its crystalline form, and by its well-known colour reaction with mercurous nitrate; the latter was also obtained in a well-crystallized condition, and gave results on analysis agreeing accurately with the formula $C_6H_{13}NO_2$.

The successive crystalline deposits, obtained by progressively concentrating the solutions from which the leucine, etc., had been partially separated, were composed of amido-valeric and amido-butyric acids, together with two new, definite, crystallizable products, *tyroleucine* $C_7H_{11}NO_2(C_nH_{2n-3}NO_2)$ and a body corresponding with the formula $C_6H_{11}NO_2(C_nH_{2n-1}NO_2)$: the quantity of tyroleucine obtained was about 60 or 70 grams from 10 kilograms of albumin. Tyroleucine presents itself as a white crystalline deposit of chalky aspect, possessing scarcely any taste, but soluble in about 20 parts of water at 15°. It melts and decomposes at 240°, breaking up into a white sublimate and a volatile oily base having an odour of radish; it leaves behind an abundant yellow vitreous residue. The analysis of the chloroplatinate of the base gives it the formula of collidine, $C_8H_{11}N$, and of the vitreous residue the formula $C_{14}H_{18}N_2O_2$; the decomposition of tyroleucine may therefore be taken as proceeding thus—

$$2(C_7H_{11}NO_2)=C_{14}H_{18}N_2O_2+2H_2O$$
$$2(C_7H_{11}NO_2)=CO_2+\underbrace{C_8H_{11}N}_{\text{Collidine.}}+\underbrace{C_5H_{11}NO_2}_{\text{Amido-valeric acid.}}$$

from which one is led to suppose tyroleucine to be a compound of amido-valeric acid with a body of the formula $C_9H_{11}NO_2$, the latter differing from tyrosine only by an atom of oxygen. This is rendered more probable by the fact that tyrosine, when heated under similar conditions, breaks up into CO_2 and a base, $C_8H_{11}NO$, which differs from collidine only by an atom of oxygen.

Among the homologues of leucine, amido-valeric and amido-butyric acids were met with in quantity, but amido-propionic acid in very small proportion only; its presence, however, was clearly and distinctly made out.

To the compounds of the formula $C_nH_{2n}+_2NO_2$, the author gives the generic name *leucines*, and to those of the formula $C_nH_{2n-1}NO_2$ the names *leuceïnes* ($n=6$). Both seem to be frequently produced by the splitting up on crystallization of bodies of the formula $C_mH_{2m}N_2O_4$ ($m=10$ or 12); however by repeated fractional crystallization the compound $C_{12}H_{24}N_2O_4$ gave always the same analytical numbers, from which it is fair to suppose that it has an independent existence. The supposition is moreover strengthened by the fact that similar results were obtained with the lower homologues containing 11, 10, 9, and even 7 atoms of carbon.

For these latter bodies, the name *glucoproteins* has been adopted, on account of their sweet taste; they crystallize less easily than the leucines, especially the lower terms; they are very soluble in water, but almost insoluble in cold absolute alcohol; hot alcohol of 90 per cent. however dissolves them with ease.

Another substance resulting from the decomposition of albumin, which is produced in important quantity, is a yellow viscous body obtained by precipitating certain mother-liquors from which leucines have been crystallized by ether. Dried at 120°, it is converted into a transparent amorphous mass, which on analysis gives numbers comprised between the formulæ $C_5H_9NO_2$ and $C_4H_7NO_2$, very often sensibly approximating to the formula $C_9H_{16}N_2O_4$; it appears in fact to be constituted in great part of butyric leucine with an admixture of some superior homologue.

The longer the action of baryta on albumin is continued, and the more concentrated the solution, the greater is the proportion of leucines and of leuceïnes formed, whilst under the contrary conditions, the intermediate bodies, or glucoproteins, constitute the bulk of the fixed residue, representing the initial terms of the hydration of albumin; under all circumstances caproic leucine and tyrosine appear to be the ultimate terms of the decomposition.

The mechanism of the reaction would therefore appear to admit of the following explanation. The albuminoid molecule losing ammonia and carbon as carbonic, oxalic, and acetic acids, and assimilating water, is converted into a comparatively simple mixture of glucoproteins, $C_nH_{2n}N_2O_4$, containing as its principle term $C_9H_{18}N_2O_4$: by the prolonged action of baryta and a high temperature, these glucoproteins split up partly into leucines and leuceïnes, and partly into double compounds formed by the union of glucoproteins and leuceïnes with the leucines.

The leuceïnes may perhaps be regarded as amido-acids of the acrylic, or of an isomeric series. They reduce ammoniacal silver nitrate on warming, and are attacked by bromine in the cold with formation of HBr and an acid of formula $C_nH_{2n-1}NO_3$. In the analysis of the fixed residue, the ratio of nitrogen to oxygen is never rigorously 1 : 2, but there is always a slight excess of oxygen, so that the ratio is nearer 1 : 2·1 or 1 : 2·3; this difference indicating the presence of small quantities of non-nitrogenous compounds, or of bodies in which the atomic relation of nitrogen to oxygen is greater than 1 : 2. A careful examination for such bodies among the crystalline deposits resulted in the detection of a few grams of an acid from 1 kilogram of albumin, offering a composition very close to that of *glutamic acid*, $C_5H_9NO_4$, and a smaller quantity of a second, whose composition was that of glutamic acid minus water, $C_5H_7NO_3$, which has been called *glutimic acid*. Judging from their amount, these acids play but a secondary part in the constitution of the mixture resulting from the decomposition of albumin: the acids, on the other hand, which are capable of being extracted in reasonable quantity from the insoluble barium salts, do not exhibit a constant composition; they appear to be residues of a progressive decomposition, and to be susceptible of being resolved by the continued action of baryta into a mixture of leucines and oxalic acid.

Without following all the steps by which the author succeeded in tracing the presence of the various bodies which are met with in small proportions as constituents of the fixed residue, and modify slightly the ratio between the nitrogen and oxygen, we may sum them up as follows:—1. Traces of succinic and lactic acids. 2. Tyrosine. 3. Amido-acids of the type $C_nH_{2n-1}NO_3$ glutamic and aspartic acids. 4. Amido-acids of the type $C_nH_{2n-3}NO_3$ glutimic acid. 5. Amido-acids of the types $C_mH_{2m-4}N_2O_6$ and $C_nH_{2n-1}NO_3$. 6. Intermediate compounds of the type $C_mH_{2m}N_2O_5$.

The principle, which is the most constant among the products of the decomposition, and whose proportion is the most easy to determine on account of its sparing solubility, is tyrosine. The maximum quantity obtained of this body was 3·5 per cent.; if, therefore, one molecule of albumin reacts in the formation of one molecule of tyrosine, it points to the approximate molecular weight 5500 for the former, since $\frac{181}{5500} = 3·3$. An expression of the form $C_{240}H_{387}N_{65}O_{75}S_3$ corresponds with a molecular weight equal to 5473, which satisfies the conditions involved in the determination of the sulphur and tyrosine, as well as the results of elementary analysis, thus—

	C.	H.	N.	O.	S.	Mol. weight.
Experiment	52·57	7·16	16·6	21·8	1·8	—
Theory . .	52·62	7·07	16·62	21·94	1·75	5473

Again, taking as the basis of calculation the experiments made with 5 or 6 parts of baryta at 180°, the centesimal proportions of the products were—

N as NH_3.	$BaCO_3$.	BaC_2O_4.	$H_4C_2O_2$.
4·03	17·6	11·0	4·6

which corresponds very fairly for 5473 parts of albumin with—

NH_3.	$H_2C_2O_4$.	CO_2.	$H_4C_2O_2$.
16 mols.	4 mols.	3 mols.	4 mols.

From these numbers the following equation may be written, which moreover would give a fixed residue of 99·6 per cent.:—

$$C_{240}H_{387}N_{65}O_{75}S_3 + 60H_2O = 16NH_3 + 4C_2H_2O_4 + 3CO_2 + 4C_2H_4O_2 + C_{221}H_{435}N_{49}O_{105} + S_3.$$

Deducting a molecule of tyrosine from the formula of the fixed residue, we have $C_{212}H_{424}N_{48}O_{102}$, which approximates very closely to an expression of the form $C_nH_{2n}NO_2$, differing from it only by a slight excess of oxygen.

By taking in this manner the series of experiments made with different proportions of baryta and at different temperatures, a number of equations may be written, in all of which the theoretical composition of the fixed residue corresponds very closely with that obtained experimentally.

There can be no doubt that, during the hydration of albumin, as many molecules of water are assimilated as there are molecules of ammonia liberated; if then from the proposed formula for albumin we deduct the ammonia, carbonic, oxalic, and acetic acids in the proportion furnished by experiment, less a number of molecules of water equal to the number of molecules of ammonia (adding as many molecules of water as there are molecules of carbonic anhydride produced, since the latter probably results from the decomposition of urea) we shall have—

$$[16NH_3 + 4C_2H_2O_4 + 3CO_2 + 4C_2H_4O_2 - 16N_2O + 3H_2O],$$

which leaves $C_{221}H_{341}N_{49}O_{581}$, an expression which corresponds with the type $C_nH_{2n-2}NO$ quite as nearly as that of the fixed residue with the type $C_nH_{2n}NO_2$, the difference on both sides being a slight excess of oxygen. The molecule of albumin therefore resembles that of a body whose formula is $x(C_mH_{2m-4}N_2O_4)$, where $m = 2n$, and undergoes hydration in two distinct steps. At 100°, with a limited proportion of baryta, the grouping fixes a number of molecules of water equal to one-half the number of atoms of nitrogen which it contains, and becomes $x(C_mH_{2m-2}N_2O_3)$. The latter, at a higher temperature, can in its turn fix a number of molecules of water equal to the number of atoms of nitrogen which it contains, changing itself to the formula $x(C_mH_{2m}N_2O_4)$, the final result being the assimilation of as many molecules of water as the albumin contains atoms of nitrogen. *Albumin is then probably an imido-derivative, which by hydration changes into a mixture of amido-derivatives.*

To return to the observed relation between the ammoniacal nitrogen evolved, and the carbonic and oxalic acids produced, it is noticeable that two molecules of ammonia are disengaged for each molecule of acid generated; the simplest reaction which could account for such a phenomenon would be to suppose that the ammonia results from the hydration of urea or cyanamide and oxamide, a supposition which acquires a much greater degree of probability when it is shown that a very large majority of animal nitrogenous principles, when similarly decomposed, yield a quantity of ammonia which is precisely the amount that should be furnished by the carbonic and oxalic acids produced at the same time, supposing the whole to result from the reaction above mentioned. The author has examined wool, hair, osseïn, isinglass, gelatin, goat's hair, silk, fibrin, and chondrin, in all of which the above relations held good.

Summary.—It has been shown: 1. That the mixture of fixed principles derived from albumin by hydration contains only amido-derivatives. 2. That these derivatives can be divided into two unequal portions, one, the weight of which is about 16 to 18 per cent., containing the substances in which the ratio of nitrogen is 1 : 3, or 1 : 4, or 2 : 5; the most important fraction of this portion consists of acids of the formula $C_nH_{2n-1}NO_4$, $C_nH_{2n-3}NO_3C_{2n}H_{4n-4}N_2O_6$, and $C_nH_{2n-1}NO_3$, the intermediate term being only a molecular combination of the terms $C_nH_{2n-3}NO_3$ and $C_nH_{2n-1}NO_3$. The second portion, which constitutes ⅘ths of the residue, may be represented by the formula $x(C_nH_{2n}N_2O_4)$ with a value for n a little less than 9. According as the limit of hydration is attained, the products formed belonging to the type $C_mH_{2m}N_2O_4$ (where m is a multiple of n) are progressively resolved into simple bodies belonging to the same apparent type; these again are resolved into bodies of the type $C_nH_{2n}N_2O_4$, which in their turn are resolved into leucines, $C_nH_{2n+1}NO_2$, and leuceïnes, $C_nH_{2n-1}NO_2$. This interpretation is not affected by the presence of more highly oxygenated acids in the fixed residue, since they may be considered as derived from any of these bodies by substitution of O for H_2.

To the memoir is added an appendix, in which are given the results of some analyses made of fixed residues obtained from different sources. Albumin purified by Wurtz's method was substituted for crude albumin; the baryta was precipitated in one instance by carbonic anhydride, in another by carbonic anhydride and sulphuric acid, and in a third by carbonic anhydride, ammonia, and ammonium carbonate, but no important differences were observable in the products of decomposition. It was also found to be a matter of indifference whether the hydration of the albumin was begun by the action of other agents less energetic than baryta, such as dilute sulphuric acid; on completing the action by the intervention of baryta as usual, the same result was obtained as in the previous instances. A fixed residue obtained by the action of baryta was subsequently boiled for twenty-four hours with a 20 per cent. sulphuric acid, but its composition was not found to be sensibly affected.

In a final operation, conducted with the usual reagents, the action of baryta upon albumin was carried to its extreme limit. The fixed residue was carefully examined to see whether any substance was produced under such condition, which had not been found, or had been overlooked in previous experiments: nothing, however, was met with but the usual mixture of leucines and leuceïnes.

The molecular weight of the various glucoproteins still remains to be determined.

THE REMOVAL OF FIXED OIL FROM COLCHICUM SEED.*

BY EMIL L. BŒRNER.

With the view of determining upon a suitable solvent for the fixed oil contained in colchicum seed, one which, while removing all of this for the preparation of the fluid extract objectionable constituent, would yet dissolve out none of the active principles of the drug, the following course was pursued, viz.:—Separate portions of the drug, in powder No. 60, were treated by percolation, the one with gasolin, a second with petroleum benzin, and a third with stronger ether, U. S. P.; the several percolates resulting were carefully evaporated until entirely free from the odour of their respective solvents.

The fixed oil thus obtained was of a density not unlike that of castor oil at a summer temperature, of a fatty odour, a pale olive colour, and very slightly bitterish taste in the case of the gasolin and petroleum benzin residues, while that exhausted with ether was of a somewhat darker colour and more decidedly bitter.

To ascertain whether the oil, as removed from the powdered seed by the process described, contained any colchicia, portions of each of the three residues were severally agitated with distilled water acidulated with hydrochloric acid, the liquids filtered and the filtrates treated for colchicia, as follows:—

That from the ethereal preparation gave, with concentrated nitric acid, concentrated sulphuric acid, hydrochloric acid and carbonate of potassium, a lemon yellow coloration; a slight white flocculent precipitate with tannic acid; a denser, nearly white, flocculent precipitate with iodo-hydrargyrate of potassium; a heavy, kermes coloured, flocculent precipitate with iodine and a turbidity with chlorine water—the solution becoming yellow upon the subsequent addition of water of ammonia—while the filtrates from the gasolin and petroleum benzin residues, when treated in exactly the same manner, gave no precipitates with any of the reagents mentioned, only a slight yellow coloration being produced by concentrated sulphuric acid.

Upon subjecting a portion of fixed oil separated from a fluid extract prepared by the process of the U. S. P. of 1870 to the same treatment as was pursued in the foregoing experiments, a slight yellow coloration was produced with each of muriatic, nitric and sulphuric acids.

Ether, because of its solvent action upon colchicia, as well as on account of its greater cost, as compared with the other solvents used, was considered objectionable, and was accordingly abandoned for any further experiments. Gasolin and petroleum benzin having, apparently, about equal solvent powers, the former of these was preferred as being more readily expelled from the drug after percolation with it, and before subjecting to the usual treatment for the preparation of the fluid extract. Upon treating a larger quantity of the powdered seed with gasolin, in the manner above described, an oil answering to the description of that first mentioned was obtained to the amount of 9·05 per cent. and having a specific gravity of ·922 at 60° F.

A portion of this oil, tested for the presence of colchicia, in the same manner as that obtained by a previous experiment, gave exactly the same results.

A suitable solvent having thus been found for the fixed oil contained in colchicum seed, its removal from the drug, before treatment in the usual manner for the fluid extract, would seem practicable, as the product obtained, unlike that of the officinal process, which separates the oil upon standing and necessitates its removal, is a perfectly clear preparation.

The advantages resulting from such a removal of the oil would seem to be quite evident, inasmuch as the fluid extract would not then be loaded with it, and would present a much more elegant appearance than does the officinal preparation. This extract being miscible with water, might perhaps even be used hypodermically by evaporating off the alcohol and diluting with water. The more evident may seem these advantages when it is remembered that nothing is sacrificed medicinally and only a slight expense incurred for gasolin, the quantity necessary for exhaustion being scarcely twice the weight of the powder to be treated with it.

Aware of the difficulty of powdering colchicum seed, the writer sought to remove the oil by maceration before grinding, but was unsuccessful, as only a part can be extracted in this way.

Though having no direct bearing upon the query here attempted to answer, the writer would state that, in availing himself of the suggestions offered in Mr. J. U. Lloyd's papers, published on pages 408 and 409 of last year's 'Proceedings,' by omitting the use of glycerin and finishing the preparation with a mixture of three parts alcohol and one part water, a more satisfactory preparation was obtained than when the Pharmacopœia formula was strictly followed.

* From the 'Proceedings of the American Pharmaceutical Association,' 1878.

ACETOUS PERFUMES.*

1. *Concentrated Aromatic Vinegar.*

Concentrated Acetic or Glacial Acetic Acid	8 ounces.
Oil of Lavender (English)	2 drachms.
Oil of Rosemary	1 drachm.
Oil of Cloves	½ ,,
Gum Camphor	1 ounce.

2. *Hygienic Vinegar.*

Strong Brown Vinegar	2 pints.
Gum Benzoin	1 ounce.
Oil of Marjoram	½ drachm.
Brandy	1 pint.
Oil of Cloves	1 drachm.
Oil of Lavender (English)	1 ,,

3. *Toilet Vinegar* (*à la Violet*).

White Wine Vinegar	2 pints.
Extract of Cassie	½ pint.
Extract of Orris	¼ ,,
Extract of Rose (triple)	¼ ,,

4. *Toilet Vinegar* (*à la Rose*).

Extract of Rose (triple)	½ pint.
Dried Rose Leaves	4 ounces.
White Wine Vinegar	2 pints.

5. *Vinaigre de Cologne.*

Eau de Cologne	1 pint.
Glacial Acetic Acid	1 ounce.

6. *Cosmetic Vinegar* (*Piesse and Lubin's*).

Concentrated Vinegar	1 ounce.
Gum Benzoin	3 ounces.
Alcohol, Pure	1 quart.
Balsam of Peru	1 ounce.
Oil of Neroli	1 drachm.
Oil of Nutmegs	½ ,,

7. *Vinaigre à la Rose.*

Glacial Acetic Acid	1 ounce.
Oil of Rose	½ drachm.

8. *White Wine Vinegar.*

Filter best ordinary brown vinegar through animal charcoal till perfectly white.

* From *New Remedies*, July, 1879.

The Pharmaceutical Journal.

SATURDAY, AUGUST 9, 1879.

A MEDICAL TITUS OATES (?).

When a ready writer is at a loss to find a subject on which to exercise his skill his pen is a weapon especially liable to be engaged in the mischief which a nursery poet tells us is the inevitable consequence of idleness. At the present day, when the possession of a free press offers such abundant scope for literary talent, it is scarcely surprising that we should now and then meet with cases of this kind, referable partly to the inexorable necessity of filling a certain number of columns and partly to the exigencies of the young lions of the press.

But besides the lack of subjects to write about there are other circumstances which tend to bring about the same mischievous exercise of literary skill, and chief among these is the love of sensation which prevails with so large a portion of the public. People demand highly spiced literary food for their daily entertainment, and if divorce cases or breaches of privilege do not afford the requisite *pabulum* the young lions must draw upon their inventive faculties, and manufacture something which will for the moment appease the desire for excitement.

We have recently been made acquainted with a flagrant instance of this kind through the kindness of a friend who has forwarded to us some pages of the *Philadelphia Medical Times*, of June 7. The managers of that journal appear to be impressed with the idea that correspondence between different parts of the civilized world is desirable in order to make the manners and customs of one country known in other countries for mutual benefit, and with that object, as we presume, they publish in the number we now refer to a "London letter." The writer of that letter is an English medical man resident in London, and it might reasonably have been expected that he would have something to say in his letter that would be useful or instructive, and in that sense worth being read by his American colleagues.

The first glance, however, at the London letter of the *Philadelphia Medical Times* serves to dispel such an idea, and it becomes evident that the London correspondent has either been in a state of literary destitution, without any suitable subject to write upon, or he has perversely devoted himself to the production of a sensational story no more fit to appear in the pages of a scientific journal than the ghost stories which school boys delight to find in our illustrated papers at Christmas time.

The article we refer to commences with the statement that amidst the varied relations of the professions there is none more curious than that of consultants and chemists, and especially chemists' assistants. Then it is remarked that any possibility of collusion between the two is not at first sight very apparent, and that of course it is natural for assistants in chemists and druggists' shops to recommend any consultant who is either known to them by repute or in the habit of sending his patients to the shops in which they serve. It is also admitted that chemists and druggists' assistants have some opportunity in common with other folk of seeing whose names most commonly occur in medical journals in connection with certain specialties, and it is further admitted that any reply upon such grounds to the inquiry, "Who is the man to consult for so and so?" would be quite unobjectionable.

So far then chemists and druggists or their assistants may be grateful to the London correspondent of the *Philadelphia Medical Times* for the liberty he is pleased to accord them. But, as he says, "the matter does not stop here;" he has penetrated deeper below the surface; and then he proceeds to lay before his American readers a description of what he pretends to have discovered. No one will deny that many persons who do not know anything about consultants, but yet wish to consult some one for an ailment or disease, think the readiest and surest plan is to drop into some well-known chemist's shop and ask who is the best man to see for such a complaint. What could be more natural than for the person whose daily avocations make him familiar with the repute of certain medical practitioners to be asked for such information? But the unsuspecting and confiding inquirer who does so is thoroughly "sold and hookwinked" by the quiet and "innocent looking youth who when thus interrogated immediately raps out some consultant's name"—at least that is the statement made in the letter published in an American medical journal for the information of medical men across the Atlantic.

This instructive correspondent next proceeds to relate how this is done and the statements he makes in that part of his letter are of such a nature that we will not venture to give them in abstract. After referring to the importance attached by English people to a physician's prescription and the anxiety to have it carefully dispensed, the writer says:—

"The youth to whom the prescription is handed looks at it sardonically, and remarks contemptuously, 'For piles?' Of course the patient is very much taken aback at this, and exclaims, 'Bless me! no! For bronchitis!' The youth has achieved his end, and the surprised and startled patient's confidence in the man he has just consulted is irrevocably shaken. That he should have got a prescription for piles when he went about his bronchitis, comes to him as a very unpleasant revelation. It is not only that he has spent his money in vain, but that he has been cheated into risking his health, and possibly ruining his constitution, by having the wrong medicine prescribed; the thought is very shocking that he should thus have been trifled with by ignorance or carelessness. In the midst of his perturbation he gasps out, 'Who is the best man to consult about brochitis?' The placid answer is, 'Oh, Dr. Vitreous Tendon, of course!' The deed is done; an assassin-like stab has been given to the reputation of an unoffending man, and the young scoundrel chuckles at the skilful manner in which the blow has been delivered. The patient goes away wrathful and indignant that the doctor he had just consulted should have treated him so badly, and vows with genuine earnestness that he himself will never consult him again; 'No; nor, by Jove, shall anybody I know consult him either, if I can help it!' Away he goes circulating the story among his acquaintances, getting this unlucky physician a bad name so far as he can. Now, this is certainly diabolical wickedness; and the apparent artlessness with which it is done disarms all suspicion. That the chemist's assistant had any motive other than of saving him from taking a medicine unsuitable if not possibly dangerous, any ulterior design in his apparently friendly action, never crosses the victim's imagination. It is the apparent innocence of the scoundrelism which is at once it strength and its protection. The utter guilelessness of the ingenious surprise of the young man behind the counter 'fetches' the victim, who never detects the trap that is so skilfully laid for him. That that young villain, that moral assassin, is 'squared,' there can be no doubt; and possibly enough he does not realize the injury he is doing to the unoffending physician to whose reputation he has delivered a nasty stab; but he does it all the same, and as effectually as if his conduct had been inspired by the most deliberate malice. He wished to put a fee into the pocket of Dr. VITREOUS TENDON, that was his main object; we will hope, for the sake of humanity, that he does not realize the injury he is doing to another man. A less indecent but equally effective plan is for the chemist's assistant to have three names on a card, and when asked about whom to consult, he declares his inability to decide, until the question is put home to him, 'Whom would he consult, if necessary?' He then mentions the lowest name on the list. The apparent absolute *bona fides* of this crafty villain allays any possible suspicion of 'a plant' which might arise in the mind of the sold individual, and the inquirer goes away perfectly satisfied."

As regards the motive for such conduct as that described in the above paragraph very little more than insinuation is ventured upon by the writer of the letter who evidently perceives that some of the dirt he seeks to cast at chemists and druggists must stick to his brother physicians, for we are told there are two kinds of physicians, one like the writer who says "Take your prescription to any good chemist," without recommending anyone in particular. Then the phrase "secret understanding between prescriber and dispenser" is slipped in and a story is told of a particular medical man being recommended by a chemist and druggist for syphilis, stricture, hemorrhoids, heart disease and every ill that man is heir to.

In this way the suggestion of a dishonest influence is conveyed to the minds of the reader, and then we have the remark "By what underground communi-"cation the chemist's assistant is rewarded for his "share in the unholy compact has not yet transpired; "but it is quite obvious some arrangement does "exist." It is almost suggested that the chemist and druggist is the prime mover of the arrangement as well as the only culpable participator in it, for it is anticipated that "doubtless the chemists' journals will resent what is here written," and "will cast doubts on the statements here made." No such resentment is referred to, however, as being likely to come from the medical journals, for the charge is adroitly made only to affect chemists and druggists and "black sheep" in the medical profession. Perhaps a reason for this is to be found in the letter itself, since the writer says he has heard of a chemist and druggist's assistant who stated that "There was no such medical man in London." Such ignorance may be more reprehensible than we are disposed to consider it, but it certainly does not justify the designation of the assistant as a "youthful young sprig of rascality."

It is very difficult to come to any conclusion concerning such an effusion as the one we have above dealt with. Charity forbids us to entertain the latent suspicion that it is an ingenious mode of obtaining the "bold advertisement" so much sought after by professional as well as trading men. But we cannot any the more regard it as wholesome criticism since it lacks the truthfulness and temperance that should always characterize a critic. More likely it is the result of an illusion provoked by the circumstance of being unknown to some chemist and druggist's assistant, and that the writer brooding on this indignity has conjured up the form and semblance of a foeman worthy of his steel and madly possessed by this idea has made himself as ridiculous as CERVANTES' lanky and lugrubrious knight in attacking a harmless and inoffensive windmill.

BRITISH PHARMACEUTICAL CONFERENCE.

BY the courtesy of the Secretaries we have been favoured with the following list of papers to be read at the meeting of the British Pharmaceutical Conference, at Sheffield, August 19 and 20:—

1. Report on the Aconite Alkaloids. C. R. A. WRIGHT, D.Sc., F.C.S.
2. The Capacity of Different Organs to Absorb and Retain Arsenic in Cases of Chronic Poisoning. N. P. HAMBERG, M.D., H.M.P.S.
3. The Growth and Development of Ergot. W. W. STODDART, F.I.C., F.C.S.
4. The Application of Chloroform in the Testing of Drugs. LOUIS SIEBOLD, F.I.C., F.C.S.
5. Note on the Specific Gravity of Liquids. LOUIS SIEBOLD, F.I.C., F.C.S.
6. Proximate Analysis of the Rhizome of *Zingiber officinalis.* J. C. THRESH, F.C.S.
7. Soluble Essence of Ginger. J. C. THRESH, F.C.S.
8. The Polarimeter and its Use in Pharmacy. C. SYMES, Ph.D.
9. The Assay of Commercial Disinfecting Powders containing Carbolic Acid. A. H. ALLEN, F.I.C., F.C.S.
10. Notes on Petroleum Spirit. A. H. ALLEN, F.C.S.
11. Cinnamon Bark. Mr. A. H. JACKSON.
12. The Gelatinization of Tincture of Kino. Mr. T. H. BAMFORD.
13. Amylic Alcohol and Amylic Nitrite. Mr. DOTT.
14. Extraction of Pilocarpine. Mr. A. W. GERRARD.
15. Anhydrous Air as a Therapeutic Agent. G. A. KEYWORTH, F.C.S.
16. Quillaia Bark, its Chemical Composition and Use in Pharmacy. Mr. H. COLLIER.
17. Note on Aricine. JOHN ELIOT HOWARD, F.R.S.
18. The Chemistry of Chaulmoogra. J. MOSS, F.I.C.
19. The Determination of Water in Iodine. E. DAVIES, F.I.C., F.C.S.
20. The Presence of Tannin in Gentian Root. E. DAVIES, F.I.C., F.C.S.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, August 6, 1879.

MR. GEORGE WEBB SANDFORD, PRESIDENT.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT.

Present—Messrs. Atkins, Bottle, Gostling, Hampson, Hills, Mackay, Rimmington, Savage, Symes, Williams and Woolley.

The minutes of the previous meeting were read. Previous to their being signed,

Mr. WOOLLEY said he wished to make an observation on two matters arising out of the minutes. The first referred to the conversation which took place respecting the Sale of Food and Drugs Act Amendment Bill. A friend of his had commiserated with him on the rap over the knuckles which it was thought he had received in the matter, but he did not want to say anything about that, except that he had never seen the Bill before. The important point was that this Bill was ordered to be printed on April 29, but it did not seem to have ever been brought before the Law and Parliamentary Committee, and carefully considered. He was not one of those who complained of the Adulteration Act, which in many instances had been of great advantage, but that it needed amendment was evident from the new Act having been passed, and as this bore so directly on the trade, the Committee ought at all events to have gone through it and seen whether some improvements could not be suggested. For instance, it was a great hardship that an innocent man could never recover his costs. He should like to ask how it was that the Bill had not been brought before the Committee.

The PRESIDENT thought it had been many times mentioned at that table or in the Committee.

Mr. WOOLLEY thought it ought to have been brought regularly before the specially appointed Committee for considering such questions, and gone through in a proper way.

Mr. RIMMINGTON said the Bill in the first place only referred to the strength at which spirit should be sold, and excited very little interest even in parliament.

The PRESIDENT said that one gentleman who was examined before the Committee, the government analyst from Somerset House, called on him respecting a matter, which had been incidentally referred to and which would have affected chemists; that was mentioned at the Council table on more than one occasion. There never was any attempt on the part of the promoters of the Bill to introduce any clause which would specially affect chemists and druggists, and he had never heard a suggestion made by the Committee or Council that alterations were required. So far as Mr. Woolley had been in error, he thought all the members of Council were in the same boat, for none of them were aware of the last line in the Bill when the matter was discussed at the last meeting of Council.

Mr. WOOLLEY said the other matter he wished to refer to was the increase of salary voted to the Editor and Sub-Editor at the last meeting. He thought this was a matter of sufficient importance to appear in the report of the Council proceedings.

The PRESIDENT said the members of the Society were apprised of any alterations in these matters by the balance sheet issued preparatory to the annual meeting.

Mr. WILLIAMS said this matter arose out of the proceedings of a Committee. If they were to publish all the reports of the Committees as well as the Council it would become a very serious matter. Unless it were made a practice to publish the reports of the Committees, such matters could not very well be published.

Mr. HAMPSON thought Mr. Williams's view was scarcely accurate, because the report very frequently contained a statement of what had been done by the Committee. For instance, in the General Purposes Committee, certain prosecutions were agreed to, and a notification of this effect was frequently made.

Mr. ATKINS was disposed to support the view taken by Mr. Woolley, though perhaps it would be discussed better at a later period in connection with a motion to which Mr. Symes had given notice.

The minutes were then confirmed.

THE INDIA MUSEUM.

The PRESIDENT said the Council was aware that it was the intention of the Government to break up the India Museum, and the Curator, Mr. Holmes, on going over it was informed that if the Society made application in all probability it would obtain certain things which were very interesting. He (the President) thereupon wrote to the Honourable E. Stanhope on the subject, and had received a reply, promising to lay the matter before the Secretary of State for India in Council for his consideration, so that he hoped, if any distribution of this collection were made, the Society would be thought of.

The VICE-PRESIDENT wished it was within the province of the Council to express a disapproval of the course which the Government had thought fit to adopt. A more unfortunate resolution he could hardly conceive than that of scattering this fine collection of Indian products.

DIPLOMAS TO PHARMACEUTICAL CHEMISTS

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a Diploma stamped with the seal of the Society:—

Alcock, Frank Harris.
Allan, James Henry.
Betts, George.
Bird, Henry.
Dutton, Hugh Odard.
Grimble, Albert.
Horton, Thomas.
Lapthorn, George.
Lomax, Alban Edward.
Mayger, William John.
Nowell, Barnes.
Pisani, Orestes Victoriano.
Porter, Thomas.
Ratcliffe, Henry Norman.
Remfry, Samuel Alfred.
Russell, James Lawson.
Shirley, Stephen Shillito.
Smithson, Thomas Henry.
Villar, Arthur.

ELECTIONS.

MEMBERS

Pharmaceutical Chemists.

The following, having passed the Major examination and having tendered their subscriptions for the current year, were elected Members of the Society:—

Alcock, Frank Harris ....Stoke-on-Trent.
Allan, James Henry..............Stockton-on-Tees.
Betts, George ....Scottow.
Horton, Thomas ....Burton-Overy.
Lapthorn, George...................Southsea.
Lomax, Alban Edward ....Birkenhead.
Mayger, William John ....Northampton.
Nowell, Barnes.......................London.
Ratcliffe, Henry Norman ......Malmesbury.
Smithson, Thomas Henry ......Thirsk.
Villar, Arthur ....Taunton.

The following, an Associate of the Society before 1842, having tendered his subscription for the current year, was elected a Member of the Society:—

Ashmall, George ....Wallingford.

Chemists and Druggists.

The following, who was in business on his own account before August 1, 1868, having tendered his subscription for the current year was elected a "Member" of the Society:—

Moore, Francis Samuel ....Castle Cary.

ASSOCIATES IN BUSINESS.

The following, having passed the Minor examination, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Davis, Henry John ....Newbury.
Hulland, Charles Richard ......Framlingham.
Pickles, Walter.....................Dewsbury.

ASSOCIATES.

The following, having passed the Minor examination and tendered or paid (as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Ballard, Frank English .. ..Aylesbury.
Bourne, Charles M. K. ...... Wolverhampton.
Bown, John Quinton ....Nottingham.
Bridge, George Edward ....Maidstone.
Carter, Francis ....London.
Clerke, William Burdett.........Leamington.
Crow, William......................Berwick-on-Tweed.
Crowther, Arthur..................Tickhill.
Davies, Thomas ....Bridgend.
De Peare, John Thomas ....Spalding.
Drew, Henry William...........Southwark.
Feaver, William ....Truro.
Green, William James............Yeovil.
Harburn, Alfred ....London.
Hope, Arthur Peach ....Uppingham.
Humphreys, Griffith ....Corwen.
Kelly, Francis Charles ....Great Yarmouth.
Lindewald, Wilhelm Edvard ...London.
Macaulay, William Henry ......Rotherham.
Manning, Alfred ....Strood.
Morgan, John Daniel ....Swansea.
Morris, David ....Cardigan.
Olden, Loathan.....................Romsey.
Peck, Frederick William.........Cambridge.
Plattin, Henry Ramm............Fakenham.
Powell, William ....Swansea.
Ratcliffe, George ....London.
Rossiter, Thomas Edward ......Tiverton.
Roughton, William ....Loughborough.
Selleck, William Robert ....Bovey Tracey.
Shrivell, Frederick William E....Hadlow.
Smith, John Thomas ....Spalding.
Stableforth, John William ......London.
Stedman, Walter ....West Malling.
Taylor, James Bennett ....Bedford.
Thompson, Arthur Stevens......Barking.
Topliss, Walter George ....Wainfleet.
Wild, George Frederick ....Hyde.
Willis, Henry James ....London.
Willis, Joseph Darrington ......Northampton.
Wimshurst, Frederick............Southborough.
Wood, Robert ....Loughborough.
Wyatt, Charles Frederick ......Old Brompton.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Baron, Richard Edward ....Alderney.
Barnett, Henry Frederick ......Uttoxeter.
Bruce, Alexander Gibb ....Broughty Ferry.
Butler, Ernest F. N. G. ....London.
Callow, Ewan ....Douglas.
Clayton, Walter Flower ....London.
Cubey, Robert Hewison ....South Shields.
Edwards, Henry ....Liverpool.
Ellisson, Charles ....Barnsley.
Farthing, Thomas William......Devonport.
Gibson, Matthew Henry.........Matlock Bath.
Gooch, Stephen Leeds............Reepham.
Green, Frederick ....London.
Grey, William ....Blyth.
Grigs, Emerson Fenwick G. ...North Shields.
Grimwade, Edward H............Croydon.
Hopper, James Henry............Ryde.
Hutchinson, John..................Kendal.
Inman, Thomas Leonard.........Batley.
Joye, Joseph ....Southport.
Knox, John ....March.
Lawton, Ernest.....................Barnsley.
McEwan, David ....Perth.
Melhado, Howard Emanuel ...Ramsgate.
Moore, Joseph Edward ....Bristol.
Morris, Harold Edward ....London.
Morgan, Richard ....London.
Owen, William ....Towyn.
Pawson, Frederick Thomas......Banbury.
Pumphrey, Arthur ....York.
Roberts, Griffith ....London.
Robinson, Thomas ....Wigton.
Shepperd, William John.........Newport, I. of W.
Taylor, George ....Fairfield.
Whaley, Thomas Cope............Barnsley.
Young, John.........................Arbroath.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The names of the following persons who have severally made the required declarations and paid a fine of one guinea were restored to the Register of Chemists and Druggists:—

William Halket, 74, Talbot Road, Bayswater, London, W.,
Richard Hammersley Forrester, 2, Merthyr Road, Abergavenny.

ADDITION TO THE REGISTER.

The Secretary reported that—

Thomas Farren Humble, Abergavenny,

having made a statutory declaration that he was in business before the passing of the Pharmacy Act, 1868, and this declaration having been duly supported by medical practitioners, his name had been placed on the Register.

REPORTS OF COMMITTEES.

FINANCE.

The report of this Committee was received and adopted, and various accounts ordered to be paid.

BENEVOLENT FUND.

The report of this Committee included recommendations of the following grants:—

£10 to the widow of a registered chemist and druggist.

£15 to aid in the education of the younger son of the widow of a registered chemist and druggist. The applicant has had two previous grants.

£10 to the widow of a pharmaceutical chemist. Applicant had a grant of £15 in September last.

£17 for continuing the education of an orphan in an establishment in Belgium for another year. This case stood over last month for further consideration.

£5 to a registered chemist and druggist who recently sustained an accident and had a grant of £10 in February last.

A letter was read from Annie Isherwood, stating that she had a very happy and comfortable home.

The Committee had declined to entertain one application, as it appeared that the applicant was of intemperate habits.

The report and recommendations of the Committee were received and adopted.

LIBRARY, MUSEUM AND LABORATORY.

The report of this Committee included the usual report from the Librarian, to the following effect:—

Attendance during the day: highest, 26, lowest, 10, average, 20; evening, highest, 17, lowest, 7, average, 10. Circulation of books: town, 154; country, 49; carriage paid, £1 5*s.* 9½*d.* He had also reported the following donations to the Library:—

Cooley (A. J.), Cyclopædia of Practical Receipts, 6 ed., 1879, pt. 13. From Messrs. Churchill.

Dragendorff (G.), Bemerkungen in Bezug auf die Nachweisbarkeit des Strychnins in verwesenden Cadavern, 1879.

Mandelin (K. F.), Chinincitrater, 1879.

Scheibe (E.), Darstellung und Beschreibung der Borcitronensäure and ihrer Salze, 1879. From Professor Dragendorff.

Tilden (Dr. W. A.), Theory of Solution and Crystallization, being the substance of a Lecture given to the Bristol Naturalists' Society, 1878. From the Author.

Pifferi (G.), Breve cenno e preparazione di un nuovo composto di chinina, 1879. From the Author.

The Committee recommended that the usual letters of thanks be forwarded.

The Committee recommended the purchase of the following books for the Library:—

General Fund:—

Allen (A. H.), Introduction to Commercial Organic Analysis; vol. i. Cyanogen Compounds, Alcohols, Phenols, Acids, etc., 1879.

Hermann (L.), Elements of Human Physiology, translated by A. Gamgee, 2 ed., 1878.

Neubauer (C.), and J. Vogel, Guide to Qualitative and Quantitative Analysis of Urine, translated by W. O. Markham, 1863.

Squire (P.), Pharmacopœias of London Hospitals, 4 ed., 1879.

Unity of Medicine, its Corruptions and Divisions; by F.R.C.S., 1858.

Yvon (P.), Traité de l'Art de Formuler, comprenant un abrégé de pharmacie chimique, etc., 1879.

Hanbury Fund:—

Baillon (H.), Natural History of Plants, vols. 1–5, 1871–8, and vol. 6 when published.

Siebold and Zuccarini, Flora Japonica, 1825–70, 2 v., 150 coloured plates.

Wallich (N.), Plantæ Asiaticæ rariores, 1829–32, 300 coloured plates.

The Curator had reported the attendance in the Museum to have been as follows:—During the day, average, 17; evening, average, 6. He had also reported the following donations to the Museum:—

Ninety-five specimens of drugs used in the United States and eleven specimens of active principles, comprising three specimens of Podophyllin; two specimens of Hydrastine, one precipitated and the other crystallized; Cimicifugin; Berberine; Sulphate, Hydrochlorate and Hypophosphite of Berberine; and Nitrate of Sanguinarina. From the Philadelphia College of Pharmacy.

Specimens of Paracoto Bark and the following substances obtained from it:—Paracotoin, Hydrocotoin, Dinitro-coton, Leucotin, Oxyleucotin and Dibenzoyl-hydrocoton.*

Coto bark and Cotoin, Sulpho-carbolate of Quinine, Quinine, Chinamine, Aricine, Cusconine, Paricine; and the following active principles of Opium, Laudanine, Cryptopine, Cryptopine Oxalate, Pseudo Morphine.

Also the following liquids:—

a. Paracotol, $C_{15}H_{24}O$.
b. Paracotol, $C_{18}H_{40}O_2$.
c. Paracotol, $C_{28}H_{40}O_2$.
Paracoto-oil.

The particulars concerning these bodies are promised in a future communication. From Dr. O. Hesse.

Specimens of the undermentioned essential oils, in illustration of a paper read by Mr. W. E. Bush at the Students' Association:—

Almond, Aniseed, Bergamot, Camomile, Caraway, Cassia, Cinnamon, Cinnamon leaf, Citronelle, Cloves, Copaiba, Coriander, Cubebs, Dill, Geranium (Spanish), Juniper, Lavender (Exotic and Mitcham), Lemons, pure, Mustard, Mustard (artificial), Neroli, Nutmeg, Orange peel, Origanum, Parsley, Peppermint (Mitcham), Petit Grain, Pimento, Sassafras, Rose, Rosemary. From Messrs. W. J. Bush and Co.

The Committee recommended that the usual letters of thanks be forwarded, with a special one for the Philadelphia College of Pharmacy.

The Curator had reported that a shark's skin had been sent by Mr. Fresson of Demerara, but as it was not suitable for the Society's Museum, it was suggested that it should be offered to some society collecting natural history specimens.

Professor Bentley had reported that his class was progressing favourably, and had kept up better at the gardens than on any former occasion. Professor Redwood had stated that there was no special matter to report in reference to his class.

It had been ordered that the Library and Museum be closed in the evenings during the months of August and September.

A letter had been submitted from an assistant residing in the country, requesting that the regulation requiring the guarantee of a member for the safe keeping and due return of books might in his case be relaxed. The Committee did not deem it advisable to make any exceptions to this rule.

The Committee recommended that the Librarian should attend the annual meeting of the Library Association to be held in Manchester in September, and that ten guineas be allowed for his expenses.

The Sub-Editor had reported that the manuscript of the Index to the Journal from 1868 to 78 was complete, and the Committee had directed that an estimate be obtained for printing the same.

Professor Redwood had reported that he had made considerable progress with the continuation of Jacob Bell's 'Historical Sketch of Pharmacy,' which he thought would make about 300 pages octavo, and he had suggested that the earlier part should be put into the hands of the printer in order that the manner in which he was continuing the work might be submitted to the Committee for approval.

The Committee recommended that estimates should be obtained for printing the book in the form suggested by the Professor.

The Committee also recommended that the Editor and Sub-Editor should attend the meeting of the Pharmaceutical Society of Germany at Hanover, and that £20 be allowed to meet expenses.

The PRESIDENT said it would be noticed that the Hanbury Fund was exhausted, and he believed it had been as well laid out as possible.

Mr. RIMMINGTON asked if the index could be bound with the previous index.

Mr. WILLIAMS said it would be a different size, owing to the change in the size of the Journal.

Mr. BOTTLE said the same point had occurred to his mind, and he should like to know if it was a matter of

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* With regard to these substances Dr. O. Hesse states that leucotin, oxyleucotin and dibenzoyl-hydrocoton are ethers of the hexatomic alcohol, hydrocoton; that dinitro-coton stands to hydrocoton in nearly the same relation as chinone to hydrochinone; and that the formation of dinitro-coton is the origin of the peculiar coloration of leucotin and oxyleucotin and dibenzoyl-hydrocoton when these are touched with strong nitric acid.

necessity that the index should be of the same size as the Journal.

The Assistant-Secretary said the estimate had been obtained and all arrangements made on the footing of the index being the size of the Journal.

Mr. Williams hoped that a sufficient number would be printed both of the index and of the "Historical Sketch," to allow of sending a copy to each member and associate of the Society.

Mr. Hampson wished to know if the manuscript of the "Historical Sketch" were complete. He thought it would be premature to make arrangements for printing before it was complete.

Mr. Williams did not see how the Council or the Committee could sit in judgment on the work of two literary gentlemen to whom it had been entrusted.

Mr. Rimmington said he should certainly object to giving these things away broadcast. The cheaper anything was made, the less it was appreciated. If people would not give 1*s*. or 2*s*. for a copy of the "Historical Sketch," it was quite clear they did not want it, and to give them what they did not want was simply to waste. The same with regard to the index. It was certainly worth 2*s*. to anyone who had the Journal, and if a person had not the set it would be entirely thrown away. Comparatively few kept their Journals and bound them, perhaps not one in one hundred.

The President thought the time had hardly arrived for settling these details. The present question was, who should print it.

The Vice-President thought it was premature to discuss the printing of the "Historical Sketch" until the manuscript was in a more complete condition. The Council did not know how much of it was ready. He thought it would be better to send the whole matter back to the Committee.

The President thought the Council should adopt the recommendation of the Committee that when the "Historical Sketch" was printed it should be in the form suggested, of which specimens were submitted. But the Council might suggest to the Committee that the printing should not be commenced until the manuscript was complete or nearly so.

Mr. Williams said the manuscript of the index was quite complete. The question to be decided was whether it should be printed for sale, in which case 1000 copies would be ample, or if copies should be given away, in which case 5000 would be required.

Some details having been given as to the estimates which had been obtained,—

Mr. Woolley thought it would be useless to give away the copies of the index.

Mr. Mackay said he should not be in favour of giving away a single copy.

The Vice-President thought it would be a mistake to distribute these things gratis. This might seem somewhat different to the opinion he had expressed on a former occasion, but the subject matter was different. When the catalogue of the museum was published he was anxious that it should be given away, because he considered it had a certain educational value in itself; but this index had no educational value, it was simply a matter of convenience to those who wanted to use the index. The "Historical Sketch" too, ought, he thought, to be paid for by those who desired to possess it.

Mr. Atkins asked if a *via media* could not be adopted, to give the index to any person who applied for it.

Mr Williams said this index was far superior to the one appended to each volume.

Mr. Atkins said it seemed to him rather strange to charge for an index to a book which was supplied to all members in return for their subscriptions. He thought perhaps it would be wise to give it on application.

The President said that was the regulation with regard to the catalogue.

Mr. Savage said he was at first in favour of adopting the same rule, but on further consideration he thought those who wanted the index should pay for it; that which was a small matter individually became a large matter collectively.

Mr. Williams could not agree with what seemed to be the opinion of the Council, and thought it was a pity it had undertaken the publication of the "Historical Sketch" if this was to be the result. It would be mere waste of money to bring out books the circulation of which it was known would be very limited if they were sold. When the matter was initiated he trusted it would have done much good by arousing an interest in pharmacy and in the Journal, by members receiving the index for the last ten years. If members had been foolish enough to throw their numbers away they would probably regret it. He should not have taken so much interest in the matter unless he had thought the Council was going to carry it out in the liberal manner which it had lately talked so much about encouraging.

Mr. Gostling sympathized very much with the remarks of Mr. Williams. It was quite possible more energy and enthusiasm might be put into the members if something were put before them. There was a work undertaken for the benefit of all, so that anything that had been published in the Journal for ten years might be referred to, and he thought it should be sent to every member even if it were in paper covers.

The President said he was informed that the original proposition was that a copy should be sent to every member. The better plan would be to refer it back to the Committee to ascertain.

Mr. Rimmington asked how many catalogues had been applied for.

The Secretary said very few.

The Vice-President asked what was the object of the Librarian attending the meeting of the Librarians' Association; and on what ground the Committee recommended the expenditure of ten guineas in this way.

The President said when the Society of Librarians was established the Librarian attended the meeting at the request of the Committee. He was a member of the Association, of course as representing the Society, and he had quite satisfied the Committee that it would be an advantage that he should attend the conference.

Mr. Williams said it was not a question of pharmacy but of libraries. The Society's was a large public library, and he thought it essential the Librarian should be in correspondence and communication with other librarians, and in fact be a part of the commonwealth of librarians. He was very glad to find that the Society's Librarian took so much interest in the matter.

Mr. Savage desired to endorse all that Mr. Williams had said. It was very important that the Council should be in possession of all the information accessible with regard to the arrangement and management of libraries in general.

The President added that the same thing was done last year.

Mr. Williams thought it was very desirable in the interest of the Journal that the Editor and Sub-Editor should attend the Conference in Hanover. The Editor came into personal contact with many gentlemen from whom he might afterwards receive communications which would be of interest.

It was then resolved that the printing of the "Historical Sketch" be deferred until the completion of the work, and that further estimates be obtained for the printing of the index, and that the Committee report again to the Council. The remainder of the report of the Committee was adopted.

Mr. Bottle having remarked that the shark's skin referred to in the Committee's report would be acceptable to the Dover Museum, it was unanimously resolved on the motion of Mr. Williams that it be presented to that body.

HOUSE.

The Secretary had submitted to this Committee a table showing the quantity of gas consumed each year during the years 1873–79, by which it appeared that the late increase still continued. Professor Redwood had attended and stated the result of experiments he had made, showing that there was no leakage anywhere, but that there was a greater day pressure than formerly, and to this circumstance, together with the more abundant supply which the companies had recently provided, he ascribed the increased consumption.

The Committee recommended that the gas used in the laboratories should pass through a separate meter.

Mr. Atkins said he had mentioned on a former occasion that he had had his gas meter repaired; but the result did not answer his expectations, for he found the consumption for the last quarter almost double that of the corresponding quarter in last year. He was satisfied, having taken great pains about it, that he burned less gas, and he therefore consulted the gas manager who told him that the complaint was very general, and his explanation was, that owing to complaints of insufficient pressure, the plant had been largely increased, and there was more than double the pressure and therefore more gas passed through the burners. The manager advised him to regulate the supply at the meter, and not allow more gas to pass than was requsite for a due supply to the burners; and having done so he was satisfied there would be a reduction.

Mr. Woolley said Mr. Atkins was quite right. He himself had Carnaby's apparatus in use, which could be put up in any convenient place, and by it he could regulate the supply at the meter down to a single burner if required.

The report of the Committee was received and adopted.

THE CONFERENCE.

The Vice-President, as representing the British Pharmaceutical Conference, said last year delegates were appointed to that body from the Council and it would be considered an honour if the same course were followed now.

It was moved by Mr. Mackay, seconded by Mr. Bottle, and carried unanimously—

"That the President and such members of the Council as are present at the meeting of the British Pharmaceutical Conference be requested to represent the Society as delegates."

GENERAL PURPOSES.

This Committee had received the reports from the Professors as to the prize examinations, and opened the motto envelopes to ascertain the names of the successful candidates.

Botany and Materia Medica.

Professor Bentley had reported that six candidates had presented themselves for examination for the bronze medal and certificates of merit, all of whom passed a satisfactory examination and three were worthy of special distinction. With regard to the Terminal examination for the silver medal and certificates of honour and merit for the session 1878–9, fourteen candidates had presented themselves, being rather over the average for the last five years, and the answers of the majority were highly creditable. The number of students attending his class during the last session had been notably in advance of last year, and the general attendance and uniform good conduct of the students, both at Bloomsbury Square and at the Botanic Gardens, proved that the school maintained its high character for order, progress and discipline.

Herbarium Prize.

Professor Bentley had reported that four collections had been sent in. The first in order of merit, that of Mr. Perkins was eminently worthy of the silver medal, it containing over 800 specimens. The second contained nearly 600 and reflected great credit on Mr. Walker, to whom he recommended that the bronze medal be awarded. The third also showed great merit and he recommended that a certificate of merit be awarded to Mr. Norman.

Chemistry and Pharmacy.

Professor Redwood had reported that in this class, the general conduct and industry of which had been very satisfactory, there were eleven competitors for the silver medal and certificates, the first six having furnished papers to which he had attached values entitling the authors to some marks of distinction. In the competition for the bronze medal and certificates there had been seven competitors, five of whom had acquitted themselves well, the first two remarkably so.

Practical Chemistry.

Professor Attfield had presented a report showing the number of marks obtained by the first eight out of seventeen competitors.

Council Examination Prizes.

Mr. Moss on behalf of Mr. Southall and himself had presented a report of this examination, giving the mottoes and number of marks of the seven competitors.

Legal and Parliamentary.

The Solicitor had presented to the Committee his usual report. It stated that

William B. Mason, 14, Arcade, Briggate, Leeds, had, prior to the hearing of the case against him, paid the amount of penalty and costs into Court, amounting to £5 8*s.* 3*d.* He had also reported that the Special Committee on the Medical Act had concluded its sittings, and that no point had arisen in which the Society was specially interested. Various cases of alleged infringement had been brought before the Committee, five of which were recommended to be placed in the Solicitor's hands with a view to taking proceedings. The consideration of the question of the sale of patent medicines had been deferred.

The Council considered in Committee, as usual, some of the cases of alleged infringement, and ultimately the report and recommendations of the Committee were received and adopted.

Prize Awards.

The following awards were made on the recommendation of the General Purposes Committee:—

Chemistry and Pharmacy.

[Five months' course.]

Bronze Medal..........Thomas Horton.
Certificates of Merit..........Henry William Drew. William Herbert Hyatt. George Wale. William Inchle Gulliver.

[Ten months' course.]

Silver Medal..........James B. Lillie Mackay.
Certificates of Honour..........Thomas Horton. Edward Jarrett Eaton. James Henry Allan.
Certificates of Merit..........Frank Harris Alcock. Henry William Drew.

Botany and Materia Medica.

[Five months' course.]

Bronze Medal..........Thomas Horton.
Certificates of Merit..........Henry William Drew. William Inchle Gulliver.

[Ten months' course.]

Silver Medal..........James B. Lillie Mackay.
Certificates of Honour..........Thomas Horton. Frank Harris Alcock. Henry William Drew. Edward Jarrett Eaton.

Certificates of Merit	James Edward Williams. William Inchle Gulliver. Fred. Wm. Ed. Shrivell. James Henry Allan. Percival C. Powrie. Isaac Leach.

Practical Chemistry.

Silver Medal	Frank Harris Alcock.
Bronze Medals	Fredk. Walmsley Warrick Robert John Price.
Certificates of Merit	Edward Jarrett Eaton. James B. Lillie Mackay. William Inchle Gulliver. Beresford F. H. Maudson. Thomas Horton.

Botanical Prize.

Silver Medal	Thos. Frampton Perkins.
Bronze Medal	Charles Walker.
Certificate of Merit	William Francis Norman

Council Examination Prizes.

Pereira Medal (silver); and Books value £5, presented by Mr. T. H. Hills.

Frank Harris Alcock.

Pharmaceutical Society's Medal (silver); and Books value £3, presented by Mr. T. H. Hills.

Marshall Leigh.

Pharmaceutical Society's Medal (bronze); and Books value £2, presented by Mr. T. H. Hills.

Henry Allen.

JACOB BELL MEMORIAL SCHOLARSHIPS.

The Committee appointed to award these scholarships, subject to the approval of the Council, reported that the examination was held on July 1, when eleven candidates competed, viz., in London, 8; Brighton, 1; Manchester, 1; Nottingham, 1.

The mottoes adopted by the two candidates who had obtained the highest number of marks were "Alere flammam" and "Minimus," and the Committee recommended that the scholarships should be awarded to the competitors who had used those mottoes.

The Committee had opened the envelopes bearing those mottoes, and the successful candidates were found to be—

William Elborne
and
John Thomas.

Superintendents of Examinations.

The following list of Superintendents and Deputy-Superintendents of written examinations for the ensuing year was agreed to:—

Aberdeen	Davidson, Charles.
Birmingham	Southall, William.
Brighton	Gwatkin, James Thomas.
Bristol	Stroud, John.
Cambridge	Deck, Arthur.
Canterbury	Bing, Edwin.
Cardiff	Hollway, A. B.
Carlisle	Thompson, Andrew.
Carmarthen	Davies, R. M.
Carnarvon	Lloyd, William.
Cheltenham	Smith, Nathaniel.
Darlington	Robinson, James.
Douglas, Isle of Man	Brearey, William A.
Dundee	Hardie, James.
Edinburgh	Mackay, John.
Exeter	Delves, George.
Glasgow	Kinninmont, Alexander.
Guernsey	Arnold, Adolphus.
Hull	Bell, Charles B.
Inverness	Galloway, George R.
Jersey	Ereaut, John, jun.
Lancaster	Bagnall, William Henry.
Leeds	Reynolds, Richard.
Lincoln	Maltby, Joseph.
Liverpool	Abraham, Thomas Fell.
London	Taylor, George Spratt.
Manchester	Wilkinson, William.
Newcastle-on-Tyne	Martin, Nathaniel H.
Northampton	Bingley, John.
Norwich	Sutton, Francis.
Nottingham	FitzHugh, Richard.
Oxford	Prior, George T.
Peterborough	Heanley, Marshall.
Sheffield	Ward, William.
Shrewsbury	Cross, William Gowen.
Southampton	Dawson, Oliver R.
Truro	Percy, Thomas B.
Worcester	Virgo, Charles.
York	Davison, Ralph.

Deputy-Superintendents of Examinations.

Aberdeen	Kay, James Petrie.
Birmingham	Churchill, Walter J.
Brighton	Gwatkin, James Ross.
Bristol	Tucker, Robert Lewis.
Cambridge	Church, Henry James.
Canterbury	Amos, Daniel.
Cardiff	Sanders, W. J.
Carlisle	Hallaway, John.
Carmarthen	Davies, R. M., jun.
Carnarvon	Hughes, Richard.
Cheltenham	Barron, William.
Darlington	Hutchinson, Rev. E.
Douglas, Isle of Man	Brearey, Arthur W.
Dundee	Kerr, Charles.
Edinburgh	Ainslie, William.
Exeter	Lake, J. H.
Glasgow	Davison, Thomas.
Guernsey	Collenette, Adolphus.
Hull	Baynes, James.
Inverness	Galloway, George.
Jersey	Ereaut, John.
Lancaster	Hall, William.
Leeds	Smeeton, William.
Lincoln	Battle, John Scoley.
Liverpool	Shaw, John.
London	Bremridge, Richard. Knapman, John W. Holmes, Edward M.
Manchester	Wilkinson, George.
Newcastle-on-Tyne	Stuart, Charles E.
Northampton	Mayger, W. D.
Norwich	Corder, Octavius.
Nottingham	Rayner, John.
Oxford	Thurland, Thomas Henry.
Peterborough	Buckle, Frank George.
Sheffield	Maleham, H. W.
Shrewsbury	Cross, William G., jun.
Southampton	Spearing, James.
Truro	Fiddick, Thomas.
Worcester	Lunn, Thomas.
York	Sowray, Joseph.

REPORTS OF THE COUNCIL PROCEEDINGS.

Mr. SYMES moved a resolution of which he had given notice, though he had slightly modified the wording of it to this effect:—

"That when any matter is considered in Committee during the Council proceedings, a record of the fact be stated in the Journal report of the Council proceedings, except under some special circumstances where the Council by vote decide that it is undesirable."

His idea was that everything taken into Committee should be reported in name, not necessarily in detail, but that the Council should still have the power by a special vote to decide that it was undesirable that some special matter should be reported. He scarcely knew whether it was necessary to say much in support of the motion, but he had brought it forward under the full impression that there was a necessity for something of the kind. The first impression perhaps on reading it would be that it implied nothing which was not now provided for, and he did not wish to propose any innovation; but it occurred to him that on several occasions the Council had gone in and out of Committee, and the members had hardly known where they were; it had occurred that day and he was informed it had occurred frequently before, which rather showed that when the Council went into Committee it should do so more formally. The motion also suggested that at present the report was not as full as it might be, that it was not adequate to the importance or commensurate with the amount of work which the Council did. Its constituency had a right to be fully informed of the method of procedure by which it was governed, and not only members of the Society, but chemists and druggists, for whom it legislated, had a right to be informed, not merely of the skeleton of its proceedings, but to have something more of the substance of them. It was complained sometimes that the members of the calling did not take as much interest in the proceedings of the Society as they might do, and the latter retaliated, when they had the opportunity, by saying that the Council did not consider their interests. It occurred to him that one means by which the Council might more fully do its part, would be by more deeply interesting these gentlemen in what it was doing. There was scarcely a subject considered there, of however little importance it might appear, the bearings of which had not some importance for persons who were concerned in the business in other matters. A report in the Journal would help to excite that interest which he was desirous of creating. They had been told that day that a matter which was not reported would appear in the balance sheet at the Annual Meeting, but if it were of sufficient interest to be stated there, it would be of more interest if it were found in the ordinary proceedings. The Annual Meeting lasted but a few hours, and when on the last occasion a gentleman got up and asked for figures, they all felt that he was straining a point too far in asking for such details. Probably he would not have asked for any figures at all if he had been able to read in the ordinary reports what had been done with the money of the Society. The Council met to conduct the business of the Society and to expend the money obtained from individual members. If those subscriptions came from wealthy men, it would not so much matter how they were expended, provided it was done wisely and not extravagantly, but many of these subscriptions came from men in a small way of business to whom it was really a tax, and they looked to get some equivalent for it. Their connection with the Society was the equivalent and they ought to have as much as possible for their money. By making the reports more full this would be done. The most interesting part of the work was generally done in Committee, and that the members of the Council should keep the most interesting part to themselves and hand over the least interesting part to their constituents, seemed a proceeding which it was not necessary to argue upon.

Mr. Atkins seconded the motion. He did not precisely know how it could be carried out, but he had had a strong conviction in his own mind for years that the constituency had a right to know what went on. He had known interesting questions occupy the Council for an hour or more, and yet in the country he had been asked why they had not been mentioned. He knew there might be a difficulty often as to what should be eliminated, but it had occurred to him that there was a middle course which did not require a great amount of discrimination to find, viz., to intimate that at a particular stage the Council resolved itself into Committee and discussed such and such a matter. Names need not be mentioned or any particulars which would frustrate legal action, if legal action were to be taken, but the fullest report consistent with prudence ought to be furnished. Certainly the unjust criticism which took place outside ought to be disarmed, that after spending four, five or six hours at the Council Board there was but a very sparse report of what had occupied the best intellects there for a number of hours. He hoped some means would be found of complying with the very reasonable suggestion contained in the motion.

The President said he had no objection to the motion, the modification introduced having entirely taken the sting out of it. There was a very good example of unauthorized reporting in the *Chemist and Druggist* with regard to the proceedings last month, for as there put it was altogether a misrepresentation of the facts.

Mr. Hampson said the Council had the cure in its own hands. If there had been an unofficial reporter present he would not have fallen into the error. He should be in favour of another reporter being admitted.

The President said the inference expressed in the words he had quoted could not be drawn from the report which appeared in the Journal.

Mr. Gostling said he had felt very strongly the injustice of the report which appeared in the *Chemist and Druggist*, and on reading it he thought he could not vote for Mr. Symes's motion. What the Council did last month was perfectly consistent with the interests of the trade, viz., not to publish what was said with regard to the prosecution of co-operative stores generally. As the motion was now altered, he could vote for it with pleasure. There was a good deal of point in some of the remarks made as to extending information amongst members as to what was done in Committee.

The President, having read the Journal report, repeated that it contained nothing to justify what appeared in the *Chemist and Druggist*.

Mr. Rimmington said he should like to know who communicated that to the *Chemist and Druggist*.

The President said he was quite unable to answer that question.

Mr. Williams said he had thought over this subject a good deal, and had long been of opinion that it would be well if the reports of Council meetings were fuller and more complete; but the present motion did not seem to him practical enough to be of real service, and he should like to see it modified so as to make it really practical instead of a mere expression of opinion. He thought he could see how the Council could get out of the difficulty. He could quite understand the difficulty which the reporter felt sometimes in knowing what to report and what to omit, and of course when the Council went into Committee he did not take down anything of the discussion, though frequently it turned out that there was no reason why the discussion should not be reported. He thought the best plan would be to have full notes taken of all transactions, whether in Council or Committee; but that before being published they should be submitted to some one, either an individual or a Committee, who should take the responsibility of what was fit to be published, or rather of what it was necessary to omit. In his own opinion the President for the the time being would be the most suitable to undertake this office. If any check were required it could be afforded by the original notes with the alterations being placed before the next Council meeting. He thought it would be found in practice that very little alteration was required.

Mr. Hampson asked if the doctoring would be done in the Editor's room or there.

Mr. Williams said certainly not in the Editor's room. He should object to placing any paid servant of the Society in such a position. He only wished to prevent the publication of matter which would be decidedly objectionable, but to have as much unobjectionable matter as possible published.

Mr. Mackay said he quite agreed with the principle of the motion, for he had always argued that the proceedings of the Council as reported were not satisfactory to the outside members. He had always felt that they were far too short, but he also felt that if the motion as originally drawn were carried, and everything that transpired were put into print the members of the Council would be running their heads against a post. As an addition had been made to the original motion that difficulty was avoided, and therefore he could vote for it. He could see, however, that there would be some difficulty in carrying it out in detail. But Mr. Williams's suggestion, he thought, was about the most unpractical he had ever heard; he did not think the man was born who would take the office of President if he had to do what Mr. Williams suggested—to be reponsible, first for reporting what took place, and next to be called over the coals a month afterwards for having either published or omitted something he ought not. He had more than once advocated, and would again throw out the suggestion that the Editor should have a seat at the reporter's table, and be responsible for giving a full account of the Council's proceedings. Let him be furnished with full notes of what took place and be responsible for what appeared.

Mr. Bottle said, with every desire to follow up Mr. Symes's wish to have a full account of all that occurred at the Council table, he could not help feeling that the mode in which the motion had now been put was peculiarly unfortunate, inasmuch as it would require that the Council should publish to its constituents that it had voted that a certain something should not be communicated to them. The members were to consider a certain thing n Committee and then in Council resolve that what they had done should be kept secret. He would rather put it the other way and let it be the vote of the Council that such and such a thing should be communicated.

Mr. Symes said he was pleased to find that the opinion of the Council was so entirely with him, as he had indeed expected; but he should like to reply to some of the remarks which had been made. If the report of the proceedings were a *verbatim* one there would be no difficulty in the matter, because everything uttered would be reported; but the Council now threw on the reporter a very serious responsibility. Mr. Mackay said the President would not think of undertaking such a responsibility, and yet at every meeting the Council threw on the reporter the responsibility of sifting out what he thought desirable to report. Now the President, being a chemist and druggist, would have to some extent a long education in what was required by chemists and druggists to be known; but the reporter was a professional reporter, who could hardly be expected to be able to select such matter as would be interesting to chemists and druggists throughout the country, and it was most unfair to him to cast this duty upon him. He had nothing to complain of as to the manner in which the reporter did his duty, but he was put in a false position. As to that report in the *Chemist and Druggist*, the first thing which occurred to him was that some one had been breaking faith in communicating it, but the second reflection was that no one had done so, but that it was a deduction from the official report, and it illustrated his position most forcibly. It showed that by giving these meagre reports and half sentences more danger was really introduced than a full report of the discussion would have done. There seemed a good deal of mystery about the reporting. One gentleman at the last meeting, who had been a member of Council ten years, said he did not know what became of the report when it left there,—whether the reports published were the same as the reporter furnished or not. He had no wish to suggest that the report was altered; he hoped it was not; but there seemed to be a vast amount of ignorance prevailing as to whether the reporter handed to the Editor certain matter which he was to publish, or whether the Editor had any right to alter it or cut it down. He quite agreed that it was desirable to make some suggestion of how the resolution should be carried out. He had had some difficulty in maturing a plan; but it occurred to him that the vote could be taken in Committee in connection with the subject under discussion, so that if it were decided not to publish it, the vote would be part of the matter which would not be published, but if the majority of the Council thought it well to publish it, the fact might be stated. That would be a healthy thing too, as it would give the constitituency an opportunity of seeing how far the Council was disposed, and which of its members were disposed, to give them a larger share of the information which they thought they ought to possess. The only thing he would suggest was that when the Council went into Committee—and it ought to go in and out of Committee more formally than it often did—then it should ask the reporter to state what he proposed to report as the result of the discussion, or it might suggest to him what he should report. That seemed the only solution: that the Council should decide on the spot what should be reported, the form in which it should be reported, or how much and also what was not to be reported.

The Vice-President wished to know in what respect the motion, if carried, would alter the existing state of things.

Mr. Symes said it made a rule for what was now optional.

The motion was then put and carried.

The President stated that according to usual custom no business beyond what was absolutely necessary would be brought forward at the September meeting, so that only a quorum, which could be obtained in London, need attend.

Report of Examinations.

July, 1879.

England and Wales.

	Candidates. Examined.		Passed.	Failed.
Major, 9th	8		4	4
„ 10th	8		2	6
„ 16th	11		6	5
„ 17th	10		6	4
		— 37	—18	—19
Minor, 9th	18		10	8
„ 10th	21		9	12
„ 11th	27		8	19
„ 16th	18		10	8
„ 17th	17		12	5
„ 18th	26		16	10
		—127	—65	—62
Modified, 9th		4	3	1
		168	86	82

Scotland.

	Candidates Examined.		Passed.	Failed.
Major, 22nd		3	1	2
Minor, 22nd	13		6	7
„ 23rd	13		5	8
„ 24th	12		7	5
		— 38	—18	—20
Modified, 24th		3	3	0
		44	22	22

Preliminary Examination.

Candidates. Examined.	Passed.	Failed.
365	184	181

6 Certificates in lieu of the Society's Examination had been received :—

2 from the College of Preceptors.
2 from the University of Cambridge.
2 from the University of Oxford.

ERRATUM.—Page 93, column 1, line 31, *for* Macdonald Robert, Edinburgh, *read* Macgregor, Donald, Edinburgh.

Proceedings of Scientific Societies.

SOCIETY OF ARTS.

THE HISTORY OF ALIZARIN AND ALLIED COLOURING MATTERS, AND THEIR PRODUCTION FROM COAL TAR.*

BY W. H. PERKIN, F.R.S.

(*Continued from page* 98.)

The anthracene, after the treatment with naphtha, should contain about 50 per cent of pure anthracene. It is not distilled in the same manner as for the preparation of dichloranthracene, but is heated in a retort, or more generally, in a semicircular iron pot. The lid of this is furnished with a safety valve, and also a steam pipe. The receiver consists of a tank, the top of which is sometimes made of canvas; a perforated tube passes round this tank near the top, which is supplied with water and produces a gentle spray, which facilitates the condensation of the anthracene. When working this arrangement, a known weight of anthracene is introduced into the iron pot, which may be called a subliming pot, and is heated until it is quite fluid. Steam is then blown in; this carries the anthracene vapour forward with it into the receiver, when both are condensed by the spray of cold water.

The condensed anthracene is found in a wet and extremely finely divided state, very suitable for oxidation. Its weight is known from the amount of washed anthracene used in the operation. Other methods of condensing the anthracene and steam are used, but the above, I believe, is the most common. Obtaining the anthracene in this finely divided state is a great improvement upon the old process of grinding it.

The oxidation of this anthracene is performed much more slowly than it was at first, the solution of potassic bichromate and sulphuric acid being kept more diluted. In this way the amount of oxidizing agent required is smaller, less being expended on the useless impurities.

In carrying out this operation in its present form, the potassic bichromate is first dissolved in water, and the wet anthracene well mixed with it. The requisite quantity of sulphuric acid, previously diluted with water, is then added by degrees, and the mixture kept gently boiling for ten or twelve hours. A Korting's air injector should be used with the steam, to keep up the agitation of the mixture. The oxidized anthracene, which has the appearance of a yellow powder, is then collected in woollen bags, thoroughly washed, pressed and dried.

The amount of potassic bichromate used is regulated principally by the proportion of pure anthracene contained in the product to be oxidized. Pure anthracene requires about 1·66 times its weight of potassic bichromate to convert it into anthraquinone. The amount used by different manufacturers varies, some employing a little under two parts, others more; but no fixed quantity can be given, as the amount required evidently must differ with the kind of impurities contained in different parcels of anthracene, some of these oxidizing more freely than others. It is remarkable that so little answers the purpose, and shows that the anthracene takes up the oxygen more greedily than the impurities. Too much oxidizing agent is injurious.

The anthraquinone is still very crude, and needs purification. The method that has been most generally adopted consists in treating it with concentrated sulphuric acid. This dissolves the anthraquinone, but does not act upon it. The impurities, however, become soluble in water, being converted in sulpho acids, etc., so that after treating the crude anthraquinone in this manner, and then mixing the product with water, nearly pure anthraquinone is alone precipitated. This method of subliming anthracene, oxidizing it and purifying it with sulphuric acid, was first proposed, I believe, by H. Caro. The process is carried out as follows:—The crude anthraquinone is placed in large iron, semicircular, cast iron pots, capable of holding a ton or more of the product. These are furnished with a steam jacket, and a strong stirrer, also of cast iron, and worked by machinery, the blades being arranged so as to work the mixture constantly upwards. These pots are charged with crude anthraquinone and sulphuric acid, in the proportion of one of the former to three or four of the latter; the steam is turned on to the jacket, and the mixture heated with continuous stirring for about twenty-four hours. The product is then run into shallow leaden trays, and exposed to the air, or the trays are arranged in a proper chamber, the atmosphere of which is kept moist by steam. In this way the acid becomes very gradually diluted, causing the anthraquinone to crystallize out. In a proper chamber this occupies about two days. The crystalline product is boiled with water, and then washed by decantation, any anthraquinone found in the liquors being afterwards collected. The anthraquinone is then pressed and dried, and is usually so pure as to contain over 95 per cent. of anthraquinone.

Instead of placing it on trays and allowing it to crystallize by the absorption of moisture by the sulphuric acid, some manufacturers pour it at once into water, boil the resulting mixture and wash it in filter presses.

During the last year or two, a modification of our original process has been coming into use; I mean the process of sublimation. The modification principally consists in assisting the process by passing superheated steam through the subliming retort, and this is important.

Although anthraquinone is such a remarkably stable body, we often noticed that a good deal of loss occurred in our subliming operations, apparently from reduction, and especially if the charges were large, because they then required a high temperature continued for a long time, the residues being bad conductors of heat. This reduction is probably caused by the steam and anthraquinone coming in contact with the iron of the retort. To avoid this loss, it is evident that the temperature should not be higher than absolutely necessary, and the charge should also be spread out in thin layers, so as to be quickly volatilized. The anthraquinone vapour and steam may be condensed in a similar manner to anthracene. The sublimed anthraquinone, which is pressed and dried, has to be still further purified. It will be remembered that we used coal-tar naphtha for the purpose, but the sulphuric acid process above described, I believe, is now always employed.

The large amount of chrome alum liquors produced in the manufacture of anthraquinone has always been a source of trouble to manufacturers, their dark green colour and acid character making them objectionable in the drains, and chrome alum being of itself of very limited consumption. Processes, however, have been now devised for working this up again into a chromate.

There is, however, another residue which, so far as I am aware, has not been turned to account, and that is the acid liquors from the purification of anthraquinone, consisting of sulphuric acid, sulpho acids, etc., and it is difficult to see to what use they can be turned, especially as such enormous quantities are produced, probably over 3,000 tons of sulphuric acid being used in this process yearly. If the original process of crystallizing the sublimed anthraquinone from naphtha were adopted, this difficulty would not exist.

In converting the anthraquinone into the sulpho acids, we at first used Nordhausen sulphuric acid, and heated the mixture in glass retorts, such as are used in the con-

* From the *Journal of the Society of Arts*.

centration of sulphuric acid, but, owing to the fragility of these vessels, we were induced to try cast iron pots. These we found to answer very well, though not quite so well as glass.

On account of the expense and difficulty in getting Nordhausen sulphuric acid imported into this country—few vessels liking it as a cargo—we commenced working with ordinary sulphuric acid. We usually employed four or five parts of this to every one part of anthraquinone, and heated the mixture up to 270°—280° C. The anthracene, as it sublimed from the operation, was put back into the acid. The sulpho acids produced in this way were treated with lime, etc., just as those obtained from dichloranthracene, and already described.

I find we employed this process principally in our works until the middle of June, 1870. We then began to work on a larger scale than we had hitherto done with dichloranthracene, and carried both processes on for a time; but finding the latter the most economical, partially on account of the ease with which it yielded the sulpho acids with ordinary sulphuric acid, we employed it almost exclusively after a time, although frequently making colouring matter by the other method.

As already mentioned, in the early experiments made with anthraquinone, it was noticed that, by reducing the amount of sulphuric acid with which it was heated and keeping the temperature as low as practicable that the colouring matter produced with the resulting sulpho acids gave purples on mordanted cloth more closely resembling those produced with madder than when a large excess of sulphuric acid had been employed. The cause of this was not understood for some time, until it was eventually found out that a monosulpho acid was required to produce alizarin. I believe this was first discovered by Messrs. Meister, Lucius and Brüning, as they were the earliest to send practically pure alizarin into the market.

The production of the monosulpho acid of anthraquinone as the chief product, by means of ordinary sulphuric acid, is difficult. I have generally thought it best to work with an excess of anthraquinone, to use a high temperature and only small operations, so that they may be quickly finished. When using ordinary sulphuric acid, every facility should be given for the escape of aqueous vapour which forms, so as to keep the acid as concentrated as possible. At temperatures over 260° C. sulphuric acid commences to oxidize anthraquinone, carbonic anhydride being slowly formed, so that high temperature should not be long continued.

The large quantity of ordinary sulphuric acid which had to be employed to convert anthraquinone into the sulpho acids, and the high temperature which had to be used, causing a certain amount of destruction to take place, evidently showed that it was desirable to employ fuming sulphuric acid in this process. In this country we found it costly, but as it was more readily procurable in Germany, the manufacturers there used it. They were afterwards supplied with a very strong fuming acid from Bohemia, containing about 40 per cent. of sulphuric anhydride. This was prepared, I believe, by distilling the sulphuric anhydride from one portion of ordinary Nordhausen sulphuric acid into another. This very strong acid was found to be without action upon ordinary tinned iron and it is now actually stored in vessels made of that material.

Within the last few years a very elegant process* has been devised by Dr. Messel and Mr. Squire for the production of sulphuric anhydride and fuming sulphuric acid. Sulphuric acid, when strongly heated, dissociates into steam, sulphurous anhydride and oxygen, thus:—

$$SO_4H_2 = OH_2 + O + SO_2.$$

* Patented 18th September, 1875, and now manufactured largely in this country by Chapman, Messel and Co. Professor C. Winkler a short time afterwards also showed that fuming acid could be made in this manner.—*Dingler, Polyt. Journ.*, ccxviii., 128—139.

This decomposition is taken advantage of to give supply of sulphurous anhydride and oxygen in the proportions required, the water being condensed and thoroughly removed by passing the gases through sulphuric acid.

The mixed gases are afterwards combined by passing them over heated platinized asbestos, and thus form sulphuric anhydride.

$$SO_2 + O = SO_3.$$

The sulphuric anhydride is then condensed, either alone or in ordinary sulphuric acid. It is remarkable that acid containing 60 to 70 per cent. of anhydride is liquid even below 0° C., acid containing 40 to 50 per cent. is solid, and acid containing 20 to 30 per cent., liquid. By this means fuming acid can be produced in any quantity, and of any strength; that usually employed in the manufacture of alizarin containing 40 or 50 per cent. of anhydride. We thus see that the demand for this acid in the production of artificial alizarin has created a new industry.

On treating anthraquinone with fuming sulphuric acid, iron pots somewhat similar to those described for the conversion of dichloranthracene into sulpho acids are used, but, as but little acid vapours escape, very little provision need be made for condensing them. In fact, if the anthraquinone be pure, there is no reason why they should not be entirely closed, though, of course, it would be desirable to have a safety valve, or some similar sort of arrangement.

The sizes of the iron pots used for treating anthraquinone with fuming sulphuric acid vary, but usually hold from 30 to 40 gallons. They should be fitted with stirrers, especially when required for the preparation of the monosulphanthraquinonic acid, and heated by means of an oil bath. The fuming acid, after being sufficiently heated to render it fluid, is emptied into these pots by means of a syphon, or by piercing the tins, after having placed them over the pots by passing an iron bar right through the top and then through the bottom; the upper hole thus made serves as an inlet for the air, and allows the acid to flow freely through the hole in the bottom of the tin.

When the monosulphanthraquinonic acid is required, a mixture of about one part of fuming acid, containing 40 to 50 per cent. of anhydride, is very thoroughly mixed with from one to one and a quarter parts of anthraquinone. The mixture is then gradually heated up to about 170°, or even to 190°, and kept at this temperature for eight or ten hours, the stirrer being kept constantly in motion. The product thus formed consists chiefly of monosulphanthraquinonic acid, together with a little of the disulpho acid and unchanged anthraquinone. It is then removed from the pots whilst rather hot and diluted with water. The anthraquinone is then separated by passing this solution through a filter press or other convenient arrangement.

The monosulpho acid is easily separated from the disulpho acid by converting it into its soda salt, which is difficultly soluble in water, this solvent dissolving only about 5 per cent. at the ordinary temperature. The filtrate is, therefore, nearly neutralized with caustic soda. This causes it to become a thick crystalline mass, which is then thoroughly pressed from the mother liquors; if required still purer, it can be re-crystallized, or purified by mixing it with about 15 or 20 per cent. of sulphuric acid, diluting with a little water and again pressing and washing with water. This salt forms beautiful small brilliant white pearly scales.

When pure, sodic monosulphanthraquinonate gives, on heating with caustic soda and chlorate of potash, practically pure alizarin. This operation I have already remarked upon.

To make the disulpho acid from anthraquinone, an excess of fuming sulphuric acid is used, about twice as much, or rather more, than in the preparation of the monosulpho acid; the temperature is also raised (as combination of the products takes place) considerably higher;

it may be allowed to rise, if a very red shade of colour is to be made, as high as 260°, but should not be taken much higher for any length of time.

The product thus obtained is perfectly soluble in water, and, when sufficiently cool, should be removed from the pots and diluted. It may then be treated with lime, as when dichloranthracene has been used, or, as some prefer, neutralized at once with caustic soda. It will then, of course, be mixed with a considerable quantity of sodic sulphate, and, so far as my experience goes, I have always found that the purer the soda salt the better it worked when treated with caustic soda to convert it into colouring matter.

Dichloranthracene, if treated with about twice its weight of fuming acid, containing 25 per cent. of anhydride, instead of with five times its weight of ordinary acid, works very well, and undoubtedly could be used at once by neutralizing with caustic soda.

It is remarkable that the artificial alizarin produced from disulpho acids, prepared from anthraquinone, does not yield such pure shades of colour on mordants as that made with the disulpho acids prepared from dichloranthracene. The latter colouring matter gives the calico printer more delicate pink and red shades, and is, therefore, also much liked by Turkey red dyers; and, notwithstanding it is sent into the market in a weaker form than the corresponding anthraquinone colouring matter, still it demands a higher price. Taking both circumstances together, the price it fetches is about 25 per cent. more than the colouring matter produced with anthraquinone.

The process with dichloranthracene has also the great advantage of always giving an artificial alizarin producing uniform shades of colour, according as ordinary or fuming sulphuric acid is used, whereas with anthraquinone it is impossible to tell with certainty the exact tint the product you are making will give.

Curiously, Continental manufacturers do not appear to have been as yet successful in manufacturing artificial alizarin from dichloranthracene in quantity, and what little they have produced in this way does not seem to have been equal in quality to that produced in this country.

The dichloranthracene and anthraquinone processes I have described are the only ones employed for the production of artificial alizarin. The method of converting anthracene into sulpho acids, and then oxidizing them so as to form sulpho acids of anthraquinone, although apparently very simple, does not work satisfactorily, the yield of colouring matter being small. The only process I have found to approach those in use is that patented by Meister, Lucius and Brüning, in which mononitroanthraquinone is used. By this process the only colouring matter dyeing mordants produced is alizarin, and from experiments I made I found the yield of colouring matter to be, on the whole, satisfactory. It is, however, obtained in a brown and impure condition.

When commencing to supply dyers and printers with artificial alizarin, we knew that we had to compete with madder. And although the new product possessed certain advantages, yet we felt it was useless to ask prices relatively much higher than those of that product, and from the first we endeavoured to act upon this principle.*

At first, nearly all the artificial alizarin we made was consumed by the Turkey red dyers of Glasgow and Manchester. The colour at this time contained large quantities of anthrapurpurin, and therefore produced a more scarlet shade than madder or garancine, and for some time it was used along with garancine, as by this means shades of colour were produced which were far more brilliant than when garancine alone was employed; but at the same time not too scarlet to be disliked by the Turkey red buyers. Of course, the use of garancine with artificial alizarin has now ceased, and much better results are obtained by employing a mixture of the red shade and blue shade.

Unfortunately, the market is now supplied, not only with the red or anthrapurpurin shade, and blue or pure alizarin shade, but mixtures of these in various proportions, so that there are more than a dozen shades in the market, and thus much of the manufacturer's time is occupied with preparing these; moreover, he is forced to keep a considerable stock of colour on hand.

It would appear that on the Continent great difficulties were experienced in the use of artificial alizarin for Turkey red dyeing,* whereas in this country it was employed for this purpose from the very first, and no difficulties worth mentioning were experienced, the chief modification being, I believe, the use of soap only in the clearing process, instead of soap and an alkaline carbonate. Several modifications, however, have since been made in oiling and mordanting the goods, which have rendered the process more simple; and the colouring matter being a purer product than madder or garancine, the clearing operations can be performed with greater facility.

In dyeing ordinary printed goods the process can be conducted much more rapidly than when madder is used, as no loss of colouring matter is experienced by using a high temperature at once, as I showed you was the case with madder; however, I believe, when good pink and red shades are to be dyed, dyers do not usually allow their dye bath to rise much above 80°—85° C.

The use of a product called "oleine," prepared by treating castor and other oils with sulphuric acid, has been found of great service, as it increases the brilliancy of the shades, especially the red or scarlet ones.

A good deal of artificial alizarin is used for topical printing. To fit it for this purpose it is mixed with a few per cent. of its weight of acetate of lime, and by dyeing patterns with light shades, say, with pure alizarin, and then printing on dark shades with anthrapurpurin, very beautiful results can be obtained.

The use of artificial alizarin, in place of madder or garancine, has a very important influence in the pollution of our rivers, as when this is used the water from the dye baths is nearly pure, whereas when madder and garancine are employed it is full of ground woody matter and I think I shall be making a very low estimate if I say that over 10,000 tons of this was annually passed into our rivers before the introduction of artificial alizarin. Surely this is a great advantage in itself.

Now that the production of artificial alizarin is equal to the demand, it is interesting to find that the supply of raw material anthracene, has been quite adequate, so that all the fears that were entertained on this subject have proved groundless; and it is also well to remember that up to the present time the anthracene contained in pitch has not been extracted to any large extent, so that much more anthracene could yet be produced if required.

(To be continued.)

* The prices given in the *Moniteur Scientifique* (April, 1879, p. 420), for the years 1870—1873, are very much higher than those ever obtained in this country.

* *Moniteur Scientifique*, April, 1879, p. 417.

Parliamentary and Law Proceedings.

Sale of Food and Drugs Act Amendment Act, 1879.

The following is the text of this Act, which has now received the Royal Assent:—

Whereas conflicting decisions have been given in England and in Scotland in regard to the meaning and effect of section six of the Sale of Food and Drugs Act, 1875, in this Act referred to as the principal Act, and it is expedient, in this respect and otherwise, to amend the said Act: Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal and Commons, in this present

Parliament assembled, and by the authority of the same, as follows:

1. This Act may be cited for all purposes as the Sale of Food and Drugs Act Amendment Act, 1879.

2. In any prosecution under the provisions of the principal Act for selling to the prejudice of the purchaser any article of food or any drug which is not of the nature, substance, and quality of the article demanded by such purchaser, it shall be no defence to any such prosecution to allege that the purchaser, having bought only for analysis, was not prejudiced by such sale. Neither shall it be a good defence to prove that the article of food or drug in question, though defective in nature or in substance or in quality, was not defective in all three respects.

3. Any medical officer of health, inspector of nuisances, or inspector of weights and measures, or any inspector of a market, or any police constable under the direction and at the cost of the local authority appointing such officer, inspector, or constable, or charged with the execution of this Act, may procure at the place of delivery any sample of any milk in course of delivery to the purchaser or consignee in pursuance of any contract for the sale to such purchaser or consignee of such milk; and such officer, inspector, or constable, if he suspect the same to have been sold contrary to any of the provisions of the principal Act, shall submit the same to be analysed, and the same shall be analysed, and proceedings shall be taken, and penalties on conviction be enforced in like manner in all respects as if such officer, inspector, or constable had purchased the same from the seller or consignor under section thirteen of the principal Act.

4. The seller or consignor, or any person or persons entrusted by him for the time being with the charge of such milk, if he shall refuse to allow such officer, inspector, or constable to take the quantity which such officer, inspector, or constable shall require for the purpose of analysis, shall be liable to a penalty not exceeding ten pounds.

5. Any street or open place of public resort shall be held to come within the meaning of section seventeen of the principal Act.

6. In determining whether an offence has been committed under section six of the said Act by selling, to the prejudice of the purchaser, spirits not adulterated otherwise than by the admixture of water, it shall be a good defence to prove that such admixture has not reduced the spirit more than twenty-five degrees under proof for brandy, whisky, or rum, or thirty-five degrees under proof for gin.

7. Every liberty having a separate court of quarter sessions, except a liberty of a cinque port, shall be deemed to be a county within the meaning of the said Act.

8. The town council of any borough having a separate court of quarter sessions shall be exempt from contributing towards the expenses incurred in the execution of the principal Act in respect of the county within which such borough is situate, and the treasurer of the county shall exclude the expenses so incurred from the account required by section one hundred and seventeen of the Municipal Corporation Act, 1835, to be sent by him to such town council.

9. The town council of any borough having under any general or local Act of Parliament, or otherwise, a separate police establishment, and being liable to be assessed to the county rate of the county within which the borough is situate, shall be paid by the justices of such county the proportionate amount contributed towards the expenses incurred by the county in the execution of the principal Act by the several parishes and parts of parishes within such borough in respect of the rateable value of the property assessable therein, as ascertained by the valuation lists for the time being in force.

10. In all prosecutions under the principal Act, and notwithstanding the provisions of section twenty of the said Act, the summons to appear before the magistrates shall be served upon the person charged with violating the provisions of the said Act within a reasonable time, and in the case of a perishable article not exceeding twenty-eight days from the time of the purchase from such person for test purposes of the food or drug, for the sale of which in contravention to the terms of the principal Act the seller is rendered liable to prosecution, and particulars of the offence or offences against the said Act of which the seller is accused, and also the name of the prosecutor, shall be stated on the summons, and the summons shall not be made returnable in a less time than seven days from the day it is served upon the person summoned.

Poisoning by Carbolic Acid.

An inquest has been held in the Coventry and Warwickshire Hospital, touching the circumstances attending the death of a girl named Edgington, from poisoning by carbolic acid. It appeared that some carbolic acid, which had been obtained for sanitary purposes had been placed on a shelf in a bottle similar to that in which some wine was usually kept, and for which it is probable that the deceased mistook it. A verdict was returned that deceased died from the effects of carbolic acid taken inadvertently, and the jury added a rider suggesting to the sanitary authorities of the town that in future a poison label should be attached to every bottle in which the acid was contained.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Tincture of Kino.

Sir,—After the interesting paper by Mr. R. Rother, which appeared in the Journal of August 2, perhaps the following note may be of some value.

Some fifteen or sixteen years ago, the idea occurred to my mind that the addition of a small quantity of glycerine to tincture of kino, might, by preventing the aggregation of the gum particles, do away with the annoying tendency to gelatinization.

I found it answer the purpose admirably and have never been troubled with gelatinized tincture since.

The proportion of glycerine I use is 5 per cent.

August 5, 1879. John B. Merrikin.

"*Gulielmus.*"—(1). Send specimen with basal sheath. (2). *Carex remota.* (3). *Carex divulsa.* (4). *Juncus bufonius.* (5). *Juncus effusus.* (6). *Juncus lamprocarpus.*

J. H. Dingle.—(1). *Pteris aquilina.* (2). *Usnea florida.* (3). *Festuca gigantea,* probably; send a more mature specimen. (4). *Pinus sylvestris.*

T. J. S. Blaine.—*Daphne Mezereum.*

R. Roberts.—(1). *Vicia sylvatica.* (2). *Lathyrus sylvestris.* (3). Send a specimen with the lower leaves. (4). Correct. (5). *Stachys palustris.* (6). *Cichorius Intybus.*

J. M.—See a paper on Permanent Essence of Rennet in vol. ix., p. 307.

"*Patent.*"—A preparation is liable to stamp duty—(1) If it is a secret or occult preparation; (2) If it is stated to be prepared only by the person whose name it bears; (3) If it is, or has been, recommended on the label, or on a handbill, or by any public advertisement, as a remedy for the cure or relief of any disorder.

Messrs. Duncan, Flockhart and Co.—Your communication has been forwarded to the publishers, Messrs. Churchill, New Burlington Street.

Communications, Letters, etc., have been received from Messrs. Cowan, Eade, Strachan, Gulielmus, Congius, Inquirer, An Associate, Lavandula, M. R. I., J. A.

NOTES ON INDIAN DRUGS.

BY W. DYMOCK.

(*Continued from Vol. IX, page* 1035.)

SPILANTHES OLERACEA, *Linn.*, COMPOSITÆ; PARA CRESS OF BRAZIL. *Vernacular*: AKURKURA (Bomb)., is commonly cultivated in gardens in Bombay. It is a small annual plant with round smooth succulent branching stems; the leaves are opposite, petioled, subcordiform, subdentate. The flowerheads are solitary, at the ends of pedicels longer than the leaves, of a conical form and of the size of an acorn; they are entirely composed of yellow or brownish yellow hermaphrodite tubular flowers.

The achenes are compressed with ciliated margins and are surmounted by two naked awns. The whole plant is very acrid, but the flower heads are especially so, having a hot burning taste which causes profuse salivation. It is on this account that the plant has been named Akurkura by the gardeners. The name properly belongs to the pellitory root of the shops. The flower heads are sometimes chewed to relieve toothache. The *S. acmella* is a native of India and has similar properties.

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ARTEMISIA INDICA, *Willd.*, COMPOSITÆ. *The plant.* *Vernacular*: NAGDOWN (Hind., Beng.); DAUNA (Bomb.); MACHIPATRI (Tam.).

History, Uses, etc.—This plant, in Sankrit Nagadamani, may be regarded as the wormwood of India. The Hindus consider it to be a valuable stomachic, deobstruent, and antispasmodic; they prescribe it in infusion and electuary, in cases of obstructed menses and hysteria. Externally it is used in fomentations. In Hindu temples downa is placed upon the heads of the goddesses, but not on those of the gods. *A. Indica* is probably one of the kinds of afsanteen described in Mahometan works, but owing to the number of species which belong to the genus, and which all have very similar properties, it is difficult to decide this point.

The authors of the Pharmacopœia of India say the strong aromatic odour and bitter taste of this plant, scarcely distinct from *A. vulgaris*, indicate stomachic and tonic properties. Dr. Wight (Illust., ii., 92) states that the leaves and tops are administered in nervous and spasmodic affections connected with debility, and also that an infusion of them is used as a fomentation in phagedenic ulceration. Dr. L. Stewart describes an infusion of the tops and leaves as "a good mild stomachic tonic."

Description.—Erect, suffruticose; leaves ashy and tomentose beneath, lower pinnatifid, upper trifid, uppermost undivided or with lanceolate lobes; lobes of the lower leaves toothed or cut. Heads of the flowers racemose-panicled, ovate; panicle leafy, spreading partial racemes pendulous before flowering, young involucre a little tomentose, at length glabrous; exterior scales foliaceous, acute, interior membranaceous, obtuse; corolla naked (Roxb. Fl. Ind., iii., 419).

Commerce.—The dry plant is sold by the herbalists and the fresh tops in the markets. Value Rs. 6 per Surat maund of 37½ lbs.

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ARTEMISIA STERNUTATORIA. *The plant.* *Vernacular*: NAKK-CHIKNEE (Hind., Beng., and Bomb.).

Description, Uses, etc.—According to Roxburgh this plant appears during the latter part of the cold season, on cultivated land. The whole plant does not cover a space more than about 6—8 inches in diameter. Root simple, the stems several, branchy, pressing on the earth; all are somewhat woolly. Leaves numerous, sessile, wedge-shaped, deeply dentate, villous. Flowers axillary, or in the divisions of the branches, solitary sessile, subglobular, hermaphrodite. Florets, from 10—12 in the centre, with their border 4-toothed, coloured and expanding; the female ones very numerous in the circumference, most minute, with the border seemingly 3-toothed, and the toothlets incurved. Receptacle naked. It differs from *A. minima* in having sessile downy leaves and numerous flosculi in each flower. The minute seeds are used as a sternutatory by the Hindus, also the powdered herb. The plant does not grow in this part of India, but the dry herb, both entire and in powder, is always to be obtained in the druggists shops. Value about annas 6 per lb.

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DORONICUM SCORPIOIDES? COMPOSITÆ. *The rhizome.* *Vernacular*: DARUNAJ-I-AKRABI (Pers., Bomb.).

History, Uses, etc.—The author of the 'Makhzan-ul-Adwiya tells us that Darunaj is a scorpioid knotted root, with a greyish exterior and white interior; that it is hard, faintly bitter and aromatic. He describes the plant as having fleshy yellowish leaves of the shape of those of the almond, which lie flat upon the ground. The flower stem he says is hollow; it rises from the midst of the leaves to a height of two cubits, and bears from 5—7 scattered leaves, thinner and longer than the lower leaves. The flower is yellow and hollow. The plant grows in Andalusia and the mountainous parts of Syria, especially about mount Yabroorat, where it goes by the name of Akrabi. There are two varieties of the drug, Persian and Turkish; the latter is most esteemed. With regard to its medicinal properties, he says that it is a resolvent of phlegm, a remedy against bile and flatulencies, cardiacal and tonic, useful in nervous depression, melancholy and impaired digestion, also in pain of the womb and flatulent dyspepsia.

Besides this it is prescribed for persons who have been bitten by scorpions and other venomous reptiles, and is hung up in houses to keep away the plague. Pregnant women wear it round the waist suspended by a silken thread, which must be made by the wearer. It is supposed to act as a charm, protecting the fœtus and procuring a painless delivery. Hung up over the bed it prevents night terrors and ensures pleasant dreams. There would appear to be a demand for it in Bombay, as it is kept by all Mahometan druggists.

Description.— Rhizomes scorpioid, occasionally branched, flat, jointed, of a dirty white colour, 3—4 inches long, ½—¾ inch broad, and about $\frac{1}{10}$ inch thick. Upper surface scaly, under surface marked by the scars of numerous rootlets, a few of which sometimes remain attached; substance brittle and horny, yellowish white, central portion somewhat spongy, odourless; taste at first insipid, but after a few minutes a sensation of warmth and pricking is felt upon the tongue.

Microscopic structure.—Sections show that the bulk of the rhizome consists of a parenchyma, each cell of which is occupied by a mass having the appearence of inulin, inactive in polarized light, but which is coloured intensely black by iodine; towards the circumference the cells become gradually smaller, and upon the surface become scaly, forming a greyish epidermis. The vascular bundles are of a bright yellow colour, and consist of spiral vessels; they form one irregular ring round the rhizome, about midway between the circumference and centre. No starch grains are to be seen in any part of the rhizome.

TRICHOLEPIS PROCUMBENS, *Wight, Ic.*: COMPOSITÆ. *Plant. Vernacular*: BADAWARD (Pers. and Bomb.).

This drug is described by Mahometan writers as the shaukat-ul-baida of the Arabs, the loofiniki of the Turks and the sanakhurd of the Syrians. Other Persian names given for it are kangar-i-sufed and asfar-i-baree. It is generally described as a thorny plant about two cubits high with downy triangular stems as thick as the thumb, or larger; heads of seed like those of a thistle, thorny and full of down; flowers purple; seeds like these of carthamus, but rounder. M. Husain says, "Some have supposed this plant to be the same as the shukai; this is not the case, but the two plants are nearly related. The true badaward has slender, white, round stems, little more than a span high, slightly downy; flower heads white, surrounding them are three delicate soft spines like needles, so that altogether they have much the appearance of a brooch. Within is a quantity of white down, which when the seeds are ripe causes them to be carried about by the wind; hence the name badaward. Medicinally the plant has tonic, aperient and deobstruent properties. It is said to drive away noxious reptiles when kept in the house" ('Makhzan' article "Badaward").

The badaward of Bombay shops agrees with the description of Meer Muhammad Husain. *T. procumbens* is found on sandy ground in Guzerat, and is thus described in the 'Bombay Flora,' "Stem flexuose, short, ramous; branches diffuse, procumbent, angularly striated, subglabrous; leaves shortly pubescent or subglabrous, those of the stem lyrate, of the branches sinuately pinnatifid, the lobes spinously mucronate; involucre ovate; scales ovate, at the base araneose, terminating in a prickle-like appendage; flowers purple, appear in the cold weather; common in light soils in Guzerat." Syn.: *Carduus ramosus*, Roxb. Fl. Ind., iii., 407. The drug has a bitter taste. It is imported from Persia.

NYCTANTHES ARBOR TRISTIS, *Linn.*: JASMINACEÆ. *Flowers, leaves and fruit. Vernacular*: HARSINGHAR (Hind.); SIULI (Beng.); PARTAK (Bomb.); PAGALA MULLAI (Tam.).

History, Uses, etc.—Royle in his 'Himalayan Botany' tells us that this tree is extremely common along the foot of the mountains which skirt the Deyra Dhoon, and may be seen for several hundred feet above Rajpore in the ascent to Mussooree.

Dr. Wallich found it in a wild state near the banks of the Irrawaddy, on the hills near Prome. In Western India it is one of the commonest cultivated trees. Its flowers open at sunset, and fall before morning; they have very strong perfume. The Sanskrit names for the tree are sephalika, parajatak, and rajanikasa. The author of the 'Makhzan' gives a minute description of all parts of the tree and tells us that the Indians use the white portion of the flowers as a purple dye, which they call gul kamah, and the orange part as a yellow dye. The seeds and leaves are considered by them to have medicinal properties. Six or seven of the young leaves are rubbed up with water and a little fresh ginger and administered in obstinate fevers of the intermittent type; at the same time a purely vegetable diet is enforced. The powdered seeds are used to cure scurfy affections of the scalp. Directions for the preparation of gul kamah will be found in the 'Karabadeen-i-kabir.' Chakradatta mentions the use of the leaves in fever and rheumatism. A decoction of the leaves prepared over a gentle fire is recommended by several writers as a specific for obstinate sciatica (Confer. Dutt's 'Hindu Mat. Med.,' p. 189).

Description.— Tree, 15—20 feet; young shoots four-sided: leaves opposite, short-petioled, cordate or oblong, pointed, entire or coarsely serrate, scabrous; panicles terminal, composed of smaller six-flowered terminal umbellets; calyx companulate, slightly five-notched, downy; corolla tube cylindric, as long as the calyx, segments 5—7; involucre of four inverse, cordate, opposite, sessile leaflets; flowers numerous; tube orange-coloured; border white, fragrant (Drury). The fruit is a dry, flat, oblong, mucronate capsule, prominently veined, $\frac{3}{4}$ inch long by $\frac{1}{2}$ broad. It is of a brown colour when ripe and is divided into two cells each of which contains a flat foliaceous seed of a light brown colour; the testa of the seed is thin, the kernel white, bitter and very astringent. The leaves have similar properties and stain the saliva yellow when chewed.

CALOTROPIS GIGANTEA, *R.Br.*; CALOTROPIS PROCERA, *R.Br.*: ASCLEPIADEÆ. *The root, leaves and flowers. Vernacular*: AK, MUDAR (Hind.); AKANDA (Beng.); AKRA, RUI (Bomb.); ERUKKU ERUKKAM (Tam.).

History, Uses, etc.—The same Indian names are applied to both of these plants; Sanskrit writers, however, notice two varieties, which are distinguished by the colour of their flowers, viz., alarka or white and arka or red. Dutt ('Hindu Mat. Med.'), gives us the following summary of the uses of the plant, extracted from Sanskrit works, chiefly that of Chakradatta. "The root bark is said to promote the secretions and to be useful in skin diseases, enlargements of the abdominal viscera, intestinal worms, cough, ascites, anasarca, etc. The milky juice is regarded as a drastic purgative, and caustic, and is generally used as such in combination with the milky juice of *Euphorbia neriifolia.* The flowers are considered digestive, stomachic, tonic and useful in cough, asthma, catarrh and loss of appetite. The leaves mixed with rock salt are roasted within closed vessels, so that the fumes may not escape. The ashes thus produced are given with whey in ascites and enlargements of the abdominal viscera. The following inhalation is prescribed for cough :—Soak the powdered root bark of arka in its own milky juice and dry. Bougies are then prepared from the powder, and their fumes inhaled. The root bark, reduced to a paste with sour congee, is applied to elephantiasis of the legs and scrotum. The milky juices of *C. gigantea* and *Euphorbia neriifolia* are made into tents with the powdered wood of *Berberis Asiatica*, for introduction into sinuses and fistulæ in ano. The milky juice is applied to carious teeth for relief of pain." An oily preparation (arkataila), made by boiling together 8 parts sesamum oil, 16 parts calotropis juice, and one part turmeric, is said to be useful in eczema and other eruptive skin diseases.

In Western India and probably elsewhere there is a curious superstition that a leaf of the akra, fetched from the tree with certain ceremonies, is of use in tedious labour. The friends of the woman take a packet of betel nut and leaf, and a piece of money, and proceed to the plant, which they address in the most respectful manner, placing the betel packet at its root and asking for the loan of one of its leaves which they promise to return shortly. They then take away a leaf and place it upon the head of the parturient woman, where it remains for a short time and is afterwards returned to the plant. This practice appears to be connected with the worship of Marootee which is popular in this part of the country. He is the god of wind, and was born from a pinda under the shelter of an akra tree. The tree is considered sacred to him, as it afforded him protection when all the other trees had been destroyed. Mahometan writers describe it under the Arabic name of ushar. In Persian it is called khark. Meer Muhammad Husain gives a good description of the plant, and notices the use of the silky cotton of the pods by the wandering Arabs and Tartars to make their makhad twist or yalish (tinder). He says there are three varieties, 1st. A large kind with white flowers, large leaves, and much milky juice. It is found near towns and the habitations of man. 2nd. A smaller kind with smaller leaves, the flowers white externally but lilac within. 3rd. A still smaller plant, with pale yellowish green flowers. The second and third kinds grow in sandy deserts. The properties of all three are similar, but the first kind is to be preferred as it produces the largest quantity of milk. The juice is described as caustic, a purge for phlegm, depilatory, and the most acrid of all milky juices. Tanners use it to remove the hair from skins. Medicinally it is useful in ringworm of the scalp, and to destroy piles; mixed with honey it may be applied to aphthæ of the mouth; a piece of cotton dipped in it may be inserted into a hollow tooth to relieve the pain. Hakeem Meer Abdul Hameed in his commentary upon the Tuhfat strongly recommends it in leprosy, hepatic and splenic enlargements, dropsy and worms. A peculiar method of administration is to steep different kinds of grain in the milk and then administer them. The milk itself is a favourite application to painful joints, swellings, etc.; the fresh leaves also, slightly roasted, are used for the same purpose. Oil in which the leaves have been boiled is applied to paralysed parts; a powder of dried leaves is scattered upon wounds to destroy excessive granulation and promote healthy action.

All parts of the plant are considered to have valuable alterative properties when taken in small doses. Lastly, some of our Mahometan writers give very exaggerated accounts of the poisonous properties of the plant. *C. procera* was observed in Egypt by Prosper Alpinus (1580—84), and upon his return to Italy was figured, and some account given of its medicinal properties ('De plantis Ægypti,' Venet. 1592, cap. 25). *C. gigantea* was figured by Rheede in 1679 ('Hort. Malabar.' ii. tab. 31).

Ainslie in his 'Materia Medica of Hindustan' (1813) mentions two kinds of calotropis, and in the 'Materia Indica,' he says, "Both plants in their leaves and stalks contain much milky juice which when carefully dried is considered as powerfully alterative and purgative, and has been long used as an efficacious remedy in the hoostum (*lepra Arabum*) of the Tamools; the dose about the quarter of a pagoda weight in the day, and continued for some weeks. The root of the yercum has a bitter and somewhat acrid, or rather warm taste; it is occasionally given in infusion as a stimulant in low fever. Of the other variety, the vullerkoo, the bark is warmish and when powdered and mixed with a certain portion of margosa oil, is used as an external application in rheumatic affections. In the higher provinces of Bengal the arka (*C. gigantea*) is supposed to have antispasmodic qualities. Mr. Robinson has written a paper on elephantiasis, which may be seen in vol. x. of the *Medico-Chirurgical Society*, extolling the mudar root (*Yercum vayr*) as most efficacious in that disease, as also in venereal affections. In the elephantiasis he gave it in conjunction with calomel and antimonial powder, in a pill consisting of half a grain of calomel, three of antimonial powder, and from six to ten of the bark of the root mudar, every eight hours. Mr. Playfair has also written a paper on the same root, which may be seen in vol. i. of the *Edinburgh Medical Chirurgical Transactions*, p. 414, wherein he speaks in praise of the alterative, stimulant, and deobstruent virtues of the bark, or rather rind below the outer crust of the root, reduced to fine powder, in cases of syphilis, leprohectic fever, etc.; dose from gr. 3--10 or 12, three times in the day, gradually increasing it. Messrs. Robertson, Playfair, and others seem chiefly to dwell on the virtues of the rind or bark of the root; but I must observe that in lower India, where I was for many years, I found the simple dried milky juice considered as infinitely more efficacious, and later communications from the East confirm me in this opinion ('Materia Indica,' vol. i., p. 487). The emetic properties of mudar were first brought to the notice of the profession by Dr. Duncan in 1829 (*Edinburgh Medical and Surgical Journal*, vol. xxxii., p. 65). They are noticed in the Bengal 'Dispensatory,' where the drug is recommended as a substitute for ipecacuanha. Since the publication of that work abundant testimony in its favour has been collected, a summary of which will be found in the Pharmacopœia of India. Duncan made a chemical examination of the root bark, the activity of which he referred to an extractive matter which he termed mudarine.

Description.—The root barks of *C. gigantea* and *C. procera* are similar in appearance, as collected in Bombay, where they are removed by a few blows with a hammer or piece of hard wood. They occur in short quilled pieces $\frac{1}{8}$ to $\frac{1}{4}$th of an inch thick. The outer surface is yellowish-grey, soft and corky, fissured longitudinally, and can be easily separated from the middle cortical layer, which is white, friable, and traversed by narrow brown liber rays. The taste is mucilaginous, bitter and acrid, and the odour peculiar.

Microscopic structure.—In both kinds of root bark the suber consists of large thin-walled cells, generally polyhedral. The parenchyma of the middle cortical layer is loaded with starch and contains some sclerenchymatous cells. The cells of the medullary rays also contain starch and crystals of oxalate of lime. In the middle layer are numerous lacticiferous vessels, the contents of which are of a brown colour.

Chemical composition.—The authors of the 'Pharmacographia,' following Duncan's process, failed to obtain anything like his mudarine, they found, however, that the plant contains an acrid, bitter resin, which is probably the active principle.

(*To be continued.*)

PHARMACEUTICAL EXTRACTS.*

CRITICAL CONSIDERATIONS UPON THEIR PREPARATION, CLASSIFICATION, GENERAL CHARACTERS, USES, ETC.

BY E. SCHMITT,

Professor of Medicine and Pharmacy at Lille.

(*Concluded from page* 86.)

III. The extract should contain all the soluble principles of the vegetable or animal substance to the exclusion of inert matters. The number of principles contained in a vegetable juice is very large; but without entering into details apart from the subject it may be said that such juices contain immediate principles that are alkaline, neutral or acid, volatile oils, gums and mucilages, resins and gum resins, pectic and albuminoid matters, sugars, tannins, soluble and insoluble fecula, fatty and waxy matters, organic and inorganic salts (especially those having lime and potash for a base), chlorophyll, *débris* of fibre and parenchyma (for the feculent extracts), and lastly, extractive matters, *i.e.*, badly defined substances, possibly belonging to one of the previous groups, or resulting from their transformation and slow destruction.

The extractive is characterized by its solubility in water. It may comprehend all the so-called colouring, bitter and depurative principles. It may exist in very small proportions in the fresh juice; but with time, by the action of air, heat, ferments, etc., it may gradually augment in a preparation of extract, and frequently finish, in a badly prepared extract, by constituting the whole of the mass.

It is very difficult to follow all these successive states of transformation, but some idea may be formed of them by recalling the modifications that crystallizable sugar undergoes under the influence of water and heat, starting with uncrystallizable barley sugar and finishing with caramel. The sugar is submitted to the phenomena of hydration and oxidation; the oxygen of the air burns a part of the hydrogen and a little carbon; vapour of water and carbonic acid are disengaged, and eventually there remains a compound richer in carbon and strongly coloured like caramel. The caramel is still soluble in water; but in the preparation of extract there is always produced a more or less large proportion of a new substance, coloured brown, green or black, and insoluble in water. This substance dissolves in alkaline liquors and acids re-precipitate it from this solution. It has much analogy with humic acid, and Berzelius named it "oxygenated extractive or apotheme." Apotheme is very little known; it is a very complex substance, and it remains as a residue when extracts are dissolved. Probably it ought not to exist in a typical or ideal extract, and it may be affirmed that the more care there is given to the preparation of extracts the less oxygenated extractive will be found in them.

In generalizing the phenomena that take place in the preparation of extracts,—phenomena of hydration, oxidation, or others,—it may be said that the volatile principles disappear or are altered, that they are retained partially by the apotheme, either alone or united with fatty or resinous matters: the aqueous extract of valerian may be quoted for an example. These volatile principles at the moment of their elaboration are hydrocarbons, which become hydrated and oxidized and yield a series of alcohols, aldehydes and ethers that in the course of the operations are volatilized, decomposed or resinified. The sugar becomes glucose, and the fecula, bassorin and cerasin become soluble.

The tannins alter more rapidly still, and it is probable that to the alteration of the astringent principles is due the greater part of the apotheme, which contains also the products of coagulation and destruction of pectic and albuminoid matters.

* *Répertoire de Pharmacie*, vol. vii., p. 249.

It may be concluded from this rapid glance at the phenomena that occur during the preparation of an extract that the alteration would be most rapid in the extracts of juices and that this alteration would diminish in energy from the aqueous extract to the ethereal, which of them all is that which contains the least amount of alterable principles. It may be concluded also, that the preparation of extracts by congelation, when it shall have become more practical, will be the most rational, because all the principles that represent the juice of the plant will be certainly thus the least altered, cold being a condition of conservation and heat of destruction.

IV. Should extracts be submitted to a pharmaceutical classification? Rouelle has divided the extracts into saponaceous extracts (containing only extractive matters), gummy extracts, gum-resinous extracts and resinous extracts. This classification is very primitive and incomplete; it does not include nearly all the extracts employed at the present day.

Without taking note of consistence, it appears to me more simple and more rational, from the pharmaceutical point of view, to classify the extracts according to the nature of the menstruum used in their preparation; but it is necessary first to divide them into simple and compound extracts. The simple extract represents the active principles of a single species of a plant or animal; the compound extract represents, on the contrary, a mixture of principles belonging to several plants, as the compound extract of rhubarb and the compound extract of colocynth. The compound extracts are little known and not much employed in France.

For the simple extracts I propose the following classification:—

1. Aqueous Extracts.
    - *a.* Commercial Extracts (aloes, catechu, etc).
    - *b.* Extracts of juices (feculent or defecated, robs).
    - *c.* Aqueous Extracts, properly so-called.
2. Alcoholic Extracts.
3. Ethereal Extracts.
4. Acetic Extracts.
5. Mixed Extracts.

It is necessary also to define clearly the part of the plant which has yielded the extract, so as not to confound the extract of aconite root or of henbane seeds with the extracts of the leaves of the same plants.

The pharmacist has nothing to do with a therapeutic classification of these extracts, but it may be remarked that from this special point of view these preparations ought to be classified so as to take into account the pharmacodynamic object the medical man proposes to attain. The object being well defined, the physician and the pharmacist ought essentially to remember that the part of the plant, the menstruum and the consistence of the extracts are the elements which should occupy their attention, especially from a posological point of view. To cite only one example, it may be said there exist five extracts of aconite: the defecated and feculent extracts of the juice of the leaves, the aqueous and alcoholic extracts of the leaves and the alcoholic extract of the root, and that this last, the most active of all, is given in doses of some milligrams. The pharmacist, on the simple prescription of "extract of aconite," will dispense in France, the soft defecated extract of the juice; in Belgium, a dry extract, with aconite powder added, under the form of a greenish grumous powder; in Germany, the alcoholic extract of the roots. It may be mentioned also that the ergotine of Wiggers would be dangerous in the ordinary dose of that of Bonjean, which is itself more active than the aqueous extract of ergot.

The necessity has thus incidentally been made manifest for a Universal Pharmacopœia, especially for very active medicines; this necessity has long been recognized by physicians having foreign patients and by travellers requiring the same prescription to be made up in different countries through which they pass.

V. The next point is the general characters of the extracts. Extracts ought to have, before all, the prescribed consistence; they are always coloured brown or green, but should not be black, as happens with extracts prepared over the bare fire. They should have the odour and taste of the substance they represent, and especially should they be free from any empyreumatic odour. The surface should be smooth, not grumous; further, it should not be covered with mould or puffed up with bubbles of gas, which would be a sign of fermentation.

The aqueous extract ought to be nearly entirely soluble in water; it dissolves better in water containing alcohol and in saccharine liquids than in pure water, so that in the preparation of a mixture it is often an advantage for the pharmacist to diffuse the extract in the syrup. The alcoholic and ethereal extracts ought to dissolve completely in their original menstruum.

Very fine crystallizations of organic or inorganic products are often found at the bottom of pots containing soft extracts; for instance, asparagin, oxalate of lime, chloride of sodium, nitrate and sulphate of potash. The extracts of bellodonna, henbane, borage and taraxacum are those which most frequently present these crystallizations; they are confined nearly always to the vegetable juices, and may also sometimes be the result of the action of atmospheric oxygen, as in the case of the nitrates.

Besides these general characters, extracts present specific or even generic characters. Some are characterized by their colour (rhatany and campeachy), odour (valerian), or taste (aloes and rhubarb); others by their chemical characters, such as the alkaloids in opium, cinchona and the narcotic plants, the astringent principles in catechu and rhatany, and the acids in opium, cinchona and the juices of fruits. Some extracts can be recognized rapidly by the action of certain reagents which produce a special odour or colour; for instance, the odour produced by the action of caustic potash upon extract of conium, or the colour produced by the action of alkalies upon the colouring matter of rhubarb. These chemical characters have been given with care by MM. Patrouillard and Lepage in their 'Guide Pratique de l'Essai des Médicaments;' but for the greater part of the extracts, and especially the "saponaceous extracts" of Rouelle, they are difficultly applicable. The study of the extractive is far from being complete, perhaps it never can be completed in consequence of the modifications which continue to take place even in the finished preparation. If this problem, then, be one of the most arduous, if the spontaneous alteration of extracts be often inevitable, and if their adulteration be difficult to detect, it will be manifest that it is the duty, as well as the interest, of pharmacists to prepare their own extracts.

This is not all; the extract has issued from the shop of the pharmacist and become a food product. Originally a medicine and even a poison in the laboratory it has become an aliment in the manufactory. The scientific preparation of extracts upon the largest scale in the present day provides for food Liebig's extract of meat, extract of milk or condensed milk, extract or essence of coffee, and the extracts of peas, hops, malt, etc. It would be easy to discuss the alimentary value of Liebig's extract and to indicate the services rendered by concentrated milk, but to broach these questions in this paper would be to go completely outside the pharmaceutical domain.

THE PREPARATION OF SALTS OF BERBERINA.*

BY J. U. LLOYD.

How can the salts of berberina be most easily prepared from the root of *Hydrastis Canadensis?* What will be the practical yield and what are the solubilities of the different salts?

Of the many processes investigated, I suggest the following as applicable to small amounts. Owing to the slight yield of this yellow alkaloid, it is hardly advisable for experimenters to work lots of less than ten pounds of hydrastis.

Moisten sixteen troy ounces of *Hydrastis canadensis* in fine powder with eight fluid ounces of alcohol; press firmly into a cylindrical percolator not exceeding three inches in diameter, previously prepared for percolation; cover the surface of the powder with a piece of blotting-paper, held in position with a few fragments of glass; add alcohol until the percolate appears at the exit, then close the orifice, cover the top of the percolator tightly by tying over it a sheet of soft rubber and place the percolator in a warm situation; macerate twenty-four hours; remove the rubber and replace with a cover of glass or tin. Cautiously open the exit and graduate the dropping so that the passage of each fluid ounce will occupy about thirty minutes. Suspend the operation when five fluid ounces have been obtained. Macerate until the next day under the former conditions and again procure five fluid ounces of percolate, observing the preceding directions. A continuous supply of alcohol must be provided. The surface of the powder must not become exposed during the operation. Mix the percolates, surround the vessel with ice and reduce the temperature, then add sulphuric acid in excess and stir well. Keep the mixture cold for twelve or more hours, then pour it upon a muslin strainer or a filtering paper, and when the liquid ceases to pass return the precipitate to a vessel containing eight fluid ounces of cold alcohol; mix well together and again separate the crystalline precipitate of impure sulphate of berberin. Dry by exposure to atmosphere.

Sulphate of Berberina.—Add one part of impure sulphate of berberina, obtained as above, to sixteen parts of cold distilled water and cautiously drop in, with constant stirring, ammonia water until in slight excess, allow the mixture to stand in a cool place from twelve to twenty-four hours, then filter and surround the vessel containing the filtrate with ice and stir sulphuric acid into the solution until the ammonia and alkaloid are saturated. In a few hours the magma of minute crystals of sulphate of berberina can be separated with a muslin strainer or a filtering paper. Care must be taken to avoid an excess of sulphuric acid. If this occur the moist magma should be removed to a vessel containing cold alcohol, washed by decantation and drained on a muslin strainer. Lastly, dry the salt by exposure to atmosphere.

Sulphate of berberina is of an orange colour, soluble in about 100 parts of water, temperature 60° to 80° F. It is readily decomposed by alkalies when in solution, yielding free berberina.

I obtain from eighteen to twenty-one ounces from a hundred pounds of hydrastis. The specimen of salts exhibited represents the sulphate of berberina from a fifteen hundred pound batch of root. This batch yielded very nearly three hundred ounces. Although the exhaustion was incomplete, with economy I could not carry the percolation farther.

Sulphate of berberina is permanent; exposure to atmosphere does not affect it. If moisture be absorbed, either the salt is impure from hygroscopic extractive matter or free sulphuric acid.

Berberina.—Rub eight parts sulphate of berberina in a Wedgewood mortar, cautiously adding ammonia water until in slight excess. Pour the dark liquid into thirty-two parts of boiling alcohol and allow the mixture to stand thirty minutes, then filter. Stir into the filtrate thirty-two parts cold sulphuric ether and cover tightly. Surround the vessel with ice and allow it to stand from twelve to twenty-four hours, then separate the magma of minute crystals of berberina with a muslin strainer or filtering paper and dry by exposure to atmosphere.

Berberina is lemon-yellow when pure. It should not be dark or orange, which shade denotes impurity. It unites directly with acids and is a beautiful organic base.

* From the 'Proceedings of the American Pharmaceutical Association,' 1878.

It forms salts, some of which are very soluble, as, for example, the pyrophosphate; others almost insoluble. I find it impossible to make one part of carbazotate of berberina dissolve in forty-five thousand parts of cold distilled water. Berberina and all its soluble salts are bitter. The carbazotate will not impart a trace of bitterness to distilled water, notwithstanding its constituents are both intensely bitter; therefore, I believe it to be almost if not absolutely insoluble.

Berberina is soluble in about four and a half parts of water, temperature 60° to 80° F. It dissolves moderately in officinal alcohol, is insoluble in ether and chloroform. It changes to orange colour when heated to 150° F., and slowly resumes its original shade when cooled.

Phosphate of Berberina.—Dissolve berberina in its weight of boiling water and add two parts of dilute phosphoric acid, drain and dry the precipitate by exposure to atmosphere. Care must be taken that the acid be made from phosphorus and perfectly free from nitric acid.

The orthophosphate is, according to Mr. Lord, soluble in 280 parts of water.

Hypophosphite of Berberina.—This salt may be prepared by substituting in the above formula hypophosphorous acid for phosphoric. Hypophosphite of berberina is soluble to the extent of from five to ten grains in the ounce of water.

Muriate of Berberina.—Dissolve berberina in sixteen times its weight of distilled water and cautiously stir in hydrochloric acid until in slight excess; drain the precipitate and dry by exposure to atmosphere.

Muriate of berberina was the first preparation of this alkaloid introduced to the medical profession from hydrastis. It was discovered accidentally. It is soluble in about five hundred parts of water 60° to 80° F., scarcely soluble at all in cold alcohol, ether and chloroform. It is the most difficult of the berberina salts to decompose, holding its acid in presence of alkalies, and even long digestion with litharge fails to thoroughly remove it. Oxide of silver at once frees the berberina from a heated solution. When dry it is changed from the natural light lemon colour to orange by a heat of from 130° to 150° F. Upon cooling the lemon colour is resumed. It is rapidly falling into disuse, giving place to the more soluble salts.

Nitrate of Berberina.—This salt can be obtained by substituting nitric acid for the muriatic acid of the preceding formula. It is of greenish yellow colour, soluble in about five hundred parts of water, temperature 60° to 80° F., more soluble in hot water, scarcely soluble in alcohol, ether or chloroform. Its use is limited.

Remarks.—Alcohol extracts from *Hydrastis canadensis* in addition to berberina a greenish fixed oil, an acrid resin, a white alkaloid, a vegetable acid, yellow colouring matter and small amounts of other substances of little interest here. The materials named are intimately associated or combined while in the root; such combinations being broken up by the addition of the acid, resulting perhaps simply in the formation of sulphate of the white alkaloid, *hydrastia;* sulphate of the yellow alkaloid, *berberina,* and the liberation of the resinous substances, colouring matter and acid.

The yellow sulphate of berberina quickly crystallizes, carrying down some of the other materials, the larger amount of the latter, however, remains in solution. This impure sulphate of berberina is difficult to dry even if well washed, the reason being the mechanical admixture of the oil alluded to; consequently at this stage it has a greenish cast and imparts an unctuous feeling when rubbed between the fingers.

Sulphate of berberina is decomposed by alkalies with the liberation of the alkaloid berberina. When we add ammonia water in slight excess to a mixture of the impure sulphate of berberina and water, sulphate of ammonium is formed, which dissolves, together with the liberated berberina, an alkaloid very soluble in water and alkaline solutions. The slight excess of ammonia precipitates the hydrastia in an amorphous state, which, with the adhering resin and oil, are separated by filtration; afterwards sulphuric acid, added to the filtrate again, forms sulphate of berberina, which crystallizes. This is pure enough for all practical purposes. It contains a small amount of sulphate of ammonium and a little foreign matter. It can be purified further if desirable by repeating the last operation, dissolving in hot alcohol and crystallizing. For practical purposes this is unnecessary.

When ammonia water is added to sulphate of berberina the salt is decomposed with formation of sulphate of ammonium and the liberation of berberina. Both substances remain in solution, the berberina imparting a dark red colour. The addition of the hot alcohol precipitates the larger portion of the sulphate of ammonium, and when the filtrate containing the berberina is poured into sulphuric ether, that alkaloid crystallizes in consequence of its slight solubility in ether and a mixture of alcohol and ether. The impurities may be traces of sulphate of ammonium.

The other salts, simply combinations of berberina and the acids, do not require mention. Almost any salt may be produced in like manner by the substitution of various acids.

I have met with little success in endeavouring to obtain berberina by evaporation of a solution of the alkaloid, unless by spontaneous evaporation, the heat of expanded steam 150° to 180° F. seeming to decompose it.

Fixed Oil of Hydrastis.—After separating the sulphate of berberina from the tincture, add to the liquid its bulk of water and evaporate the alcohol. Allow the residuum to remain in a cool place some days and carefully skim off the green oil which collects on the surface of the water associated with a little resin. It can be purified by dissolving in sulphuric ether.

This oil has a disagreeable odour and taste, but is not bitter. It turns reddish-brown by age.

Volatile Oil of Hydrastis.—In addition hydrastis contains a very small amount of volatile oil, which imparts the peculiar odour of the root. It may be procured in minute quantities by distilling water in contact with the root.

Resinous Substances.—Decant the aqueous solution from which the oil was separated, and at the bottom of the vessel will be found a black tarry substance, thickly interspersed with yellow particles. Usually a yellow shining layer covers the top. This consists of resin, a little oil and mixtures of both the white and yellow alkaloids, with the resin and yellow colouring matter. Perhaps a combination exists between this substance and the alkaloids which settle with it. It is difficult to separate them by simply washing in hot water, which should scarcely be the case if they are disassociated, inasmuch as the sulphates of both alkaloids are quite soluble in this menstruum; wash the precipitate well and dry. The black resinous substance is acrid to the taste, slightly soluble in hot water and dilute acids, soluble in concentrated sulphuric acid, to which it imparts a deep red colour and from which it is separated by the addition of water. It may be a mixture of several proximate principles.

In some respects this substance reminds us of the amorphous material obtained from cinchona, known as chinoidine, and it may perhaps be largely composed of a principle from hydrastis, bearing a somewhat similar relation to hydrastia that chinoidine bears to the crystallizable alkaloids of the cinchonas.

Hydrastia.—This white or yellowish-white alkaloid exists as sulphate in the liquid decanted from the last-named preparation. It is associated with small amounts of all the preceding substances and a soluble vegetable acid. To obtain it add an alkali, preferably ammonia water, in excess to the cold liquid and allow the brown or brownish-yellow precipitate to settle; then decant the supernatant liquid and wash the precipitate with cold water. Add cold water enough to the drained precipitate to bring to the original volume and then slight excess of sulphuric acid. Allow it to stand in a cold place twenty-four hours and filter. To the filtrate add an alkali in excess and wash the precipitate as before. Dry the precipitate, dissolve in boiling alcohol, filter and crystallize. These crystals are of a deep dark yellow colour. They are not bitter, but impart a disagreeable acrid sensation to the throat and fauces. The yellow colour results from the intimate admixture of a yellow substance, very soluble in acid solutions and imperfectly in neutral and alkaline. It is not berberina.

Purify hydrastia by dissolving in a dilute acid, digesting with animal charcoal and filtering, repeating the operation several times. Or dissolve the crystals of impure hydrastia in boiling alcohol and crystallize, repeating the operation several times. Specimens of small hydrastia crystals, apparently white, are found to be yellow when crystallized in large masses. It is very difficult to obtain an article free from yellowness if the crystals be large. I have none.

Hydrastia is insoluble or nearly insoluble in water, freely soluble in cold chloroform and to an extent in cold alcohol, very soluble in boiling alcohol, from which it crystallizes in beautiful crystals. It forms salt with acids, mostly very soluble in water, uncrystallizable or crystallizing with difficulty.

These incidental products are of little general interest to manufacturers, as only berberina salts are in demand.

I have already digressed from the direct line of my query. I will close by saying that there is a doubt in my mind as to the relations of these several principles while associated in the plant. I cannot believe they are as simple as we might expect and is generally believed. I doubt even if berberina and hydrastia are not mutually combined with other bodies. The splitting up of these organic compounds under the influence of chemical agents, drying the plants and the action of solvents, is with me very obscure.

ARGAN OIL.*

Except a brief notice of the exportation into Europe of Argan oil by the Danish Councillor of State, Georges Höst, who travelled in the kingdoms of Marocco and Fez during the years 1766—1768, the only published account of the uses of the Argan is given in a very little known Danish work, published by P. K. A. Schousboe, entitled 'Iagttagelser over Vœxtriget i Marokko.' Forste Stycke. Kiobnhavn, 1800, 4, 7 tab., of which a German edition appeared in 1801, in 8vo, by J. A. Markussen. It gives an account of some Marocco plants; and, after an introductory sketch of the physical geography of Marocco, it contains descriptions of the plants of the country in Latin and German, with occasional observations in German. The account of the Argan under Retz's name of *Elæodendron Argan* is long: first comes a technical description, followed by a history of its synonymy, and then the following notes (kindly translated for us by Mr. Bentham):—

"It is surprising that this tree should hitherto have been so little known; as it is found in a country near Europe, and visited by many travellers, who speak in their diaries and descriptions of oil of Argan and of Argan trees, these last as constituting a considerable proportion of the forests of the country. It is, however, not to be met with in the northern provinces, but only towards the south. All those persons from whom I have sought more accurate information on the subject are unanimous in stating that it only grows between the rivers Tansif and Sus—that is, between the 29° and 32° N. lat.—and there constitutes forests of considerable extent. It flowers in the middle of June, and the fruit remains on the tree the greater part of the year. The young fruit sets in the end of July or beginning of August, and grows slowly till the rainy season commences towards the end of September. It now enlarges rapidly and attains its full size during that season, so as that by the middle or end of March it is ripe enough to be gathered for economical uses. Both the fruit and the wood are serviceable, but especially the former; for from the kernel an oil is extracted which is much employed for domestic purposes by the Moors, and is an important production of the country, as it saves much olive oil, which can thus be thrown into commerce and made to bring money into the country. It is calculated that in the whole Argan region 1000 cwt. of oil is annually consumed, thus setting free an equal quantity of olive oil for exportation to Europe. Our countryman, Höst, in his 'Efterretninger om Marokos,' p. 285, says that the Argan oil is exported to Europe, where it is used in manufactures. Such may have been the case in former times when it might be cheaper; but now there would be no advantage in doing so, as it costs almost as much as olive oil. At present no Argan oil whatever is exported.

"As the practice in preparing this oil is somewhat different from that of common olive oil, it may be useful to enter into some details on the subject. I have myself been present during the whole operation, and consequently speak from experience.

"In the end of March the countryman goes into the wood, where the fruits are shaken down from the trees and stripped of their husks on the spot. The green fleshy pericarp, which is good for nothing else, is greedily eaten by ruminating animals, such as camels, goats, sheep and cows, but especially by the first two. Therefore, when the Arab goes into the wood to collect Argan nuts, he gladly takes with him his herds of the above animals, that they may eat their fill of the green husks whilst he and his family are collecting and shelling the nuts. The horse, the ass and the mule, on the contrary, do not like this food. When a sufficient quantity of nuts are collected they are brought home, the hard wooden shell is cracked between stones and the inner white kernels are carefully extracted. These are roasted or burnt like coffee on earthen, stone or iron plates; in order that they may not be too much done they are constantly stirred with a stick. When properly roasted they should be all over of a brown colour, but not charred on the outside. The smoke which is disengaged during the process has a very agreeable odour. As soon as the kernels have cooled, they are ground in a handmill into a thick meal, not unlike that of pounded almonds, only that it is of a brown colour, and the meal is put into a vessel in which the oil is separated, which is done by sprinkling the mass now and then with hot water, and keeping it constantly stirred and kneaded with the hand. This process is carried on until the mass becomes so hard that it can no longer be kneaded: the harder and firmer are the residuary coarse parts, the more completely is the oil extracted. At the last, cold water is sprinkled upon it, in order, as they say, to expel the last particles of the oil. During the operation the oil runs out at the sides, and is from time to time poured into a clean vessel. The main point to be attended to in order to extract the greatest quantity and the best quality of oil, is that it should be well kneaded, and that the proper proportion of hot water for the extraction of the oil should be used; it is always safer to be sparing of it than to be too profuse. The residuary mass, often as hard as a stone, is of a black-brown colour, and has a disagreeable bitter flavour. The oil itself, when it has settled, is clear, of a light brown colour and has a rancid smell and flavour. When it is used without other preparations in cooking, it has a stimulating and pungent taste which is long felt on the gums. The vapour which arises when anything is fried in it affects the lungs and occasions coughing. The common people use it generally without preparation, but in better houses it is the custom, in order to take off

* From the *Gardeners' Chronicle*, August 2, 1879.

that pungency, to mix it previously with water, or to put a bit of bread into it and let it simmer before the fire.

"The wood, which is hard, tough, fine-grained and of a yellow colour, is used in house carpentry and for other purposes."

MORPHIOMETRIC PROCESSES FOR OPIUM.*

BY ALBERT B. PRESCOTT, M.D.

The following pharmacopœial assay process for opium is submitted to the Committee of Revision:—

Opium, when dried (in powder) at (about) 100° Centigrade (212° Fahrenheit) until it ceases to lose weight, should yield (from 10 to 12?) per cent. of morphia.†

The proportion of morphia may be determined by the following process:—Take of opium, in powder and dried as above required, 6½ grams (100·3 grains); lime, freshly slaked with one-third its weight of water, 3 grams (46·3 grains); chloride of ammonium, in powder, 4½ grams (69·4 grains); benzole (see List of Reagents), 50 cubic centimetres (the volume of 772 grains of water); washed ether (List of Reagents), 6 cubic centimetres (the volume of 92 grains of water); distilled water, 70 cubic centimetres (1080 grains), or a sufficient quantity. Place the opium in a paper filter of 4 inches (10 centimetres) diameter, in a small funnel; add benzole to fill and cover the powder, and when the filtrate begins to drop, close the neck of the funnel and leave to macerate one hour. Then percolate, by adding the remainder of the benzole, and dry the filter and its contents at a gentle heat until the odour of benzole has disappeared. Carefully transfer the contents of the filter (which is to be preserved) to an exactly weighed flask, of the capacity of 100 to 120 cubic centimetres, add the lime, with 20 to 30 cubic centimetres of distilled water, agitate for several minutes, then stopper the flask and shake till a uniform mixture is obtained. Add distilled water enough to make the contents of the flask weigh 74½ grams (1149·7 grains). Digest, by immersing the flask in nearly boiling water, with occasional agitation, for one hour. Cool, and add distilled water to restore the exact weight of 74·5 grams. Filter, through the paper filter previously used, into a test-tube or other cylindrical glass of the capacity of 80 to 90 cubic centimetres, and previously marked for the volume of 50 cubic centimetres (771·6 grains of water), until the filtered liquid reaches the mark. Should the filtrate lack a few drops of the required volume, the filter-contents are gently pressed to bring the liquid to the mark, but in any case no more than this volume is received. To the filtered liquid (now representing 5 grams of the opium), add eight drops of the benzin, and 3 cubic centimetres of the washed ether (the volume of 46 grains of water), then stopper the tube and agitate. Add the chloride of ammonium, and when it has dissolved, agitate again, and set aside in a cool place for three to three and a-half hours. The crystalline deposit is now gathered by filtration, in a small filter previously weighed and moistened, collecting the deposit, and washing the filter with several portions of distilled water, using but a few drops in each portion. The filter-contents are now dried at about 50° Centigrade (122° Fahrenheit), washed with the remainder of the washed ether (3 cubic centimetres), dried again and weighed.‡ The weight represents the morphia in 5 grams (77·16 grains) of opium. The per cent. is found by multiplying the weight in grams by 2, or by dividing the weight in grains by 0·7716.

The plan of Mohr: The use of lime solution in excess to dissolve morphia from opium or its infusion, and the use of ammonium chloride to neutralize the lime and precipitate the alkaloid—a plan corresponding to the successive use of potassa and ammonium chloride for aluminium separation—has been well approved by the best authorities for the practical assay of opium. It has been adopted in the British Pharmacopœia, with exhaustion of the opium with water before adding the lime, and with acidulation with hydrochloric acid and then evaporation, before adding ammonia to throw down the morphia. The addition of a little ether and benzole to hasten the crystallization of the morphia, and especially to prevent the crystals from adhering to the sides of the dish, was recommended by Hager (*Phar. Centralhalle*, Jg. 9, No. 1, u. 2), and the process so executed was designated Hager's later process. Hager directed to deduct one-tenth the weight of the crystalline precipitate for impurities. In view of the fact that some of the narcotina is dissolved by the lime solution, and crystallizes with the morphia, Jacobsen advised to wash the dried crystals with chloroform; this suggestion, with preference of ether instead of chloroform, Hager accepted, directing the deduction of one-thirtieth for impurities. Hager Jacobsen's process, with the lime solution of 5 grams of opium all washed through the filter (and consequent concentration of the filtrate) is chosen by Dragendorff, in his 'Werthbestimmungen starkwirkender Droguen' (1874), p. 93, as the best process for practical uses, and only second to Schacht's prooess, with correction by amyl alcohol extraction and volumetric estimation, for a method of greatest exactness. Then Hager devised the improvement of taking 6½ grams of opium, and having 65 grams of water in the lime solution, taking the first 50 grams of filtrate, to represent 5 grams of the opium, thereby *avoiding the washing of the filter and the concentration of the filtrate*, saving the morphia from waste by wet heat, and shortening the operation. This form of Hager-Jacobsen's process is given in Hager's 'Untersuchungen,' ii., 176; also in Hoffmann's 'Examination of Medicinal Chemicals,' p. 268. I submit the process, very nearly as given in the two works last named, but with addition of the preliminary treatment with benzole, for the consideration of the Committee of Revision.*

With the desire to contribute some proof of the comparative exactness of different processes of morphiometric assay, I have instituted a series of comparative trials, each process being applied in turn to each one of a set of samples of opium, holding the conditions as nearly parallel as possible. Then, as a test of each result, the purity of the morphia was estimated volumetrically by Mayer's solution, and the morphia remaining uncrystallized in the mother liquor was sought to be extracted by amyl alcohol and estimated volumetrically; these means of correction, the one against overvalue and the other against undervalue, being essentially those which were proposed and used by Dragendorff, in his 'Werthbestimmungen starkwirkender Droguen.' All the operations here reported were intrusted to the execution of Mr. Henry Stecher,† and I desire to acknowledge, still farther, the benefit of his counsel in conducting the work throughout the investigation.

* From the 'Proceedings of the American Pharmaceutical Association,' 1878.

† I would suggest, as others have done, that opium ought to be limited in maximum as well as in minimum strength. The Pharmacopœia can hardly depend upon commercial interest *always* to carry over-rich opium to the morphia manufacturer. But I am not confident as to what limits should be fixed, and it seems to me that a requirement permitting a variation of only 2 per cent. is more strict than can be enforced.

‡ Hager (after Jacobsen) directs to *subtract from this weight its one-thirtieth* for impurities (not removed by ether washing of the morphia previous). In his process, however, there is no treatment of the opium with benzole. This treatment with benzole lessens the impurities of the morphia weighed, and probably wastes some morphia (not over $\frac{1}{2000}$ of the weight of the benzole used). The subtraction of one-thirtieth is more fully discussed farther on.

* A strong approval of Hager-Jacobsen's process, by Dr. Schlosser, is given in the *Am. Jour. Phar.*, 1871, p. 224.

† Mr. Stecher has been Assistant in the Chemical Laboratory at Michigan University.

The following named processes were tried:—

A. The process here proposed for the U. S. P., Hager-Jacobsen's, with a preliminary treatment of the opium with a limited quantity of cold benzole.

B. The same, Hager-Jacobsen's process, modified in treatment of the opium at the start with a *sufficient* quantity of hot benzole.

C. Hager-Jacobsen's process, as given by Hager, without initiatory treatment of the opium with benzole. The results being taken before as well as after washing the morphia with ether.

D. Procter's Staples's process ('Am. Pharm. Asso. Proceed.,' 1870, p. 130), the plan of the preparation of morphia by U. S. P., 1870, with initiatory treatment of the opium with benzole.

E. Schachtrupp's process for estimation of morphia and narcotina ('Zeitschrift für Analyt. Chemie,' 1868, vii., 509). The plan of this method consists in exhaustion of the opium, made alkaline and dried, with hot benzole, the benzole solution being evaporated and its residue dissolved in acidulated water and titrated with Mayer's solution, for narcotina, when the benzole-washed opium is exhausted with amyl alcohol, this solution evaporated, and its residue taken up in acidulated water, and ammonia added, for the crystallization of the morphia, so estimated, gravimetrically. The morphia gravimetric results of this process, as of the others, were subjected to volumetric trial.

Four of the samples of opium used were obtained at different drug stores in Ann Arbor, and one was taken from the laboratory stock, all being "powdered opium." The samples were all dried at 100° C., till drying ceased to diminish the weight. Except for process C, only four samples were worked in the trial of each process.

A. *The process proposed by the writer, for the U. S. P.*, as described at the beginning of this paper, Hager-Jacobsen's process, with initiatory treatment of the opium with a limited quantity of benzol not heated. The results represent 5 grams of opium (6·5 grams being taken), as the directions stipulate. Corrections were undertaken, by volumetric estimation of the precipitates, and also of the amyl alcohol extract of the filtrates, with Mayer's solution of potassium mercuric iodide, as described in detail below:—

Process A.

	Percentages. No. 1.	No. 2.	No. 3.	No. 4.	Mean.
a. Crystalline precipitate of crude morphia* .	12·20	13·10	12·32	12·05	12·42
b. Ether-washed morphia	10·74	11·94	11·84	11·68	11·55
c. By estimating *b* with Mayer's solution . .	7·40	8·80	8·48	8·80	8·37
d. From filtrate, by amyl alcohol and Mayer's solution	2·12	1·92	2·76	3·21	2·50
e. Total morphia by Mayer's solution ($c+d$)	9·52	10·72	11·24	12·01	10·87
f. Subtracting from *b* $\frac{1}{30}$ (Jacobsen)	10·38	11·54	11·44	11·29	11·16
g. Subtracting from *a* $\frac{1}{10}$ (Hager)†	10·98	11·79	11·09	10·85	10·18

The quantities of benzole used upon the opium in this series of trials were larger than the directions specify, being, for No. 1, 100 c.c.; for No. 2, 80 c.c.; for No. 3, 80 c.c.; for No. 4, 70 c.c. Even these quantities did not complete the removal of colour by the benzole, the last portions being still slightly coloured. The reason for restricting the quantity of benzole, and using it cold, is given under process B.

For *estimation with Mayer's solution*, the volumetric potassium mercuric iodide, the *precipitates* were dissolved in sulphuric acidulated water, and so diluted that, at the final reaction in titrating, the solution should be about 200 parts to 1 part of morphia (as Dragendorff advises). Mayer's solution* is made by dissolving 13·55 grams mercuric chloride and 49·84 grams potassium iodide, both strictly dry, in water to make 1 litre. The solution is, therefore, twentieth normal (old decinormal) of $HgCl_2+6KI$. Mayer gave the value of 1 c.c. of the solution as 0·020 of alkaloid. Dragendorff reports trials giving (in solutions of 200 to 1) 0·0224 and 0·0221 of crystallized morphia, and of morphia, dried at 120° C., 0·0191 and 0·0205, respectively, for 1 c.c. Again, 0·020 of crystallized alkaloid. The precipitate is not insoluble in water; therefore a uniform dilution of 200 to 1 is advised. If four molecules of morphia salt react with three molecules of the iodomercurate $[(KI)_2HgI_2+2KI?]$, then 0·0202 should be the value of 1 c.c. of the solution, in crystallized morphia, $C_{17}H_{19}NO_3 \cdot H_2O=303$, no allowance being made for the solubility of the precipitate in water. Dragendorff has stated that the precipitate was visible in a solution of morphia salt in 2500 parts of water. From all the evidence at command, and some trials with crystallized morphia, I believe that titration of morphia with Mayer's solution, at 0·020 alkaloid to the c.c., gives results certainly not too high, and possibly a little too low; also that these results of titration are closer than can be obtained gravimetrically by methods of purification of the crystals. Nevertheless, more investigation is needed as to the conditions of accuracy in titrating with Mayer's solution.

The final reaction was found by patiently waiting for the precipitate to subside after each addition liable to be final, then taking a drop with a glass rod, upon a glass plate resting on black colour, and adding thereto a drop from the burette. If a precipitate appears, these drops are rinsed from the glass plate, into the solution, with a drop or two of water.

In undertaking *to exhaust the mother liquors* (the filtrates) of their remaining morphia,† the following plan, after Dragendorff, was adopted:—The crude morphia was filtered out, at the time specified by the process, and the filtrate set aside some time longer for additional crystallization of morphia. The precipitate so obtained was filtered out, washed slightly with water, dried, and washed with ether, dissolved in sulphuric acidulated

* The weight of these precipitates were, respectively for the four samples, 1st, 0·610; 2nd, 0·655; 3rd, 0·616; 4th, 0·6025 grams.

† Hager's directions to subtract $\frac{1}{10}$ from the crude precipitate and take the remainder for morphia, as well as Jacobsen's direction, accepted by Hager, to subtract $\frac{1}{30}$ from the ether-washed precipitate and take the remainder as the morphia, were both given for processes without initiatory benzole washing of the opium.

* F. F. Mayer, 'Pro. Am. Pharm. Asso.,' 1862, x., 238; *Am. Jour. Pharm.*, 1863, xxxv., 20; *Chem. News*, 1863, 159. George Dragendorff: 'Werthbestimmungen starkwirkender Droguen' (1874), 9; 'Gerichtlich-chemische Ermittelung von Giften' (1868), 227.

† The solubility of morphia in pure water is about 1 milligram to 1 cubic centimetre, and Cleaver (*Phar. Jour. and Trans.*, vii., 243, 1876) advises to add to the weight of purified morphia crystals, one-thousandth of the weight of all the water of the mother liquors and washings, to compensate for the morphia so held in solution. It is of interest to note that this correction, with the 50 grams of mother liquor in the Hager-Jacobsen process, just makes one-tenth the morphia of U. S. P. standard opium, the correction formerly advised by Hager to be deducted for impurities (see result *g* of process A, above). But it has been clearly shown that opium mother waters, even when non-alcoholic, dissolve more morphia than pure water does. Cleaver states that "solutions of opium from which the morphia has been precipitated, if allowed to stand until the smell of ammonia has disappeared, will re-dissolve large quantities of morphia." If, however, much excess of ammonia is left in the liquid, the amount of dissolved morphia is much greater (*Phar. Jour.*, 1876, vii., 242).

water, and titrated with Mayer's solution. The opium filtrate (from the morphia precipitate) was then shaken in a large test-tube with amyl alcohol, and the separated alcohol removed, three portions respectively of 15, 10 and 5 c.c. of amyl alcohol being so applied, each portion being heated in a mixture. The united amylic solutions were then evaporated to dryness, the residue dissolved in sulphuric acidulated water, and this solution titrated with Mayer's solution. The following results were obtained:— In the work with Nos. 1 and 2, after treatment with ammonium chloride, the solutions were left twelve hours, and in Nos. 3 and 4, four hours, instead of the "three to three and a-half hours" of the process, for the precipitate to form.*

Supplementary to Process A.

	Percentages. No. 1.	No. 2	No. 3.	No. 4.	Mean.
a. Additional precipitates, estimated by Mayer's solution	0·36	0·20	0·80	0·28	0·41
b. From last filtration by amyl alcohol and Mayer's solution .	1·76	1·72	1·96	2·93	2·09
c. Total additional, as given in A, *d* . . .	2·12	1·92	2·76	3·21	2·50

(*To be continued.*)

ANTISEPTIC GAUZE AND COTTON.†

Although we have already given one or the other of the below-mentioned formulæ for the preparation of antiseptic gauze, we take this occasion to republish a series of the most approved formulæ, in order to answer the inquiries of several correspondents:—

1. *Lister's Carbolized Gauze.*

Paraffin	7 parts.
Resin	5 parts.
Carbolic Acid	1 part.

Melt the paraffin and resin and add the carbolic acid. The mixture contains 7·7 per cent. of carbolic acid. The original formula of Dr. Lister prescribed that the mixture should be applied by means of a syringe, provided with a sprinkling nozzle, upon the gauze, and that the latter should then be heated under pressure in an air-tight apparatus. For some time past, manufacturers of this gauze have found it more advantageous to dip the gauze into the mixture, and then pass it through rollers in order to remove the excess.

All carbolized gauze must be kept in air-tight boxes, to prevent evaporation of the carbolic acid.

2. *Bruns' Carbolized Gauze.*

Resin, in coarse powder . .	400 gms. (14 av. oz. 48 grs.)
Castor Oil . .	40 gms. (1 av. oz. 180 grs.)
Carbolic Acid .	100 gms. (3 av. oz. 230 grs.)
Alcohol . . .	2 litres ($67\frac{1}{2}$ fl. ℥.)

Dissolve the first three ingredients in the alcohol. Saturate the gauze with it thoroughly, wring it out and dry it by hanging it up horizontally, or by shaking it, spread out in lengths of about seven yards; if done in the latter way, two persons holding the two ends and shaking it up and down, it will be sufficiently dry in a few minutes.

This gauze is much softer and pliable than Lister's, and is free from the drawback of irritating the skin, which is sometimes caused by paraffin.

The above solution contains 10 per cent. of carbolic acid.

3. *Eilau's Carbolized Gauze.*

Linseed Oil, boiled	4 ounces.
Yellow Wax	2 ounces.
Resin	4 ounces.
Oil of Turpentine	8 ounces.
Carbolic Acid, Calvert's No. 2 .	1 ounce.

Melt the first three ingredients, then add the other two. Immerse the fabric in the liquid and pass it through a clothes wringer several times; then fold it, wrap it in oiled silk or carbolized paper, and keep it in a well closed tin box. The above solution contains a little over 5 per cent. of carbolic acid.

4. *Pohl's Carbolized Gauze.*

Deprive the gauze of fat or grease by treatment with caustic soda, thorough washing and drying. Then make a mixture of 100 parts of pure carbolic acid and 5 parts of strong alcohol, of which about 4 grams (1 ʒ) are sprinkled upon each square metre (a little over a yard) of the fabric. This is then introduced into a copper boiler which is provided with a safety valve, and is to be hermetically closed, where it is heated to a temperature of 120° C. (=248° F.).

5. *Benzoated Gauze or Cotton* (Bruns).

This is either made with a 5 per cent. or with a 10 per cent. solution, namely:—

a. 5 per cent. solution.

Benzoic Acid . .	50 gms. (1 av. oz. 334 grs.)
Castor Oil . . .	20 gms. (309 grs.)
or Castor Oil .	10 gms. (154 grs.)
Resin . . .	10 gms. (154 grs.)
Alcohol	2430 c.c. (82 fl. oz. 110 min.)

b. 10 per cent. solution.

Benzoic Acid . .	100 gms. (3 av. oz. 231 grs.)
Castor Oil . . .	20 gms. (309 grs.)
or Castor Oil	10 gms. (154 grs.)
Resin . .	10 gms. (154 grs.)
Alcohol	2360 c.c. (79 fl. oz. 447 min.)

The gauze or cotton (which latter should have previously been deprived of oil), is dipped in the liquid, expressed, and dried at a gentle heat.

6. *Salicylated Gauze or Cotton* (Bruns).

a. 5 per cent. solution, and *b.* 10 per cent. solution are prepared exactly like the preceding.

7. *Benzoated or Salicylated Gauze or Cotton* (Thiersch).

These are prepared like those under Nos. 5 and 6; only in place of castor oil an equal quantity of glycerin is used. But this is found not to entirely prevent the loss of benzoic or salicylic acid in the shape of fine dust on handling.

8. *Borated Gauze or Cotton.*

Boracic Acid	10 oz.
Glycerin	4 fl. oz.
Water	q. s. to make 100 fl. oz.

Dissolve by the aid of a heat, which should not be raised higher than necessary, but should be kept up during the saturation of the cotton, so that the acid will not crystallize upon it. The cotton must have been previously deprived completely of its fat by boiling with soda, and subsequent thorough washing and drying.

9. *Borated Lint.*

Dr. Vulpius, of Heidelberg, directs to dissolve 1 part of boracic acid in 4 parts of boiling water, to saturate 1 part of lint with this solution, and to dry.

* Dragendorff reports, from Mr. Fricker's work ('Werthbestimmung,' 92):—

1. Morphia by Hager's process, 5·9 per cent.; by three days' crystallization, 0·3 per cent.; by amyl alcohol, 1·06 per cent.

2. Morphia by Hager's process, 5·8 per cent.; by three days' crystallization, 0·85 per cent.; by amyl alcohol, 0·73 per cent.

3. Morphia by Hager's process, 7·3 per cent.; by three days' crystallization, 1·27 per cent.; by amyl alcohol, 0·56 per cent.

4. Morphia by Hager's process, 6·24 per cent.; by three days' crystallization, 0·80 per cent.; by amyl alcohol, 0·46 per cent.

5. Morphia by Hager's process, 0·38 per cent.; by three days' crystallization, 0·07 per cent.; by amyl alcohol, 0·62 per cent.

† From *New Remedies*, August, 1879.

The Pharmaceutical Journal.

SATURDAY, AUGUST 16, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE CONFERENCE MEETING.

BY the time this Journal reaches the hands of its readers many of them will, it is hoped, be turning their thoughts towards the steel metropolis and the gathering there of the British Pharmaceutical Conference during next week. It will, therefore, be of interest to them to know what are the arrangements made for that event by the Local Committee.

The meeting will be commenced on Tuesday morning, the 19th inst., at half past ten, in the Freemasons' Hall, Surrey Street, under the presidency of Mr. GEORGE FREDERICK SCHACHT, of Clifton. After the usual preliminary business, the reception of the Report of the Executive and the Address of the President, the reading of papers—a partial list of which appeared in this Journal last week—will be commenced; this will be continued until five o'clock, and resumed on the following day at half-past ten.

On each day there will be an adjournment, extending from one until half-past two o'clock, for luncheon, and on Tuesday the members will have the opportunity during this interval of visiting the extensive cutlery works of Messrs. RODGERS and SON, under the guidance of some appointed members of the Local Committee. In the evening of the same day special cars will be provided to convey visitors to the Armour Plate Works of Messrs. J. BROWN and Co., Limited.

On Wednesday morning, at half-past nine, members of the Local Committee will be in attendance to accompany visitors to electro-plate and other works, previous to the resumption of the Conference. No arrangement has been made for Wednesday evening, in order that members may be at liberty to hear the Inaugural Address of Professor ALLMAN, the President of the British Association.

After two days of hard work the members of the Conference will be ready for a holiday, and should this most unseasonable of summers prove capable of yielding one more fine day on Thursday, the 21st, the Excursion to which the Local Committee invites the visitors, both ladies and gentlemen, should be a most enjoyable one. Starting at nine o'clock the company will be conveyed in carriages *viâ* Owler Bar, Froggatt Edge, Calver and Bakewell to Haddon Hall, an old baronial mansion, situated on the banks of the Wye, and belonging to His Grace the Duke of RUTLAND. This will be the most distant point of the excursion and here lunch will be provided. After ample opportunity has been given for exploring the old mansion, the company will leave for Chatsworth, where the celebrated mansion of the Duke of DEVONSHIRE will be thrown open to the visitors. After a ramble through the park the road back to Sheffield will be struck where it crosses the Derwent at the village of Baslow. But before proceeding further "high tea" will be served at the Wheatsheaf Arms. This it is expected will be brought to a close about half-past eight, and then the company will make their way northward to Sheffield.

We do not presume to say which part of this programme is most enticing, the scientific conference or the scientific outing; but we think that as a whole it is sufficient to decide the minds of any waverers in favour of being present at the Sixteenth Meeting of the Conference. We are glad to learn that, so far as can be judged from the number who have applied to Mr. MALEHAM, the Honorary Local Secretary, to secure them accommodation, there are already indications of its being a most successful gathering.

PHARMACOPŒIA REVISION.

As mentioned on several occasions recently the question of Pharmacopœia revision has been taken up by the pharmacists of the United States with considerable vigour. In that country the construction of the Pharmacopœia is not at present controlled by legislation, and among the consequences of this freedom are a multitude of suggestions and a large amount of volunteer work from pharmacists which under proper guidance will probably leave a beneficial impress upon future editions of the United States Pharmacopœia and at the same time profit pharmacy generally. Such guidance may be expected from the American Pharmaceutical Association, which has shown considerable interest in the work, and a report of a committee of that body, presented at the last annual meeting at Atlanta, describes the general principles which it is recommended should be followed in the next revision.

Language is the first subject dealt with, and with respect to this it is distinctly stated that whatever might be urged in favour of the use of the Latin language in European pharmacopœias, it would be impracticable in the United States, for that if it were adopted the original text would be seldom consulted and most pharmacists would use a translation.

In the arrangement it is proposed to abolish the division of the materia medica into primary and secondary lists,—a practice which has been recommended more than once for imitation in this country,—and to arrange all the articles in one alphabetical order, retaining however such headings as aquæ, infusa, decocta, etc., where it is thought desirable to give general directions referring to a whole class. It is also proposed to continue the plan of placing the name of a plant first, followed by the name of the particular part.

The question as to the elimination of articles at present in the Pharmacopœia and the introduction of others is next discussed and lists are given which are too long to quote entire. Among those it is proposed to discard are several indigenous remedies, some of which have more or less been recommended as substitutes for foreign ones, such as Americian elder flowers, *Cannabis americana*, *Euphorbia Ipecacuanha*, *Gentiana Catesbœi*. Chiretta and oil of rue are also included in this list. Among the crude drugs proposed to be added may be mentioned coca, guarana, tea, *Eriodictyon Californicum*, *Eucalyptus globulus*, *Rhamnus Frangula*, *Fucus vesiculosus*, *Grindelia robusta* and *G. squarrosa*, *Hamamelis Virginica* and jaborandi. Seventy chemicals are proposed to be added, including chrysophanic, dilute hydrobromic, purified oleic and salicylic acids, cinchonine and sulphate of cinchonidine, salicylates of iron, lithium and quinine, hypophosphites of calcium, iron, potassium, and sodium, and pilocarpine hydrochlorate. The list of pharmaceutical preparations is still larger, and includes a number of extracts, oleates of the alkaloids and of mercury, tincture of gelsemium, hydrastin, viburnin, and leptandrin, and solutions of the silicates of potassium and sodium.

The descriptions of crude drugs are to be sufficient to indicate the distinctive characteristics visible to the naked eye and when necessary such as are visible under an ordinarily good pocket lens. Common admixtures and falsifications are to be mentioned and the differences pointed out. The Committee further recommends that all chemicals of definite composition should have their formulæ added, according to both the old and the new notation, together with their atomic weights; but that except when differences of process would give different results, chemicals should only be described and defined by concise but complete tests of identity and purity. Also, that temperatures should be stated both in degrees of Centigrade and Fahrenheit.

In the expression of quantities the Committee thinks that all measures of capacity should be abandoned and quantities expressed only in parts by weight. It also recommends that the opportunity afforded by the reconstruction of the formulæ for this purpose should be taken advantage of, in cases where a slight variation of dose is of no importance, to make the tinctures, wines, etc., of uniform strength, so far as relates to the proportion of the crude drug used to a definite quantity of product, and that in doing so the quantities of the ingredients entering into a compound should be expressed in the simplest possible terms and whenever possible in a decimal ratio; but that in the case of very active preparations the present strength should be as nearly as possible preserved.

In cases where certain weights of ingredients are directed to be combined under conditions that may involve a partial loss of any of them—as for instance, when a variable quantity of water may be lost by heat—it is recommended that the weight of the end-product should be specified. Recognition of the progress the metric system is making in the United States is indicated in the proposition that wherever it is necessary to employ definite expressions of weight the quantity should be expressed both in apothecaries' and decimal weights.

The fluid extracts appear to be the most difficult problem the Committee has to deal with. It has decided to recommend that in regard to strength they shall all represent the drug, grain for grain; but as to the practical process for their preparation the Committee hesitates between an improvement of PROCTER's process and SQUIBB's process of repercolation recently described in this Journal. Co-operative experiments are still being carried on under the superintendence of Professor DIEHL to assist the Committee to come to a decision on this point.

As an Appendix the Committee think the next edition of the United States Pharmacopœia should be provided with a table of solubilities of the officinal chemicals in water and in alcohol, at 60° F., and the boiling points; a table of maximum safe doses of powerful remedies; an alcoholometric table; an acidimetric table; a table of reagents; a list of synonyms; a weight and volume table, to facilitate the introduction of the metric system in prescribing; and a table comparing the strength of powerful galenical preparations of other pharmacopœias with that of the corresponding preparations in the United States Pharmacopœia.

BRITISH MEDICAL ASSOCIATION.

THE Annual Meeting of this Association was held in Cork last week, commencing on Tuesday the 5th inst. The number of members present in the city on the first day is estimated at four hundred; there were also many eminent foreign practitioners present. The new President is Dr. O'CONNOR. The Address in Medicine was delivered by Dr. A. HUDSON, of Dublin, and that in Surgery, by Mr. SAVORY, the subject of the former being the labours of LAENNEC and their influence in medicine, and the latter being mainly a criticism of LISTER's antiseptic method. Amongst the business transacted was the award of the gold medal of the Association, for distinguished merit, to Surgeon-Major REYNOLDS, in recognition of his services at Rorke's Drift.

SIR WILLIAM JENNER.

WE learn from the medical journals that Sir WILLIAM JENNER is suffering from an attack of whooping cough, and that he has ceased to practise for the present in order that he may not spread the disease.

Provincial Transactions.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The half-yearly meeting of the above Association was held at the rooms, Halford Street, on Tuesday, August 5, 1879, the Vice-President, Mr. Brampton, in the chair. After transacting some preliminary business the following report was read and adopted:—

"In submitting the report of the proceedings of the Association for the past session, your Committee congratulate the members upon the fact that the Association has now completed its twenty-first session. In looking at the results attained in the past through the medium of the Association, your Committee have every reason to be highly gratified; whilst at the same time they are assured that with the appliances they now possess, much greater success may reasonably be looked for in the future.

"Your Committee regret to notice that the attendance of members has not been so good as could be desired, but are pleased that the rooms have been used by the members for private study on other than class nights to a considerable extent.

"Your Committee are highly gratified at the success of the botany class which has been conducted by Mr. W. J. Harrison, F.G.S., in connection with the Science and Art Department of South Kensington. At the Government examination held in May, the following members were successful:—First Class, Mr. Burford; Second Class, Messrs. Brampton, Lewitt, Llewellyn, Shuttlewood and Raynor.

"Three lectures have been delivered during the past session, viz.:—By the Rev. E. Atkins, B.Sc., on 'Electrolysis;' Mr. W. B. Clark, on 'Chemical Toxicology,' and J. E. Weatherhead, Esq., on 'Cetacea;' to these gentlemen your Committee tender their sincere thanks for the very able and interesting lectures with which they have favoured the Association.

"Your Committee are pleased to notice that a member of the Association, Mr. Raynor, has passed the Minor examination.

"The library is in a flourishing condition, and the valuable books it contains have been in constant requisition.

"In conclusion, your Committee desire to thank those who have rendered help in the past, and to remind the members that the welfare of the Association depends, to a great extent, upon the efforts put forth by each individual member to further the interests of the Association."

The Treasurer's report, showing a balance in hand of 8*s.* 8½*d.*, having been received and adopted,

Mr. Clark proposed that the Secretary be instructed to forward to the late President the following resolution:—

"The members of this Association having heard with regret of the departure from Leicester of Mr. Raynor, beg him to accept their thanks for the many services he has rendered, and assure him that in whatever position he may be placed, he will have their best wishes for his future welfare."

Mr. Shuttlewood seconded the resolution.

The Chairman having put it to the meeting, it was carried unanimously.

The meeting then proceeded to the election of a Committee for the ensuing session, with the following result:—President, Mr. J. J. Edwards; Vice-President, Mr. W. S. H. Brampton; Honorary Secretary, Mr. S. F. Burford; Treasurer, Mr. W. B. Clark; Messrs. Lewitt, Shuttlewood, Thirlby.

Proceedings of Scientific Societies.

SOCIETY OF ARTS.

The History of Alizarin and Allied Colouring Matters, and their Production from Coal Tar.*

BY W. H. PERKIN, F.R.S.

(*Concluded from page* 119.)

The tars from different gasworks yield very different quantities of anthracene; this is to a great extent due to the kind of coal employed and the temperatures to which the retorts are heated in the gasworks. To take two extreme cases. Newcastle coal yields a tar which is very suitable for the preparation of anthracene, whereas cannel coal gives a tar containing but little anthracene and a great deal of paraffin. Now, at some gasworks cannel coal is principally used, as in Scotland. At others, some is often mixed with Newcastle or other variety of coal to increase the illuminating power of the gas; this is done frequently in cold weather. Thus tars of all sorts of qualities are formed, and consequently, the kind and quantity of impurities in the anthracene prepared from them differ.

Further complications also arise in the tar works according to the way the distillation of the tar is conducted. If it is carried only so far as to leave a soft pitch in the still, it does not contain so many varieties of impurities as when the distillation is carried on until hard pitch is produced, or the pitch coked. Crude anthracene is, therefore, found to be not altogether of value according to the percentage of anthracene it contains, but to a considerable extent upon the nature of the impurities associated with it. Thus, anthracene obtained from pitch is scarcely a saleable article to those who purify their anthracene by washing it with naphtha, and then by sublimation.

It would be very interesting to see if it would not be worth while distilling coal near the pit's mouth, for the purpose of manufacturing benzol, anthracene, and other useful products, selecting the most suitable qualities of coal, and employing temperatures which experiment proved to be the most suitable. The gas and coke, of course, could be utilized as fuel. Should the supply of coal tar from any circumstance become insufficient, as, for example, by gas being superseded by the electric or any other source of light, this undoubtedly would have to be done, and it would be a great advantage to get products of a uniform quality.

It will, perhaps, be of interest here to record the prices paid for anthracene during the first year or two of the manufacture of artificial alizarin. In 1870—1871, we gave from 9*d.* to 1*s.* 6*d.* per cent. per cwt., and in 1872 from 1*s.* 6*d.* to 5*s.*, and a small quantity at 5*s.* 6*d.* This shows how the price advanced with the demand;† since then there have been great variations, and much higher prices are said to have been given by some buyers.

The anthracene was at first valued by the bisulphide of carbon or petroleum and bisulphide of carbon tests, and also, by the alcohol process, the present anthraquinone method not being then proposed. For our own information, we employed from nearly the first an anthraquinone test, which consisted in oxidizing about ten grams of the anthracene, previously purified with petroleum and distillation with caustic potash, subliming off the anthraquinone in a retort, crystallizing it from naphtha and then weighing. This, although not very accurate, we found to be practically of much value to us.

As to the advantage of the use of naphtha or petroleum spirit for purifying anthracene, manufacturers differ in opinion. It is evident, however, that petroleum spirit has the great advantage of dissolving less anthracene, and, at the same time, the other impurities are sufficiently soluble

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* From the *Journal of the Society of Arts.*

† The prices of anthracene given in the *Moniteur Scientifique*, April 19, p. 420, are much too high.

in it to be removed if enough be employed, say two or three times as much as the crude anthracene to be purified; it is also easily removed from the purified anthracene by steam, on account of its volatility. Coal-tar naphtha, however, dissolves out a good deal of anthracene; so that the impurities dissolved by it, and left after it has been distilled off, contain often seven or eight per cent. of anthracene, which is difficult to recover. Neither naphtha nor petroleum remove much of the carbazol. The following is a table of solubilities of anthracene, etc., in benzene and petroleum:—

	Petroleum. B.P. 70°–100° C.	Benzene. B.P. 80°–100° C.
Anthracene	·115 per cent.	·976 per cent.
Phenanthrene	3·206 ,,	21·94 ,,
Carbazol	·016 ,,	·51 ,,
Dichloranthracene	·137 ,,	·52 ,,
Anthraquinone	·013 ,,	·166 ,,

There is an impurity in anthracene which is sometimes very troublesome, and that is paraffin. This paraffin is of high fusing point, and of little solubility either in petroleum or in naphtha—very different in this respect from ordinary paraffin. It will dissolve in these solvents when they are hot, but on cooling is almost entirely deposited again. A small quantity of this left in the anthracene frequently greatly impedes the filtration in the succeeding operations, and being a stable compound, passes through most of the processes; it is, therefore, a very troublesome substance, and interferes with the value of a crude anthracene containing it. Crude anthracene is very much purified by being hot-pressed, so much so, that if it is thoroughly done, it is scarcely needful to treat it with naphtha or petroleum. The anthracene, which dissolves in the fused impurities and is then pressed out, may be afterwards recovered.

I will now make a few remarks upon the process of distilling anthracene with caustic potash. This process has been very much spoken against, as destroying a considerable quantity of the anthracene. I may remark that anthracene is not acted upon by heating with caustic potash; and from all the experiments I have made on the subject, which are very numerous, I have not found that there is any more loss of anthracene by distilling it with caustic potash than by distilling it alone.

The effect of caustic potash on crude anthracene is very remarkable, sometimes as much as forty and fifty per cent. of impurities being removed by distilling it with this alkali. The action appears to be twofold: first, it chars all the difficultly volatile and unstable products and bodies of a phenolic character; and, secondly, it combines with the carbazol, forming with it a remarkable compound. Carbazol is present in considerable quantities; crude anthracene, after being washed with naphtha, containing from ten to twelve per cent. of carbazol; washed anthracene, which has been distilled with caustic potash, consists chiefly of anthracene and phenanthrene.

For the economical production of dichloranthracene, we found anthracene which had been purified by distillation with potash essential. This, when properly chlorinated, gives a beautifully crystalline mass, containing a certain amount of oily bodies, which can easily be removed by pressure. Whereas anthracene, which has not been treated with potash, yields a confusedly crystalline mass mixed with sticky impurities, which cannot be pressed out until rendered fluid by the addition of coal-tar naphtha, which results in a considerable loss of product.

One advantage of this process of treating anthracene is that it brings anthracenes of different origins to similar conditions—even pitch anthracene works perfectly well after being subjected to this process. It is also useful as indicating the origin of the anthracene. The further the distillation of the tar has been carried, it will be found the greater the loss of weight the crude anthracene obtained from it will suffer on distillation with potash, on account of the impurities it contains being more easily charred.

There is one curious fact in connection with the process. If anthracene which has been well washed with naphtha or petroleum be distilled with potash, it will be found that on treatment with these solvents again, a considerable amount of impurity will freely dissolve out, apparently consisting chiefly of phenanthrene.

I know of no method of procuring anthracene in a pure state easily and in quantity but by purifying it by distillation with caustic potash. Anthracene thus treated, if washed with benzol or other suitable solvents, and then dissolved in boiling benzole, will crystallize out on cooling in a most beautiful manner in nearly colourless plates with a blue fluorescence, one or two crystallizations rendering it perfectly pure. And this brings me to the subject of the use of pure anthracene in the manufacture of alizarin.

Generally speaking, as a manufacture advances, so the quality of the materials used are improved, and I quite think that the need of anthracene in a pure or purer condition than it is now employed in, will be found to be very desirable in the production of artificial alizarin. Just before I left off manufacturing this product, at the end of 1873, I was engaged upon experiments in this direction, for the purpose of improving the method of preparing dichloranthracene, so as to reduce the amount of chlorine oils formed, or to avoid their formation altogether. As chlorine forms, with pure anthracene, the theoretical amount of dichloranthracene, it is evident that if some convenient method were adopted to allow these bodies to freely react upon each other, pure dichloranthracene could be produced very cheaply, as there would be no loss and no purification needed. I quite think this might be accomplished.

The oxidation of pure anthracene for the preparation of anthraquinone does not succeed well by the process at present adopted, so that this would likewise have to be modified; but if it could be obtained pure, or nearly pure, at once, instead of having to be dissolved in oil of vitriol, or sublimed and then treated with this acid, it would be a great advantage. To obtain anthracene in a pure or nearly pure state on the large scale, I think that it would probably be found best to distil hot-pressed anthracene with potash; then to grind it fine, wash it with petroleum or naphtha and lastly crystallize it from naphtha.

I may here, perhaps, make a few remarks upon carbazol, as it is quite probable that it may yet be found to be a valuable product. To obtain it, anthracene, preferably hot-pressed or washed with naphtha, is distilled with caustic potash until no more anthracene passes over. The black residue is then freed from potash by being well washed with water, and on being distilled yields carbazol; as I mentioned before, crude anthracene gives as much as 10 or 12 per cent. of this substance. Another method consists in boiling the anthracene with fused caustic potash in a cylinder, until free from water, and then allowing the mixture to stand to cool. On opening the cylinder, the anthracene will be found as a layer on the top of the potash containing the carbazol, and can be scaled off. After this is removed, the remaining product is treated as just indicated.*

This remarkable compound of potash and carbazol, when heated to redness, gives off large quantities of hydrogen gas, the carbazol being decomposed. From experiments I have made, this compound appears to contain one atom of potassium to one of carbazol, its formula probably being $C_{12}H_8KN$. It is now under investigation.

* The process of distilling crude anthracene with caustic potash was communicated to H. Caro, of the Badische Aniline and Soda Fabrik, and it was by this means that the carbazol investigated by Graebe and Glaser was obtained.

Carbazol is a beautifully crystallized body, not unlike anthracene. When heated with mercuric chloride, or various other oxidizing agents, it produces a blue colouring matter. This, however, has not been found to be of practical value. It is probably the substance which was described several years ago as anthracene blue, the anthracene used probably containing carbazol.

In crude anthracene and oil, accompanying it, there is a peculiar organic base called acridine, having the formula $C_{12}H_9N$. It was first observed by Caro, and investigated by Graebe and Caro. It crystallizes in brownish yellow four-sided rectangular prisms, and is a most stable compound. The vapour causes sneezing and coughing, and it gives to the oils accompanying anthracene a very irritating action when rubbed on the skin. In hot weather the workmen employed in pressing or otherwise working with crude anthracene sometimes suffer very considerably from the pain it temporarily produces.

Some improvement in the treatment of sulpho acids of anthraquinone with caustic soda in the production of colouring matter is very desirable. The amount of alkali used is often six or eight times more than indicated by theory, and, as no suitable means have been obtained for recovering this before precipitating the colouring matter, it is all converted into sodic sulphate, for which a large amount of sulphuric acid has also to be employed. The sulphate of soda, being in solution, does not pay for evaporation, otherwise it might be reconverted into caustic soda.

Some experiments have been made to precipitate the colouring matter from the alkaline solution with lime, but this, unfortunately, especially with red shades of colours, acts very imperfectly, and is therefore of no value. It is also very desirable that the condition under which the α and β disulphoanthraquinonic acids are formed as also of the disulpho acid giving the sulpho acid of alizarin should be studied, so that their separate formation may be effected at will.

Having now given an account of the manufacture of artificial alizarin, it will be interesting to inquire into the commercial results of this industry, and, firstly, what has been its influence upon the sale of madder and its derivatives. I mentioned at the commencement of this paper that the annual value of the imports into the United Kingdom of madder and garancine, from 1859 to 1868, amounted to about £1,000,000 sterling, with prices averaging for madder 45*s.* and 50*s.* per cwt., and for garancine, 150*s.* In the subjoined table will be seen the remarkable changes that have taken place in the imports, and also the great reduction in price:—

Average Annual Imports of Madder and Garancine into the United Kingdom.

Year.	Madder.	Garancine.	French madder.	Turkey roots.	Garancine.
	cwts.	cwts.	*s.*	*s.*	*s.*
1859–1868	305,840	45,560	45	50	150
1875	100,280	25,860	—	—	—
1876	59,137	15,396 or 6,436	—	—	—
1877	38,711	8,875	—	—	—
1878	32,990	2,790	18	17	65

Up to and during 1876 considerable quantities of artificial alizarin were imported from the Continent, and entered at the Customs as garancine or madder, which having been brought to the notice of the officials, the returns made subsequently are more reliable. The imports of garancine were returned by the Board of Trade in 1876 as 15,396 cwts. when first published, but in the following year, when the figures for 1876 were given for comparison with those of 1877 and 1878, the returns were stated as only 6436 cwts. The erroneous entries were most probably made to evade the penalties for the infringement of patent rights.*

Dutch ground madder has been relatively much higher in price than the other qualities. This is owing to its extensive use in wool dyeing. For various reasons artificial alizarin has made but little progress in its application to wool dyeing, and Dutch madder being mostly used for this purpose, its prices have been maintained at from 28*s.* for ordinary "Ombro" to about 40*s.* to 45*s.* for crop madder. The wool dyers have, however, been working cautiously with artificial alizarin, and now some of them are using it somewhat largely, and, considering its cheapness as compared with Dutch madder, no doubt they will soon find how to use it successfully, and cease to employ madder.

The decline in the sale of madder is still rapidly going on. During the first two months of last year the imports were—

Madder . . . . 6846 cwts.
Garancine . . . . 533 „

During the first two months of this year they were—

Madder . . . . 2185 cwts.
Garancine . . . . 175 „

Or about two-thirds less. And not only so, but the price is still declining. Turkey roots may now be bought at 11*s.* per cwt., whereas before artificial alizarin was introduced they were sold, on an average, at 50*s.* At the present prices of madder its cultivation is unremunerative, and will undoubtedly be soon a thing of the past. Such has been the success of artificial alizarin in competing with madder and garancine in this country, and it is equally true of other countries. The quantity of madder grown in all the madder-growing countries of the world prior to 1868 is estimated at about 70,000 tons per annum. The amount of artificial alizarin now produced is equal in dyeing power to considerably more than this; in fact, the lowest estimate I have been able to get for 1878, and which is confirmed from other sources, is 9500 tons, which is equivalent to 950,000 tons of madder. This remarkable result has been arrived at in ten years only.

To produce this quantity of artificial alizarin there are about nine manufacturers on the Continent and one in this country, Messrs. Burt, Bolton and Haywood, who have two large works for its production, viz., the original works at Greenford Green, and new ones at Silvertown.

Graebe and Liebermann, in their paper in the *Moniteur Scientifique*,† give some statistics of the production of artificial alizarin, which, however, require correcting. They also leave out the years 1869 and 1870. In 1869 we had advanced in the manufacture so far as to send colour into the market, the first invoice being dated October 4th, and that year we produced about one ton. In 1870 we produced 40 tons; in 1871, 220 tons; in 1872, 300 tons; and in 1873, 435 tons. Up to the end of 1870 we were practically the only makers of this product. One of the largest chemical and coal-tar colour manufacturing firms of Germany, with whom we were in correspondence, stating that in November, 1870, they had only lately commenced producing 50 pounds of alizarin, 10 per cent. quality, per day, and that no one else in that country was supplying artificial alizarin; and in 1871 we were practically the only producers of quantity, at any rate during the first part of the year, for in March, 1871, the firm already referred to, and who had great opportunities of knowing what was being done in their country, wrote that they had not received know-

* A method so often resorted to as to render English chemical patents nearly useless as a protection against infringements by foreign manufacturers, the results of this being alike detrimental to the inventor and injurious to the national interests.

† April, 1879, p. 416.

ledge of any establishment but their own manufacturing artificial alizarin.

In November, 1871, however, Messrs. Gessert Frères announced to the Industrial Society of Mulhouse that they had produced 30,792 kilogrammes of alizarin in paste. This is equal to about 30 tons, an amount which was evidently considered by them a very large quantity.*

Graebe and Liebermann's statistics are as follows compared with our production:—

	Graebe and Liebermann. Tons.	Perkin and Son's Productions. Tons.
1869		1
1870		40
1871	125— 150	220
1872	400— 500	300
1873	900—1000	435

Without wishing to detract from Graebe and Liebermann's original discovery, we may say that the birthplace of the manufacture of artificial alizarin was in England. It was in this country that the difficulties and doubts about the manufacture and supply of the raw material, anthracene, were solved, and the production of artificial alizarin by new processes successfully accomplished. After these results were obtained in this country, continental chemists were encouraged to manufacture on a comparatively large scale, but up to the end of 1873 the English manufacturers had practically no competition in the home market.

Having considered the amount of artificial alizarin now manufactured, it will be of interest to see what its money value is.

Taking the lowest estimate, viz., 9500 tons, and calculating its selling prices at £150 per ton, the annual value amounts to no less than £1,425,000, or nearly a million and a-half.

As a dye, it is now at most not more than one-third of the average price of madder in 1859–1868. Consequently, in the United Kingdom, when the annual value of madder imported was £1,000,000, the annual saving is very great.

While collecting the statistics about alizarin, I thought it would be of interest to get, if possible, the statistics of the entire coal-tar colour industry, and to the kindness of H. Caro, of the Badische Aniline and Soda Fabrik, I am indebted for most of the following particulars:—

Estimated Value of the Production of Coal-Tar Colours in 1878.

Germany . .	£2,000,000	of which four-fifths are exported.
England . .	450,000	
France . . .	350,000	
Switzerland	350,000	
Total. .	£3,150,000	

In referring to the works which have been set up for the purpose of making coal-tar colours, I thought it would be of interest to show a copy of a rough sketch of the first works erected for this purpose as they appeared in 1868, two years after the patent for the mauve was taken out.

These works were not one year old when sketched, and the practicability of making the mauve commercially had only been proved a short time. In 1873 they had increased to such an extent as to cover about six acres.

There are now in this country six coal-tar colour works; in Germany, no less than seventeen; in France, about five; and in Switzerland, four. There are also three works in Germany and three in France which manufacture aniline in enormous quantities for the production of coal-tar colours.

Such is the wonderful growth of this industry, which dates only from 1856. It is the fruit of scientific researches in organic chemistry, conducted mostly from a scientific point of view; and, while this industry has made such a great progress, it has, in its turn, acted as a handmaid to chemical science, by placing at the disposal of chemists products which otherwise could not have been obtained, and thus an amount of research has been conducted through it so extensive that it is difficult to realize, and this may before long produce practical fruit to an extent we have no conception of. One very important colouring matter related to coal-tar, and one of the original sources of aniline—a product of as great importance as alizarin—has yet to be produced on the large scale. I refer to indigo. Baeyer has shown that it can be produced artificially, but at present no practical means of accomplishing it have been discovered. No doubt, however, it will not be many years before this is achieved, and the cultivation of the indigo plant share the fate of madder.

* *Moniteur Scientifique*, April 1879, 416.

ROYAL INSTITUTION OF GREAT BRITAIN.

A New Chemical Industry, Established by M. Camille Vincent.*

BY PROFESSOR ROSCOE, LL.D., F.R.S.

"After I had made the discovery of the *marine acid air*, which the vapour of spirit of salt may properly enough be called, it occurred to me that, by a process similar to that by which this *acid* air is expelled from the spirit of salt, an *alkaline* air might be expelled from substances containing the volatile alkali. Accordingly I procured some volatile spirit of sal-ammoniac, and having put it into a thin phial and heated it with the flame of a candle, I presently found that a great quantity of vapour was discharged from it, and being received into a basin of quicksilver it continued in the form of a transparent and permanent air, not at all condensed by cold." These words, written by Joseph Priestley rather more than one hundred years ago, describe the experiment by which ammonia was first obtained in the gaseous state.

Unacquainted with the composition of this alkaline air, Priestley showed that it increased in volume when electric sparks are passed through it, or when the alkaline air (ammonia) is heated the residue consists of inflammable air (hydrogen).

Berthollet, in 1785, proved that this increase in bulk is due to the decomposition of ammonia into nitrogen and hydrogen, whilst Henry and Davy ascertained that two volumes of ammonia are resolved into one volume of nitrogen and three volumes of hydrogen.

The early history of sal-ammoniac and of ammonia is very obscure. The salt appears to have been brought into Europe from Asia in the seventh century, probably from volcanic sources. An artificial mode of producing the ammoniacal salts from decomposing animal matter was soon discovered, and the early alchemists were well acquainted with the carbonate under the name of *spiritus salis urinæ*. In later times sal-ammoniac was obtained from Egypt, where it was prepared by collecting the sublimate obtained by burning camels' dung.

Although we are constantly surrounded by an atmosphere of nitrogen, chemists have not yet succeeded in inducing this inert substance to combine readily, so that we are still dependent for our supply of combined nitrogen, whether as nitric acid or ammonia, upon the decomposition of the nitrogenous constituents of the bodies of plants and animals. This may be effected either by natural decay, giving rise to the ammonia which is always contained in the atmosphere, or by the dry distillation of the same bodies, that is, by heating them strongly out of contact with air; and it is from this source that the world derives the whole of its commercial ammonia and sal-ammoniac.

Coal, the remains of an ancient vegetable world, contains about 2 per cent. of nitrogen, the greater part of which is obtained in the form of ammonia when the coal undergoes the process of dry distillation. In round numbers two million tons of coal are annually distilled for the manufacture of coal gas in this country, and the

* Read at the Weekly Evening Meeting, Friday, February 21, 1879.

ammoniacal water of the gas works contains the salts of ammonium in solution.

According to the most reliable data 100 tons of coal were distilled so as to yield 10,000 cubic feet of gas of specific gravity 0·6, giving the following products, in tons:—

Gas.	Tar.	Ammonia Water.	Coke.
22·25	8·5	9·5	59·75 average.

This ammonia water contains about 1·5 per cent. of ammonia, hence the total quantity of the volatile alkali obtainable from the gasworks in England amounts to some 9000 tons per annum.

A singular difference is observed between the dry distillation of altered woody fibre as we have it in coal, and woody fibre itself. In the products of the first operation we chiefly find in the tar the aromatic hydrocarbons, such as benzene, whilst in the second we find acetic acid and methyl alcohol are predominant.

The year 1848 is a memorable one in the annals of revolutionary chemistry, for in that year Wurtz proved that ammonia is in reality only one member of a very large family. By acting with caustic potash on the nitriles of the alcohol radicals he obtained the first series of the large class of compound ammonias, the primary monamines. Of these methylamine is the first on our list:—

$$\left.\begin{matrix}CH_3\\CO''\end{matrix}\right\}N+2\,KOH=\left.\begin{matrix}CH_3\\H_2\end{matrix}\right\}N+CO''\left\{\begin{matrix}OK\\OK\end{matrix}\right.$$

The years that followed, 1849–51, were prolific in ammoniacal discoveries. Hofmann pointed out that not only one atom of hydrogen in ammonia can be replaced by its equivalent of organic radical, but that two or all the three atoms of the hydrogen in ammonia can be likewise replaced, giving rise to the secondary and tertiary amines, by the following simple reactions:—

$$1.\quad CH_3I+\left.\begin{matrix}H\\H\\H\end{matrix}\right\}N=HI+\left.\begin{matrix}CH_3\\H\\H\end{matrix}\right\}N$$

$$2.\quad CH_3I+\left.\begin{matrix}CH_3\\H\\H\end{matrix}\right\}N=HI+\left.\begin{matrix}CH_3\\CH_3\\H\end{matrix}\right\}N$$

$$3.\quad CH_3I+\left.\begin{matrix}CH_3\\CH_3\\H\end{matrix}\right\}N=HI+\left.\begin{matrix}CH_3\\CH_3\\CH_3\end{matrix}\right\}N$$

To these bodies the names of methylamine, dimethylamine, and trimethylamine were given. They resemble ammonia in being volatile alkaline liquids or gases, which combine with acids to form crystalline and well-defined salts.

Hitherto these compound ammonias have been chemical curiosities; they have, however, recently become, as has so often been the case in other instances, of great commercial importance, and are now manufactured on a large scale.

We are all well aware that the French beet-root sugar industry is one of great magnitude, and that it has been largely extended in late years. In this industry, as in the manufacture of cane sugar, large quantities of molasses or treacle remain behind after the whole of the crystallizable sugar has been withdrawn. These molasses are invariably employed to yield alcohol by fermentation. The juice of the beet, as well as that of cane sugar, contains, in addition to the sugar, a large quantity of extractive and nitrogenous matters, together with considerable quantities of alkaline salts. In some sugar-producing districts the waste-liquors or spent-wash from the stills—called *vinasses* in French—are wastefully and ignorantly thrown away, instead of being returned to the land as a fertilizer, and thus the soil becomes impoverished. In France it has long been the custom of the distiller to evaporate these liquors (*vinasses*) to dryness, and to calcine the mass in a reverberatory furnace, thus destroying the whole of the organic matter, but recovering the alkaline salts of the beet-root. In this way 2000 tons of carbonate of potash are annually produced in the French distilleries. For more than thirty years the idea has been entertained of collecting the ammonia water, tar, and oils which are given off when this organic matter is calcined, but the practical realization of the project has only quite recently been accomplished, and a most unexpected new field of chemical industry thus opened out through the persevering and sagacious labours of M. Camille Vincent, of Paris.

The following is an outline of the process as carried out at the large distillery of Messrs. Tilloy, Delaune and Co., at Courrières. The spent-wash having been evaporated until it has attained a specific gravity of 1·31, is allowed to run into cast-iron retorts, in which it is submitted to dry distillation. This process lasts four hours; the volatile products pass over, whilst a residue of porous charcoal and alkaline salts remains behind in the retort. The gaseous products given off during the distillation are passed through coolers, in order to condense all the portions which are liquid or solid at the ordinary temperature, and the combustible gases pass on uncondensed and serve as fuel for heating the retorts.

The liquid portion of the distillate is a very complex mixture of chemical compounds, resembling in this respect the corresponding product in the manufacture of coal-gas. Like this latter, the liquid distillate from the spent-wash may be divided into—

1. The ammonia water.
2. The tar.

The ammonia water of the *vinasse* resembles that of the coal-gas manufacture in so far as it contains carbonate, sulphydrate and hydrocyanide of ammonia; but it differs from this (and approximates to the products of the dry distillation of wood) by containing in addition methyl alcohol, methyl sulphide, methyl cyanide, many of the members of the fatty acid series and, most remarkable of all, *large quantities of the salts of trimethylamine.*

The tar, on re-distillation, yields more ammonia water, a large number of oils, the alkaloids of the pyridene series, solid hydrocarbons, carbolic acid and, lastly, a pitch of fine quality.

The crude alkaline aqueous distillate is first neutralized by sulphuric acid, and the saline solution evaporated, when crystals of sulphate of ammonia are deposited; and these, after separating and draining off, leave a mother liquor, which contains the more soluble sulphate of trimethylamine. During the process of concentration, vapours of methyl alcohol, methyl cyanide, and other nitrils are given off, these being condensed, and the cyanide used for the preparation of ammonia and acetic acid by decomposing it with an alkali.

Trimethylamine itself is at present of no commercial value, though perhaps the time is not far distant when an important use for this substance will be found. The question arises as to how this material can be made to yield substances capable of ready employment in the arts. This problem has been solved by M. Vincent in a most ingenious way. He finds that the hydrochlorate of trimethylamine, when heated to a temperature of 260°, decomposes into (1) ammonia, (2) free trimethylamine, and (3) chloride of methyl.

$$3\,NMe_3HCl=2\,NMe_3+NH_3+3\,MeCl.$$

By bubbling the vapours through hydrochloric acid the alkaline gases are retained, and the gaseous chloride of methyl passes on to be purified by washing with dilute caustic soda and drying with strong sulphuric acid. This is then collected in a gas-holder, whence it is pumped into strong receivers and condensed. These receivers are wrought-iron cylinders, tested to resist a pressure of 20 kilos. per square centimetre, and containing 50, 110, 220 kilos. chloride of methyl.

Both ammonia and chloride of methyl are, however, substances possessing a considerable commercial value. The latter compound has up to this time, indeed, not been obtained in large quantities, but it can be employed for two distinct purposes: (1) it serves as a means of producing artificial cold; (2) it is most valuable for preparing methylated dyes, which are at present costly, inasmuch as they have hitherto been obtained by the use of methyl iodide, an expensive substance.

Methyl chloride was discovered in 1804 by MM. Dumas and Péligot, who obtained it by heating a mixture of common salt, methyl alcohol and sulphuric acid. It is a gas at the ordinary temperature, possesses an ethereal smell and a sweet taste and its specific gravity is 1·738. It is somewhat soluble in water (about 3 volumes), but much more in acetic acid (40 volumes) and in alcohol (35 volumes). It burns with a luminous flame, tinged at the edges with green, yielding carbonic and hydrochloric acids. Under pressure, methyl chloride can be readily condensed to a colourless, very mobile liquid, boiling at −23° C. under a pressure of 760 mm. As the tension of the vapour is not high, and as it does not increase very rapidly with the temperature, the liquefaction can be readily effected, and the collection and transport of the liquefied chloride can be carried on without danger.

The following table shows the tension of chloride of methyl at varying temperatures:—

At 0°	the tension of	CH_3Cl is	2·48	atmospheres.
„ 15°	„	„	4·11	„
„ 20°	„	„	4·81	„
„ 25°	„	„	5·62	„
„ 30°	„	„	6·50	„
„ 35°	„	„	7·50	„

From these numbers we must of course subtract one to obtain the pressure which the vapour exerts on the containing vessel.

As a means of producing low temperatures chloride of methyl will prove of great service both in the laboratory and on a larger industrial scale. When the liquid is allowed to escape from the receiver into an open vessel, it begins to boil, and in a few moments the temperature of the liquid is lowered by the ebullition below −23°, the boiling point of the chloride. The liquid then remains for a length of time in a quiescent state, and may be used as a freezing agent. By increasing the rapidity of the evaporation by means of a current of air blown through the liquid, or better by placing the liquid in connection with a good air-pump, the temperature of the liquid can in a few moments be reduced to −55°, and large masses of mercury easily solidified. A small freezing machine employed by M. Camille Vincent consists of a double-cased copper vessel, between the two casings of which the methyl chloride is introduced. The central space is filled with some liquid, such as alcohol, incapable of solidification. The chloride of methyl is allowed to enter from the cylindrical reservoir by a screw tap, and the screw left open to permit of the escape of the gas. As soon as the whole mass of liquid has been reduced to a temperature of −23°, ebullition ceases, the screw may be replaced and, if a temperature lower than −23° be required, the tube placed in connection with a good air-pump. By this simple means a litre of alcohol can be kept for several hours at temperatures either of −23° or −55°, and thus a large number of experiments can be performed for which hitherto the expensive liquid nitrous oxide or solid carbonic acid was required.

M. Vincent has recently constructed a much larger and more perfect and continuous form of freezing machine, in which by means of an air-pump and a forcing pump the chloride of methyl is evaporated in the freezing machine and again condensed in the cylinders. This enlarged form of apparatus will probably compete favourably with the ether and sulphurous acid freezing machines now in use, as they can be simply constructed, and as the vapour and liquid do not attack metal and are non-poisonous, and as the frigorific effects which it is capable of producing are most energetic.

The second, and perhaps more important, application of methyl chloride is to the manufacture of methylated colours.

It is well known that rosaniline or aniline-red, $C_{20}H_{19}N_3$, yields compounds possessing a fine blue, violet, or green colour, when a portion of the hydrogen has been replaced by the radicals methyl or ethyl, and the larger the proportion of hydrogen replaced the deeper is the shade of violet which is produced. Thus we have triethyl rosaniline or Hofmann's* violet, $C_{20}H_{16}(C_2H_5)_3N_3$.

By replacing one or two atoms of the hydrogen of aniline by methyl and by oxidizing the methyl anilines thus obtained, Charles Lauth obtained fine violet colours, whilst about the same time Hofmann observed the production of a bright green colouring matter, now known as iodine green, formed during the manufacture of the violet, and produced from the latter colour by the action of methyl iodide.

In order to prepare aniline green from the pure chloride of methyl, a solution of methyl-aniline violet in methyl alcohol is placed in an iron digester and the liquid rendered alkaline by caustic soda. Having closed the digester, a given quantity of liquid chloride of methyl is introduced by opening a tap, and the digester thus charged is placed in a water-bath and heated by a jet of steam until the temperature reaches 95° and the indicated pressure amounts to from four to five atmospheres. As soon as the reaction is complete, the hot water is replaced by cold and the internal pressure reduced by opening the screw tap of the digester. The product of this reaction, heated and filtered, yields the soluble and colourless base, whose salts are green. To the acidulated solution a zinc salt is added to form a double salt and the green compound is then precipitated by the addition of common salt. By adding ammonia to a solution of the green salt a colourless liquid is obtained, in which cloth mordanted with tannic acid and tartar emetic becomes dyed of a splendid green.

If rosaniline be substituted for methyl aniline in the preceding reaction, Hofmann's violet is obtained. The application of methyl chloride to the preparation of violets and greens is, however, it must be remembered, not due to M. Vincent; it has been practised for some years by aniline-colour makers. M. Vincent's merit is in establishing a cheap method by which perfectly pure chloride of methyl can be obtained, and thus rendering the processes of the manufacture of colours much more certain than they have been hitherto.

The production of methyl violet from di-methyl aniline may be easily shown by heating this body with a small quantity of chloral hydrate and then introducing some copper turnings into the hot liquid. On pouring the mixture into alcohol the violet colour is well seen.

In reviewing this new chemical industry of the beetroot *vinasses*, one cannot help being struck by the knowledge and ability which have been so successfully expended by M. Camille Vincent on the working out of the processes.

Here, again, we have another instance of the utilization of waste chemical products and of the preparation on a large scale of compounds hitherto known only as chemical rarities.

All those interested in scientific research must congratulate M. Camille Vincent on this most successful issue of his labours.

Parliamentary and Law Proceedings.

Prosecution for the Sale of Adulterated Sweet Spirit of Nitre.

At the Leeds Town Hall, on Friday the 8th inst., William Greenwood, of Commercial Road, Kirkstall,† was summoned by the Corporation under the Sale of Food

* Hofmann, 'Proc. Roy. Soc.,' xiii., 13 (1863).

† Not on the Register of Chemists and Druggists.—Ed. P. J.

and Drugs Act, 1875. The Town Clerk appeared on behalf of the Corporation, and stated that the proceedings were instituted under the 6th section of the above Act, which provided that "no person shall sell to the prejudice of the purchaser any article of food or any drug which is not of the nature, substance, and quality of the article demanded by such purchaser, under a penalty not exceeding £20."

It appeared that Inspector Handford went on July 10th to the shop kept by the defendant and asked for six ounces of spirit of sweet nitre, for which he paid him 1*s*. 6*d*. He told the defendant he had purchased the nitre for the purpose of having it analysed by the public analyst.

The Public Analyst stated that the medicinal value of the liquid depended chiefly on the quantity of nitrous ether contained therein, and that the sample submitted to him contained scarcely any of that element. The defendant stated that he had bought the spirit of nitre as it was from two chemists in the town.

The defendant was fined 20*s*. and costs.—*Leeds Mercury*.

Obituary.

Notice has been received of the death of the following:—

On the 6th of July, 1879, Mr. Thomas Britten, Chemist and Druggist, Liverpool Road, Southport. Aged 56 years.

On the 10th of July, 1879, Mr. William Griffiths, Chemist and Druggist, Aberayron, Cardiganshire. Aged 51 years.

On the 13th of July, 1879, Mr. Thomas Eyre, Chemist and Druggist, Hayfield, Derbyshire. Aged 31 years.

On the 24th of July, 1879, Mr. David Moir Mackay, Chemist and Druggist, Aberdeen. Aged 52 years.

On the 3rd of August, 1879, Mr. Walter Ferguson Leadbitter, Chemist and Druggist, Sunderland. Aged 71 years.

On the 8th of August, 1879, Mr. Edward Thurland, Pharmaceutical Chemist, Magdalen Street, Oxford. Aged 85 years. Mr. Thurland had been a Member of the Pharmaceutical Society since 1853.

BOOKS, PAMPHLETS, ETC., RECEIVED.

An Introduction to the Practice of Commercial Organic Analysis. By Alfred H. Allen, F.C.S. Vol. I. London: J. and A. Churchill, 1879. From the Publishers.

International Medical-Pharmaceutical Dictionary, in Three Languages: French, English and German. Compiled by George Herman Moeller. Munich: J. Grubert. 1879. From the Publisher.

Elements of Modern Chemistry. By Adolphe Wurtz. Translated and Edited from the Fourth Edition, by Wm. H. Greene, M.D. Illustrated. London and Philadelphia: J. B. Lippincott and Co. 1879. From the Publishers.

Notes and Queries.

[621]. SULLIVAN'S AMALGAM.—The reason of the non-amalgamation is, your precipitate was in too fine powder.

Let the zinc remain twice as long in contact with the solution; the result will be grains the size of ordinary filings. The fine powder should be thrown away with the washings.

Dingwall. P. J. Dewar.

[623]. EMP. COLCHICI.—I have several times had emp. colchici prescribed. It is an American preparation. Having failed to procure it from the wholesale house I shall feel greatly obliged if you will ask for the formula for making the same.

M. R. J.

THE INTRODUCTION OF CHLOROFORM AS AN ANÆSTHETIC.—The following letter on this subject, from Mr. Henry Brown, of Northallerton, has appeared in the *British Medical Journal*:—

The subject of anæsthesia is one ever of interest, and many have not taken the trouble to read the literature of thirty or forty years ago bearing upon the question. I have for some time doubted the priority of Sir J. Y. Simpson's discovery; but he must be credited with great patience and enormous working power; and he never threw away a palpable suggestion, even if emanating from a babe in science, literature, or medicine.

In regard to the composition of the chloric ether (or shall I say chloroform?) introduced into the practice of the Liverpool medical men, in 1838, by Mr. Waldie, I can find no reliable data. I am now referring to exact chemical composition. Whether the chloroform, as suggested by Mr. Waldie to Sir James Simpson, was the chloric ether of Thomson, Robiquet, and Colin, I am not able to say. I leave Liebig out of the discussion altogether: his analysis was defective and inaccurate, inasmuch as hydrogen is completely omitted in his calculation.

In 1834, Dumas determined the true composition of chloroform, and gave it the name by which it is universally known. Mr. Guthrie, of America, and Soubeiran, of France, in 1831, prepared chloroform; but does Guthrie's description at all correspond to our modern article? He writes, in 1832, that "he had used the product very freely during the previous six months to the point of intoxication; that he had found it singularly grateful, producing promptly a lively flow of animal spirits and consequent loquacity, and leaving little of the depression consequent on the use of ardent spirits; that it promises much as a remedy in cases requiring a safe, quick, energetic, and palatable stimulus; and that, for drinking, it requires an equal weight of water."

Dr. Black, of Bolton, speakes of it, in 1833, as a new remedy, and considers it useful in asthma and adynamic conditions of the system.

In 1847, the *United States' Dispensatory*, published in July, describes it thus: "It acts as a diffusible soothing stimulus *in the same manner as sulphuric ether*, but with this decided advantage, that, when sufficiently diluted, it possesses a bland sweet taste, which renders its administration easy even to children. The dose for an adult is a teaspoonful diluted with water. In affections characterized by difficult respiration it may be used by inhalation."

We have thus Guthrie and the *United States' Dispensatory* speaking of a something called "chloroform," but which is miscible with water. Now we know chloroform is only soluble in water to the extent of one in two hundred, and barely soluble in an equal weight of rectified spirit; how, then, could pure chloroform be described by Guthrie and the *United States Pharmacopœia* as possessing the properties above mentioned? I believe it was a spirituous solution of chloroform that Waldie introduced into Liverpool, and it was called chloric ether; but it was not the chloride of olefiant gas of Thomson and others. The question may be asked, Was it chloroform as we now know it that was used by Sir James Simpson in his first experiments, or was it the spirituous solution? I have searched all available records, and confess that upon this point we are in ignorance. I know it is stated a liquid, by some means or other put aside, was used, and most unexpectedly answered the purpose—*i.e.*, of anæsthesia. The party grew exhilarated, we are told, and some become insensible. I need not refer to the fact that, for more than ten years, ether and ether-anæsthesia were the rage, and every medical and pharmaceutical journal literally teemed with accounts of ether-inhalation and descriptions of apparatus up to 1847. Mr. Jacob Bell, editor of the *Pharmaceutical Journal*, in a note on p. 357, No. viii., for February, 1847, thus writes: "Chloric ether has been tried in some cases with success; it is more pleasant to the taste, but appears to be rather less powerful in its effects than sulphuric ether."

Of the dead we must say nothing but in praise; but I am bound to add, Sir James Simpson got his first hint in regard to the anæsthetic power of chloroform from Mr. Waldie; but the name of Jacob Bell must not be overlooked. Bell's note was written in February, 1847, and Waldie's suggestion was offered in November of the same year. I thus leave the subject; but with ample material behind to prove that, although Sir James Simpson was the first to put thoroughly to the test the anæsthetic power of chloroform or chloric ether of 1847, he was indebted to others for the suggestion, and Mr. Waldie followed in the wake of Mr. Jacob Bell. Mr. Bell does not inform us as to his authority; but anæsthesia with ether, and no doubt with chloric ether, was practised for reality's sake, or for the purpose of scientific curiosity, years before the discovery of Sir James Simpson took the medical and civil world by storm.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[334]. In this prescription "An Apprentice" does not give the quantity of calomel, and from the general character of the formula I should be disposed to regard it as one of those lay recipes which are dispensed from time to time rather than as the prescription of a qualified practitioner. In dispensing these the pharmacist has to draw largely as a rule on his judgment, and if the dose of calomel be not excessive I think "An Apprentice" would find mucilage of acacia go far to remove his difficulty. At the same time it is hard to see the object of the combination of calomel and bals. copaibæ.

GULIELMUS.

[335]. In answer to "Nihil" the following formula for emp. iodinii is from Beasley's 'Pocket Formulary,' p. 126:

Lead Plaster	ʒvj
Resin Plaster	ʒij

Melt together and add iodine ℈j rubbed with olive oil ʒss. In the same work may also be found formulæ for emplastrum iodinii compositum and emp. iodinii c̄. belladonnâ, and in Squire's 'Hospital Pharmacopœias,' a formula for emp. iodi co. as follows:—

Iodine	ʒij
Potass. Iodid.	ʒiij
Emplast. Plumbi.	℥xvj
Emp. Opii	℥vj

As the prescription ordered emp. iodinii merely, I should think the first of these formulæ the proper plaster to have used.

GULIELMUS.

An answer has also been received from "Lavandula."

[337]. In reply to query No. 337, I think "G. W. W." must have used hard water. Pure distilled water will make a perfectly clear solution with liq. ferri dialysati and syr. aurant., but if the mixture be only slightly alkaline, the iron will be immediately precipitated.

T. A. TAIT.

Correspondence.

THE BENEVOLENT FUND.

Sir,—In reading over the reports of the Benevolent Fund Committee, which are given in your Journal from time to time, there is food for much reflection, yet, strangely enough, there is too much reason to suppose that, by the vast majority in our community, they are not treated with the attention they deserve.

Lying quite outside the pale of pharmaceutical politics, away from scientific controversy, and rigidly apart from all questions of trade and trade interests, there exists in our midst a neutral ground—a border-land, where charity and goodwill reign supreme, and where the cry of the sorrow-stricken is seldom heard in vain.

When one sees, month after month, a system of relief, extended without ostentation to decayed fellow workers, to bereaved and desolate women, to orphans who have been dearer than life itself to those who have gone before, surely silence can be stretched beyond the point of endurance and the iron-grip of apathy clog the efforts of good men who were working so wisely and so well.

How it is possible for any individual amongst us to withhold his practical sympathy from a work which so persistently proves its nobility it is indeed difficult to say, and it would be a thought reflecting bitterly upon our boasted intelligence as a class if we could for one moment suppose that there existed the man who realized to the full the generous nature of the work done and who still could give some plausible reasons why he should not enlist side by side with those whose only object is to relieve the suffering and distress of fellow creatures—brothers in the close communion of a hard and earnest calling, and whose "crown of sorrow" may be the remembrance of brighter and better days.

Surely, in such a course as this, argument must be unnecessary. I will simply ask my reader, if he should chance to be a non-subscriber to this fund, to turn through some of the back numbers of this Journal, to read over these records of charity—charity in the true sense of the word—to give them a few moments' quiet thought, and then to ask himself "Can no more be done?" The issue I am content to leave to himself and his conscience.

Kilburn, N.W. CHARLES B. ALLEN.

TINCTURE OF KINO.

Sir,—Those who have been troubled with a gelatinized tinct. kino will, I am sure, be pleased to know that the remedy suggested by Mr. Merrikin is of the utmost value. But (having had at one time and another, considerable trouble with this preparation) I would suggest that the percentage of glycerine which he advises be doubled. As a revision of the B.P. is occasionally talked of, would it not be advisable to discard the present tincture and introduce a liquor kino in its place? A preparation which I have used for some time, and which has given the utmost satisfaction, has been prepared as follows:—

Kino in coarse powder	ʒij
Sp. V. Rect	℥v
Glycerine	℥v
Aquæ Dest.	℥x

Macerate for seven days.

I have found the above to make a preparation which may be confidently relied upon, and I would therefore suggest to those who have been troubled in this matter to give it one trial. I am sure they will be pleased.

"CAREY."

F. A. B.—Pereira's 'Selecta e Prescriptis, published by Churchill.

"*Carbolic.*"—See a paper on "Permanent Essence of Rennet," in vol. ix., p. 307.

J. Griffiths.—The Drugging of Animals Act, 1876. It is printed in the Society's Calendar, p. 422.

D. W.—The Act is for the protection of the title.

G. J. Gostling.—We do not know, and must refer you to the gentlemen mentioned for the information.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Mitchell, Harrison, Cairns, Watts, Cherry, Reynolds, Hesse, D. Howard, Rump, Maw, Minor, Dewar.

The Pharmaceutical Journal.

SATURDAY, AUGUST 23, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE CONFERENCE MEETING.

AFTER an interval of six years the British Pharmaceutical Conference has again visited the county of the ridings and for the second time experienced the hospitality of their Yorkshire *confrères*. In point of numbers the meeting has been a most successful one, one hundred and forty-five names having been signed in the visitors' book. The company included many of the best known pharmacists in the three Kingdoms as well as delegates from several kindred associations, amongst them, notably, the Pharmaceutical Societies of Great Britain and Ireland, which were represented by their respective Presidents and several members of their Councils. Nor do we think that the general verdict upon the papers read and the discussions, as compared with those of former years, will be an unfavourable one. Early in the meeting, however, one most unwelcome fact was revealed in the reading of the report, namely, that the Senior General Secretary, Professor ATTFIELD, to whose energy and enthusiasm the present position of the Conference may be in a large measure attributed, had unexpectedly intimated his intention of resigning his present office, although at the request of the Committee he had consented to hold it during one more year. The appreciation of his services by the Executive Committee was evinced by the prompt formation of a provisional committee, to which many other members present added their names. The Honorary Secretary is Mr. M. CARTEIGHE, and the business of the Committee will be to consider the best method of testifying to Professor ATTFIELD the sense of the Conference as to its indebtedness to him.

The Presidential Address was chiefly devoted to carrying out the contrast between the ideal and actual position of the pharmacist in Great Britain which Mr. SCHACHT had presented to the Conference last year. As the Address itself will be found *in extenso* at another portion of this Journal, we leave any more detailed reference to it until a future occasion.

Once more Dr. WRIGHT has provided a report on the aconite alkaloids, the present one being devoted to the alkaloids from Japanese aconite, atis root, and the leaves, flower and stalks of English grown aconite. From Japanese aconite Dr. WRIGHT reports that he has obtained a crystallizable alkaloid, agreeing in composition with the formula $C_{66}H_{88}N_2O_{11}$, which is itself in some respects more stable than aconitine and pseudaconitine, in not yielding "apo" derivatives, and he appears to think it may be a dehydrated derivative of a hypothetical parent base. As an incident of the research he also reports that "treatment with alcohol alone, unacidulated by any acid at all, extracted practically all the alkaloids present in the roots examined." These results confirm those obtained when Japanese aconite was first examined two years ago* in regard to the points of pharmaceutical interest, namely, that Japanese aconite contains more alkaloid—amounting to about 2·5 per cent. soluble in ether—than any other kind of aconite, and that the crystallizable alkaloid obtainable from it is of a specific nature. In the course of the discussion Mr. GREENISH suggested the desirability of ascertaining the botanical origin of the Japanese aconite roots worked upon, and expressed the opinion that as met with in commerce this drug is not always of the same character. This point is of special importance, as this kind of aconite, as pointed out by Mr. UMNEY, is now the kind almost exclusively met with in the market. The examination of atis roots (*Aconitum heterophyllum*) has not led to any definite results sufficient either to confirm or controvert those recorded by BROUGHTON, some years ago, in reference to the substance he termed "atisine." In the examination of the flowers, leaves and stalk of aconite plants no definite result was obtained, and although the quantity of material worked upon amounted to nearly three hundredweight, it was only by inference from the comparative absence of inconvenience experienced in working that the non-existence of poisonous alkaloids was conjectured.

The next report presented to the Conference contained a statement of the results obtained by Mr. THRESH in carrying out the investigation of commercial ginger, for which a grant was placed at his disposal last year. These results show that ordinary Jamaica ginger contains, in the portion extracted by ether—(1) a crystalline fat, consisting of a dark red, tasteless and odourless portion, insoluble in strong alcohol, a white amorphous tasteless and odourless portion, soluble in alcohol, and a wax-like tasteless and odourless resin; (2) a red fatty substance, very pungent and soluble in alcohol; (3) a limpid, volatile, straw-coloured oil of an aromatic, somewhat camphoraceous taste, having a sp. gr. of 0·853 at 15° C.; (4) a neutral resin, soluble in strong alcohol; and (5) acid resins of a dark brown colour. The pungent or active principle of ginger, to which Mr. THRESH gives the name of "gingerol," is a viscid odourless liquid, about the consistency of treacle, readily soluble in alcohol even when dilute.

* *Pharm. Journ.* [3], vol. viii., p. 172, and 'Year-Book' (1877), p. 469.

That portion of ginger which is insoluble in ether consists chiefly of mucilage, inorganic constituents, a substance precipitated by tannin, metarabin, cellulose, albumenoids, etc. The comparative examination of different kinds of ginger showed that the variety most esteemed contains only half as much essential oil as the others, also less active principle than African or common Jamaica. The volatile oil of fine Jamaica ginger has, however, the finest bouquet.

The first paper read after the presentation of these reports was on the "Soluble Essence of Ginger," and it described a modification of the method originally proposed by Mr. Thresh for its preparation. The *rationale* of this process was to be gathered from a consideration of the constituents of ginger root; in carrying it out, the alcoholic tincture which contains, together with the extractive soluble in water, neutral and other resins, gingerol, mall quantities of the red fat, wax, etc., is mixed with slacked lime, by which the greater part of the resin is precipitated. On adding dilute sulphuric acid to the clear liquid the dissolved lime is precipitated, and by diluting the resulting clear liquid, and filtering through powdered pumice or silica, the wax, fat, extractive, and the rest of the resin is got rid of, together with any excess of volatile oil.

The next paper gave an account of an investigation conducted by Mr. Stoddart, to ascertain the cause of a periodical fatality amongst sheep in the neighbourhood of Bristol. Though the inquiry was not originally of any apparent pharmaceutical interest, it incidentally furnished results of value in regard to the period at which ergot should be gathered for medicinal purposes. It was observed that the sheep fed on natural herbage always had foot-rot, even in summer, and other circumstances led Mr. Stoddart to suspect that the mischievous effects might be due to ergotism. On examining the old mature plants of *Lolium perenne* he noticed well-formed purplish dark coloured ergots, but could not discover these upon the younger plants, which were greedily devoured by the lambs, while they sought to avoid the old plants. In the following spring Mr. Stoddart obtained specimens of *Lolium perenne* the inflorescence of which was just commencing, and he traced the development of the ergot from this stage of its growth until the commencement of August, at which period he found the fungus had reached the limit of its vegetative or myceloid growth. It is at this stage that the peculiar medical effect of the *Claviceps* on the animal economy exists in greatest intensity, and it was at this period that the effect produced upon the sheep was greatest. After carrying out these observations for six or seven years he came to the conclusion that for all medicinal purposes ergot should be gathered in the months of August or September, because at the end of the vegetative period its action is greatest.

Dr. Symes then read a paper describing the construction and principles of the different forms of polarimeter and its application in pharmacy. Among other illustrations of this he gave the results of the determination of the rotatory power of a number of essential oils. Another illustration of the utility of the polarimeter had reference to the examination of urine, a legitimate branch of the pharmacist's calling, not subject to the influence of unfair competition on the part of uneducated outside traders.

Next in order were three papers by Mr. Siebold. The first described the application of chloroform in the testing of drugs, and was based upon the principle indicated by Dr. Himley, that the presence of mineral adulterants in flour can be detected by their sinking in that liquid, while the normal constituents of the flour float at the surface. Mr. Siebold described the results obtained in this way as being more satisfactory than those obtained by incineration. The second paper suggested that the difference in the coloration of chloroform by iodine according to the presence or absence of alcohol afforded a means of detecting the presence of alcohol in chloroform. With a mixture of chloroform and alcohol the brown colour of the alcoholic solution of iodine predominates over the purple colour of the chloroform solution sufficiently to give indications to satisfy the requirements of the pharmacist, as in this way the presence of half per cent. of alcohol can be detected. The third paper was on the use of the hydrometer in determining the specific gravity of liquids, and described a number of experiments undertaken with the object of deciding whether the indications of the hydrometer can be depended upon with liquids containing undissolved powders, oils, resins, etc., uniformly suspended. The results tended to show that the presence of such substances does not affect the indications of carefully made hydrometers.

The last paper read at Tuesday's sitting of the Conference was by Mr. Gerrard, on the extraction of pilocarpine by ammoniated alcohol, which he has found to be a much more convenient solvent than those hitherto used, it furnishing a larger amount of product and effecting the separation of the alkaloid from the dark colouring matter much more readily. It was pointed out by Mr. Williams, in the course of the discussion on this paper, that the use of ammoniated alcohol may possibly be adopted with advantage in the extraction of alkaloids from other materials.

On the second day's sitting the business was commenced by the reading, by Mr. Allen, of some "Notes on Petroleum Spirit," describing some characteristic reactions of petroleum spirit as compared with those of benzene from coal tar, as well as a method of testing mixtures of petroleum spirit and benzole. The different behaviour of these substances when treated with nitric acid furnished the basis for this method of testing.

Mr. F. W. FLETCHER then read a paper on the "Valuation of Citrate of Iron and Quinine." After adverting to the circumstance that the Pharmacopœia test furnished no indication whether the alkaloid obtained by its directions was or was not quinine, the author suggested the application of the plan of fractional crystallization to the sulphate as a means of detecting the presence of cinchonidine. The necessity of employing this test was shown by the mention of the circumstance that certain foreign makes of "sulphate of quinine" invariably contain a large proportion of cinchonidine sulphate.

Two papers by Mr. E. DAVIES were then read. The first, on the "Estimation of Water in Iodine," by combining a known quantity of iodine with a weighed excess of mercury, and weighing the dried residue, elicited some useful information. The other paper, on the "Presence of Tannin in Gentian Root," suggested the possibility that the tannin contained in the root is liable to decomposition when the gentian is powdered, or that tannin is not a uniform constituent of gentian root.

A paper on "Amylic Alcohol and Amylic Nitrite," by Mr. DOTT, consisted mainly of a reply to certain criticisms* of the paper read by Mr. DOTT upon this subject at the meeting of the Conference last year.† The author maintained the correctness of the statements in his original paper and he was supported in that position by speakers who stated their experience in the course of the discussion.

The "Gelatinization of Tincture of Kino" formed the subject of a paper by Mr. BAMFORD. The author suggested frequent agitations of the tincture as an efficient remedy of the inconvenience experienced by many dispensers from the behaviour of tincture of kino. In the course of the discussion that followed the reading of this paper it soon became evident that gelatinization of tincture of kino is not by any means invariably experienced. Some of the speakers had never seen a case during many years; others had observed it only on one or two occasions, and it was suggested that the result was probably due to some peculiarity in the kino used rather than a constant characteristic of this drug. Amongst other preventives of gelatinization the effect of the addition of glycerine, as suggested by Mr. ELLINOR, was in the main spoken of favourably, but it was also remarked that the glycerine might to some extent counteract the astringent action of the kino. The judicious selection of the proper kind of kino for the preparation of tincture of kino will probably be the most effective remedy for this kind of difficulty and its attainment may therefore be intrusted to the relative intelligence of wholesale houses.

The use of Anhydrous Air as a Therapeutic Agent was described in a paper by Mr. KEYWORTH, who had found that its application as an absorbent of moisture gave relief from the pain and inconvenience caused by tension in various morbid conditions, such as cancerous growths, ulcers, etc. A jet of dried air applied for an hour in the evening was said to have been found to cause cessation of pain for several hours and secure a good night's rest.

Mr. H. COLLIER read a paper on the use of tincture of quillaia bark as an emulsifying agent, in which he described the efficacy of this preparation in producing emulsions with materials of a resinous or oily nature and suggested that on this account it was deserving of consideration as a pharmaceutical agent. Some strong doubts were expressed in the discussion of this paper that the peculiar activity of quillaia bark would render it inappropriate for use as the means of effecting emulsification, but the remarkable efficacy of the tincture in causing the rapid subdivision of mercury was considered to promise well for its application in the preparation of sheep ointment.

Another paper by Mr. COLLIER dealt with the chemical condition in which saponin exists in the quillaia bark.

Next in order was a note on Aricine, by Mr. JOHN ELIOT HOWARD. Referring to the recent paper on this subject by Dr. HESSE, and to the specimen of aricine presented by that chemist to the museum of the Society, the author stated that he had compared this sample with the one deposited in the museum by himself in 1852 and was satisfied as to their identity. He also found the bark from which Dr. HESSE obtained his alkaloid to be exactly like his own, namely, the *jaune de Cuzco* of DELONDRE and BOUCHARDAT, which was imported as Calisaya in 1829. This, Mr. HOWARD believes, is the only bark from which aricine has been obtained, and he points out that the suggestion of the existence of aricine among the alkaloids of *Cinchona succirubra* is merely matter of conjecture. Mr. HOWARD disavows any claim to the discovery of aricine, though he has satisfied himself of the substantial accuracy of PELLETIER'S observations, and has therefore maintained the existence of the alkaloid described by him as aricine, although it has generally been denied. It is suggested that the further examination of bark yielding aricine promises to be of interest as regards the classification of different species of the genus *Cinchona*, and that in connection with this inquiry it will also be desirable to study the physiological action of aricine, as well as that of paricine, which appears to occur among the alkaloids of *Cinchona succirubra*.

A paper on the "Chemistry of Chaulmoogra Oil," by Mr. MOSS, showed that the existence of any alkaloidal substance in this oil was doubtful, at least so far as to account for any medicinal efficacy. Chemically, the specific characteristic of chaulmoogra oil consists, according to the author's results, in its containing a peculiar fatty acid, gynocardic acid, associated with palmitic acid, hypogœic acid and cocinic acid.

* *American Journal of Pharmacy*, for February, and *Pharm. Journ.* vol. ix, p. 899.
† *Pharm. Journ.* [3], vol. ix. p. 172.

Dr. Hamberg's paper on the "Capacity of Different Organs to absorb and retain Arsenic in Cases of Chronic Poisoning" described the chemical results obtained in a physiological investigation carried out for the purpose of elucidating this subject.

The last paper read was on the "Estimation of Morphia in Turkey Opium," by Professor Fluckiger. The author recommended the exhaustion of the opium with cold water as being the most convenient for extracting the morphia. The clear liquid is then mixed with definite proportions of alcohol, ether and ammonia, and after shaking crystals of morphia are formed at the surface of the layer of ether. After a day or two, the whole of it is deposited and can be collected and weighed.

At the conclusion of the reading of papers, a ballot was taken for the election of officers of the Conference for the ensuing year, which resulted in the choice of Mr. William Southall, of Birmingham, as President. The place of the next meeting, decided in accordance with the previous custom of accompanying the meeting of the British Association, is Swansea, and Mr. J. Hughes, of that town, has been elected Local Secretary; the Vice-Presidents being Mr. Grose, of Swansea, Mr. Reynolds, of Leeds, Mr. Ward, of Sheffield, and Mr. Sandford, of London.

The usual votes of thanks for the services rendered by the members of the Local Committee were then proposed, special mention being made of the names of Mr. Ward, President of the Sheffield Chemical and Pharmaceutical Association, Mr. Maleham, the Local Secretary of the Conference, and Mr. Learoyd, who has actively assisted him. These complimentary acknowledgments of the service rendered to the Conference were never more thoroughly well merited, and we think that all who were present at this meeting will share the opinion expressed by a Yorkshire man, that Yorkshire has reason to be proud of the way that Sheffield has received the Conference and maintained the credit of the county.

On the following day the prospects of fine weather at an early hour were very slender, but at the time fixed for meeting at the Freemasons' Hall it had so far improved that there was a large muster of members, a few of whom were accompanied by ladies, and the excursion was carried out in accordance with the programme indicated last week. With the exception of one brisk shower, a kicking mare and some mountain dew there was nothing to mar the enjoyment of the entertainment that had been provided by the zealous exertions of the Local Committee. Before eleven o'clock at night the whole party had returned safely to Sheffield without any mishap and highly delighted with the excursion.

Besides providing for the convenient lodging accommodation of visitors and for their amusement the efforts of the Local Committee were extended to obtaining for them access to some of the interesting manufactories existing in Sheffield. First amongst these must be mentioned the works where the manufacture of steel according to the Bessemer method is carried on in the manner described in this Journal when the process was only in its infancy. It was naturally at Sheffield that the inauguration of this method took place, and those who had an opportunity of witnessing the enormous extent to which it has developed during the last thirty years have great reason to be grateful to the Local Committee for having procured for them an opportunity of witnessing the operations of this interesting branch of manufacture. In addition to the treat thus afforded, the members were also enabled to visit the electro-plating works of Messrs. Walker and Hall and the show-rooms of Messrs. Rodgers, and so to obtain an actual knowledge of the way in which two of the chief manufacturing trades in Sheffield are carried out. For these facilities the members are under great obligation to the Local Committee, and they are no less indebted to the proprietors of the works visited, as well as to the various officials connected with them, for the extreme liberality with which everything was shown, and for the courtesy and attention displayed, no doubt at the cost of some considerable personal inconvenience.

In this superficial sketch of the Pharmaceutical Conference at Sheffield it has only been possible to indicate some of its most salient features, and there are many things we should have been glad to speak of had time and space permitted. But we may, from a general point of view, say that this has been, in every respect, one of the most successful and satisfactory meetings that have yet been held.

THE BRITISH ASSOCIATION.

The customary proceedings of the British Association commenced on Wednesday evening with the delivery of the Presidential Address, the attendance at which was far from sufficient to fill the Albert Hall. A portion of this Address will be found at another part of the Journal. On Thursday the business of the sections commenced with the delivery of addresses, some of which we hope to print in subsequent numbers. Up to the present time the number of visitors appears to be somewhat small.

THE WEIGHTS AND MEASURES ACT.

The following Order in Council, creating new denominations of standards of apothecaries' weights and measures under this Act, appeared in the *London Gazette* of the 15th inst. It will be observed that it differs from the draft Schedule forwarded by the Board of Trade to the Council of the Pharmaceutical Society* in including the half a scruple weight, and there is no doubt that this important concession is due to the representation of the Council on the subject. Nothing is said as to the stamping of the small weights and subdivisions of

* See *Pharm. Journ.* [3], vol. ix., p. 1003.

glass measures, but probably, as suggested in the letter of the President to Mr. TREVOR, of the 9th of May, the arrangements for carrying this out will be provided for in a less formal manner.

At the Court at *Osborne House, Isle of Wight*, the 14th day of *August*, 1879.

Present—The Queen's Most Excellent Majesty in Council.

Whereas by "The Weights and Measures Act, 1878," it is (among other things) provided that the Board of Trade shall from time to time cause such new denominations of standards, being either equivalent to or multiples or aliquot parts of the imperial weights and measures ascertained by the said Act, as appear to them to be required in addition to those mentioned in the Second Schedule to the said Act, to be made and duly verified, and that those new denominations of standards, when approved by Her Majesty in Council, shall be Board of Trade Standards in like manner as if they were mentioned in the said Schedule:

And whereas it has been made to appear to the Board of Trade that new denominations of standards of apothecaries' weight and measure, being multiples and aliquot parts of the imperial weights and measures ascertained by the said Act, are required, and they have caused the same to be made and duly verified and deposited in their custody:

And whereas the Board of Trade have given to the said new standards of apothecaries' weight and measure the several denominations set forth in the Schedule hereto:

Now, therefore, Her Majesty, by virtue of the power vested in Her by the said Act, by and with the advice of Her Privy Council, is pleased to approve the several denominations of standards of apothecaries' weight and measure set forth in the Schedule hereto as new denominations of standards, and doth direct that the same shall be Board of Trade Standards in like manner as if they were mentioned in the Second Schedule to "The Weights and Measures Act, 1878." *C. L. Peel.*

SCHEDULE.

DENOMINATIONS OF STANDARDS OF APOTHECARIES' WEIGHT AND MEASURE.

1. *Apothecaries' Weight.*

Denomination.		Weight in grains in terms of the Imperial Standard Pound which contains 7000 such grains.
Ounces.	10 ounces	4800 grains
	8 "	3840 "
	6 "	2880 "
	4 "	1920 "
	2 "	960 "
	1 ounce	480 "
Drachms.	4 drachms or half an ounce	240 "
	2 drachms	120 "
	1 drachm	60 "
Scruples.	2 scruples	40 "
	1½ " or half a drachm	30 "
	1 scruple	20 "
	half a scruple	10 "
	6 grains	6 "
	5 "	5 "
	4 "	4 "
	3 "	3 "
	2 "	2 "
	1 grain	1 grain
	half a grain	0·5 "

2. *Apothecaries' Measure.*

Denomination.	Containing the following weight of Distilled Water. Temperature=62° Farenheit. Barometer=30 inches. Imperial Pound=7000 grains.
A fluid ounce and the multiples thereof from one to 40 fluid ounces. Half a fluid ounce	One fluid ounce contains 437·5 grains weight, or $\frac{1}{160}$ imperial gallon.
A fluid drachm and the multiples thereof from one to 16 fluid drachms. Half a fluid drachm	One fluid drachm equals $\frac{1}{8}$ fluid ounce.
A minim and the multiples thereof from one to 60 minims	One minim equals $\frac{1}{60}$ fluid drachm.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

Wednesday, August 6, 1879.

Present—Charles R. C. Tichborne, LL.D., Ph.D., President; Sir George Owens, M.D., Dr. Collins, Messrs. Allen, Brunker, Doran (Bray), Goodwin, Hayes, Hodgson, Holmes, Simpson.

The minutes of the meeting held on July 2, were read and signed.

Read a letter from Messrs. Ennis and Son, solicitors, with reference to proposed prosecutions, and also, in connection therewith, the Report of the Law Committee.

Proposed by Mr. Simpson, seconded by Mr. Allen, and resolved—

"That Messrs. Ennis be instructed to take legal proceedings against the offenders in the two cases of illegal compounding in which proof has been obtained, as recommended by the Committee."

Read a letter from Mr. Harry N. Draper, Dublin, together with a correspondence which he had had with the Clerk of the Peace, respecting his being summoned as a grand juror to the county court, at Kilmainham, and fined for non-attendance; although as a pharmaceutical chemist he was exempt from service, under the provisions of the Juries Procedure (Ireland) Act, 1876.

Proposed by Mr. Brunker, seconded by Mr. Hayes, and resolved—

"That Mr. Fennell be directed to send to the clerks of the North and South Dublin Unions a copy of a list of licentiate pharmaceutical chemists and request that they shall be returned as exempt in all future lists of persons liable to serve as jurors for the county or city of Dublin, and at the same time to state that this course has been rendered necessary by the fact that several of our body have been replaced on the jury lists after having been struck off in previous years."

Read a letter from Professor Schaer, of Zurich, thanking the Council for the books relating to the history of pharmacy in Ireland, which they had sent him.

The reports of the examinations held in July were laid on the table. At the examination for Pharmaceutical Chemists, held on July 2, *five* candidates presented themselves. The following *three* passed—

Thomas Batt, jun., 48, Fontenoy Street, Dublin.
Robert James Hardy, Tandragee.
John Patrick Henry, 160, York Street, Belfast.

Eighteen candidates presented themselves at the Preliminary examinations held on July 7 and 8, of whom *sixteen* passed and *two* were rejected.

William Whitla, M.D., 41, Victoria Place, Belfast, who was proposed and seconded at the July meeting, was now elected a member of the Society.

On the motion of Mr. Hodgson, the Treasurer, seconded by Mr. Doran, it was resolved that £300 of the Society's funds be invested in 3 per cent. Consols, in the names of the President, the Vice-President, and the Treasurer.

Proposed by Mr. Holmes, seconded by Mr. Doran, and resolved—

"That the Pharmaceutical Society of Ireland be represented at the forthcoming Meeting of the Pharmaceutical Conference, to be held in Sheffield in August, and that the following be accredited as representatives:—the President; Mr. R. W. Pring, Belfast; Mr. H. N. Draper; Mr. W. Hayes; Mr. E. M. Hodgson.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

The Sixteenth Annual Meeting of the British Pharmaceutical Conference was commenced on Tuesday, the 19th of August, in the Freemasons' Hall, Surrey Street, Sheffield. The chair was taken at half-past ten o'clock by the President, G. F. Schacht, F.C.S.

Prior to the commencement of the general business—

Mr. W. Ward (Sheffield) welcomed the members of the Association on behalf of the Sheffield Committee, and after adverting to the pleasurable anticipation he and his *confrères* had enjoyed in the prospect of the visit of the Association to the town, said he trusted that the arrangements made were such that the members would carry away many vivid and lively impressions that would live in their memories for years to come.

Reception of Delegates.

The Senior General Secretary then read the following list of gentlemen representing other associations at the Conference:—

From the *Pharmaceutical Society of Great Britain.*—Mr. G. W. Sandford, President, Mr. G. F. Schacht, Vice-President, T. Greenish, F.C.S., Treasurer, and Messrs. J. Robbins, W. D. Savage, J. Shaw, C. Symes and J. Williams.

From the *Pharmaceutical Society of Ireland.*—Professor Tichborne, President, and Messrs. J. E. Brunker, H. N. Draper, W. Hayes, E. M. Hodgson and R. W. Pring.

From the *Bradford Chemists' Association.*—Mr. Silson.

From the *Bristol Pharmaceutical Association.*—Messrs. Pitman, W. W. Stoddart and G. F. Schacht.

From the *Brighton Association of Pharmacy.*—Messrs. T. Billing and W. D. Savage.

From the *Glasgow Chemists' Association.*—Mr. E. C. C. Stanford.

From the *Hull Chemists' Association.*—Messrs. C. B. Bell and J. Oldham.

From the *Leeds Chemists' Association.*—Messrs. P. Jefferson, R. Reynolds and E. Yewdall.

From the *Leicester Chemists' Association.*—Mr. J. W. Clark.

From the *Liverpool Chemists' Association.*—Messrs. T. F. Abraham, A. H. Mason, R. Sumner and C. Symes.

From the *Manchester Chemists and Druggists' Association.*—Messrs. F. B. Benger, Robinson, L. Siebold and W. Wilkinson.

From the *Sheffield Chemical and Pharmaceutical Association.*—Messrs. G. Carr, J. T. Dobb, G. T. W. Newsholme, J. Preston, J. Turner and J. Watts.

Mr. F. Baden Benger, General Secretary, then read the following—

Report of the Executive Committee.

During the past year the various objects of the Association have been successfully promoted or accomplished.

It is again the pleasant duty of your Committee to report a satisfactory condition of the British Pharmaceutical Conference. The annual Year-Book was issued in good time and fully maintained the reputation of its predecessors as a faithful *résumé* of pharmaceutical progress. The MSS. of the 1879 volume is now in the hands of the printer, and its issue to members will take place as soon as the report of the forthcoming meeting and the Editor's introductory chapter can be added to it.

At a meeting of your Committee, held in London on October 2nd of last year, applications for grants of money to aid authors to defray the cost of materials used in carrying out stated researches were received and considered. It was resolved—"That £10 be placed at the disposal of Mr. Thresh for the purchase of materials for an analysis of the rhizome of *Zingiber officinalis*, and a Comparative Examination of the gingers of trade; that £10 be at the disposal of Mr. Gerrard and Dr. Senier for the purchase of the drug termed *Pituri*, and for the materials for its pharmaceutical and chemical examination; and, that £40 be placed at the disposal of Dr. Wright towards the cost of the materials for an investigation of the active principle or principles of Japanese aconite, and for an investigation of the active principles in the leaves and flowers of ordinary aconite."

Reports by these gentlemen will be presented.

At a second Committee meeting, held on July 2nd, Professor Attfield, Senior General Secretary, reported in detail the work done since the last meeting of Committee, including matters relating to the editing, printing and publishing, and delivery to members of the Year-Book; the grants in aid of research; correspondence respecting improper use of the membership of the Conference; correspondence respecting the Bell and Hills Fund books; compilation and distribution of the list of subjects for research; collection of subscriptions; organization of the approaching meeting at Sheffield; correspondence with members likely to work on the Executive Committee in 1879–80; and arrangements for inviting all registered chemists and druggists not already members to join the Conference.

The very successful meeting held in Dublin last year will be still fresh in your memories. The pleasant relationships with our Irish brethren then formed or strengthened fully justified (if justification were needed) our acceptance of the invitation to visit Ireland, and proved with what satisfactory results two societies may form one conference. In returning once more to its native land, approaching indeed its very birthplace, the Conference is welcomed with a heartiness which must be highly gratifying to its members, but which is so invariably extended to it that there is danger of our accepting it more as a right than a privilege. On the present occasion we have perhaps a special reason for remarking on the thoughtfulness which has characterized the arrangements of the Local Committee. It has been repeatedly urged that the objects of the Conference are best promoted by the avoidance of formal entertainments, and whilst fully appreciating the generous impulse which has so often in the past disregarded this perhaps not sufficiently strongly expressed conviction, your Committee venture to hope that the action of the Sheffield Local Committee in this particular may be allowed to form a precedent. The excursion, which usually takes place on the Thursday following the business meetings, affords an admirable opportunity for the renewal of old friendships and the formation of new ones; or to quote the words of the first article of our constitution, of promoting "the friendly reunion of those engaged in the practice or interested in the advancement of pharmacy." The organization of reunions of this kind will, your Committee is assured, be always gratefully accepted by the Conference as an ample indication of the hospitable feelings of its entertainers.

Sufficient papers of pharmaceutical interest have been received to fully occupy the time which can be devoted to their reading and discussion at the present meeting. The names of many old and valued friends of the Conference appear in this list, as well as those of new contributors, to whom a cordial welcome will be given.

The Committee have to announce with much regret that at a meeting held last evening they received a formal communication from their valued Senior Honorary Secretary, in which he tenders his resignation of the post he has so long filled with such distinguished success. The communication runs as follows—

"Ashlands, Watford,
"August 16, 1879.

"To the President of the British Pharmaceutical Conference:—

"Dear SCHACHT,

"After sixteen years of pleasant labours as one of the Honorary Secretaries of our Association, I regretfully, and yet with a feeling of satisfaction at having done useful service, place my resignation in your hands. I thank my colleagues for the opportunities they have given me of joining them in promoting scientific development in pharmacy and good fellowship amongst pharmacists. From the birth of our organization we have all worked together with the utmost heartiness and harmony, and although I now return to the ranks, I trust I shall be allowed to continue to support the objects of the Conference with undiminished enthusiasm and with all the experience and knowledge I have gained as a member of the staff. I hope and believe that the welfare of the Conference and its objects has not suffered either at my hands as a secretary or during my secretaryship, and I do not resign until I have assured myself that that welfare will be maintained, if not enhanced, by the change or changes that will, I know, necessarily be consequent on my resignation.

"I am, Dear SCHACHT,
"Yours faithfully,
"JOHN ATTFIELD."

The Committee felt that the changes involved in Professor Attfield's resignation were of so serious a nature that they shrank from the responsibility of accepting it until a very mature consideration had provided the means for meeting them with a fair prospect of efficiency, and at their earnest request Professor Attfield consented to continue the duties for one year more, in order to afford them the necessary time. The Committee are sure every member of the Conference will concur in a feeling of real gratitude to Professor Attfield for this further manifestation of his self-denying devotion to the best interests of the Conference.

Professor Attfield then read the financial statement, and the statement of the Hon. Treasurer in account with the Bell and Hills Library Fund, which is printed on p. 148.

The President moved the adoption of the report and financial statement, and referred with great satisfaction to the fact that Professor Attfield had, waiving all personal feeling, decided to continue his services for one year longer, and said he had no doubt that he would act with the same energy, ability and skill as heretofore.

Mr. G. Ellinor (Sheffield), in seconding the motion, adverted to the prosperous condition of the funds, which he was sure would be used well in promoting pharmacy in general in connection with the Conference.

The motion was then put to the Conference, and carried unanimously.

Professor Attfield read a communication which the President had received from Mr. H. B. Brady, one of the oldest friends of the Conference, apologizing for not being able to attend, and mentioning as evidence of the wide-spread influence of the Conference that he had observed in Japan that a native firm of booksellers offered the Year-Books for sale at four and a-half dollars per volume.

THE GIFT OF BOOKS.

Professor Attfield explained that the sum of ten guineas, placed at the disposal of the Committee from the Bell and Hills Library Fund, had been expended for the purchase of such books as the officers of the Local Association thought would be the most useful in their library. In addition to those books there were two others—Hanbury's 'Science Papers,' and Flückiger and Hanbury's 'Pharmacographia,' presented to the Local Association in memory of Daniel Hanbury by his brother Thomas Hanbury. There were, moreover, along with these books, engravings of Jacob Bell, William Allen and Jonathan Pereira offered to the Local Association by Mr. Thomas Hyde Hills.

Mr. Ward and Mr. Learoyd returned thanks on behalf of the Sheffield Association.

Mr. Schacht then proceeded to read the following:—

PRESIDENT'S ADDRESS.

Amidst the customs which rule this Conference in its relations with its President are two that in their co-existence may not always conduce to fortunate results. The same individual is retained in his exalted position for two consecutive years, and he is expected to deliver an address on the occasion of each Annual Meeting.

In defence of the latter, it may perhaps, with other considerations, be reasonably urged that he who is selected by the voice of this Association to a dignity so distinguished as the occupancy of this chair, may fairly be expected to have something to say to his fellow pharmacists, gathered from either his personal knowledge, his experience or his aspirations, worthy of being uttered. But when he finds himself called upon to repeat the duty after the short interval of one year, he may be excused for feeling, as I feel, that his chance of enlisting the interest of those who listen is sadly diminished, and that he must, even more earnestly than on the occasion of his former effort, hope for indulgent sympathy.

In days gone by, the course of events during the current year, so far as they affected scientific pharmacy, assisted much to indicate the plan and scheme of a Presidential Address; and some of the ablest discourses recorded in our annals consist chiefly of judicious summaries of the progress of the sciences connected with our calling and of such movements within and outside our body as appeared to affect pharmaceutical culture. But the conditions which rendered such a course wise in the earlier Conference days are now much changed. The same interest, perhaps even greater interest, is felt in those matters, but the work of summarizing them appears to have passed to other hands.

The press, which is ubiquitous, and whose chiefest apparent function is to absorb most other functions, has grown strong in our midst, and able editors obligingly offer to us all month by month, and journal by journal, a taste of the plums and a slice of the pie your President might otherwise be fondly regarding as destined for his own gathering and maturing as a *bonne bouche* for his expected guests; and to complete his discomfort lurks the conviction that should even a stray blossom escape this scrutiny and he succeed in impressing it to his service, the Conference itself, in its own elaborate and well ordered Year-Book, will, a few weeks later, completely extinguish his puny entertainment and make the remembrance of it stale and flat.

The area for my choice appearing thus somewhat narrowed, I endeavoured last year to select a subject which for complete consideration would afford matter for two addresses, and which yet could be so arranged that the portion first delivered might stand fairly well by itself should any cross stream of events interfere with the original purpose, and I finally determined to make, as well as I could, two presentments of the same fact, viz.,

FINANCIAL STATEMENT, 1878–79.

THE GENERAL FUND.

The Senior Hon. Secretary in Account with the British Pharmaceutical Conference.

Dr.	£	s.	d.
Balance from 1877—1878	77	6	2
To Sale of Year-Books by Secretary	15	0	0
" " " Publishers	39	3	4
" Advertisements in 1873 vol.	0	3	2
" " 1874 vol.	1	0	0
" " 1877 vol.	14	9	3
" " 1878 vol.	126	1	0
" Subscriptions from Members	740	16	4
	£1013	19	3

Cr.	£	s.	d.	£	s.	d.
By Expenses connected with Year-Book:—						
Butler and Tanner for printing, binding, and banding	£410	5	9			
Editor's Salary	150	0	0			
Messrs. Churchill:—						
Commission on Advertisements	35	8	4			
Advertising Year-Book	2	3	0			
Delivery to Members	53	16	9			
Foreign Journals (Nutt)	3	4	6			
				654	18	4
" General Printing:—						
Butler and Tanner	3	15	0			
Stevens and Richardson	3	15	3			
Parkins and Gotto	7	2	7			
				14	12	10
" Printing and postage of 10,500 Invitations to Membership				86	10	8
" Directing Circulars and Envelopes				5	0	3
" Assistant-Secretary's Salary				40	0	0
" Postage (about 10,000 letters)				41	10	0
" Sundries				13	1	6
" Expenses of Meeting at Dublin				12	6	4
" Purchase of a few sets of Year-Books, 1870—1872				24	3	4
" Grants in Aid of Research				50	0	0
" Balance to Treasurer				71	16	0
				£1013	19	3

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

1878. *Dr.*	£	s.	d.
To Balance in hand on July 1	33	7	5
July. To Dividend on £250 Consols	3	13	6
1879.			
Jan. To " "	3	13	6
June 30. To Cash from Hon. Sec.	71	16	0
	£112	10	5

1879. *Cr.*	£	s.	d.
Jan. 29. By Power of Attorney	0	6	0
By Balance	112	4	5
	£112	10	5

Assets July 1, 1879		£	s.	d.
	Cash in hand	112	4	5
	Consols (stock)	250	0	0

THE BELL AND HILLS LIBRARY FUND.

The Hon. Treasurer in Account with the British Pharmaceutical Conference for Year ending June 30, 1878.

1878. *Dr.*	£	s.	d.
To Balance in hand on July 1	5	4	1
July. To Dividend on £350 Consols	5	2	9
1879.			
Jan. To " "	5	2	9
	£15	9	7

1878. *Cr.*	£	s.	d.
By Purchase of Books for Sheffield	10	10	0
" Balance	4	19	7
	£15	9	7

Assets July 1, 1879		£	s.	d.
	Cash in hand	4	19	7
	Consols (stock)	350	0	0

Examined and found correct, W. HAYES, Dublin. G. A. CUBLEY, Sheffield. *Auditors.*

the pharmacist as we see him ourselves, and the pharmacist as seen by others; and further, should those two images be found to differ (and I scarcely expected them to coincide) to reflect upon some of the points that difference might suggest.

Last year then I offered the first part of this scheme, a view of the pharmacist as seen by ourselves.

It would doubtless be wrong to assume that the picture then offered was universally approved; but I know it to have been the result of truth-seeking observation, and twelve months' further experience assures me that it was fairly correct. I find that the more I know of my fellow labourers, the more good stuff I see in them, and the closer I become familiarized with the work they are doing the more I am able to respect it. Hence I feel no hesitation in repeating the opinion expressed last year, that the typical pharmacist "stands the illustration of a high order of citizen."

But, lest there be danger that such an estimate resting long unchallenged provoke conceit, let me turn to what may prove an antidote of the severest kind, viz., the estimate of ourselves by others.

Already I can fancy that the recollection of a well-worn couplet has passed through many minds, and has prepared their conceit, had it begun to develop, for a heavy fall—

"Oh wad some power the giftie gie us
To see ourselves as others see us:"—

for whatever was really prevailing in the poet's mind when he penned those lines, the usual sense in which they are quoted is one that implies erroneous self-estimate, on the one hand, and wisdom, superior if not supreme, on the other; and by this reading I and those who are inclined to support my views ought to stand convicted by a jury of our own choice, not only of great conceit, but of great folly also. But to such a position and to such a verdict I demur. A solicitude to ascertain what others think of us need not necessarily coincide with any such relation. "Whom do men say that I am?" was the inquiry of one we should be little inclined to charge with folly or conceit; it was "men," not the speaker, that were likely to be the better for a correct appreciation of the speaker's self; and at the risk of being charged with an unwise comparing of small things with great, I venture the opinion that what the public think of us pharmacists is of graver import to the public than to us.

Every art must rest its claim for existence upon some great public want. The universality of disease created the art of medicine. The cure or relief of human suffering is the great aim and purpose of that art, and hence in its pure and wholesome progress, every single creature of the public must ever have the profoundest interest. If public ignorance or public prejudice in any way warps that wholesome progress, it is the public that chiefly suffer; they are the many, we are the few; the penalties we may be called upon to pay are but sectional, theirs must be universal. We have but to accommodate ourselves to the conditions, they have to endure them. Conversely, should the public wisdom tend, but in the least degree, to favour the full, fair, scientific progress of medicine, the benefit must be experienced in a thousand-fold degree where there is a thousand times the capacity for its reception.

Does that wisdom then display itself in a fashion most conducive to the best interests of the public? Let us frankly and gratefully answer, that in many respects it is manifested with high intelligence, and with noble generosity. The hospitals that adorn our entire land, and many of the laws that grace our statute books stand among the living monuments of both; moreover few of the recognized professors of medicine pass through the labour of their lives without achieving fair reward in honour or in money, perhaps I might truthfully say in honour *and* in money. And if the same or similar sentiments prevailed towards pharmacy and its professors, the two presentments I am supposed to be offering would probably coincide, and I should have to say but little more on this topic to-day. But with the majority of the public, certainly with the section that is called "society," this is not the case, and but little of the honour, and as little as possible of the money, is given to us in exchange for our life-long work. The sole monuments of *our* professional existence are of our own raising, and "a House" can scarcely be got together to consider a bill, having for its object the regulation of so *un*interesting a matter as pharmacy. It is true we are credited with being concerned in a "clean" sort of business, from which we are oddly enough accused of making very small incomes out of very large profits; we are admitted to possess decent shops which it is not unseemly to enter, and which indeed it is quite correct to make use of for any purpose not demanding a fee; we are supposed to be bound by some law of custom (certainly not by any sense of duty) to obey all behests, at all hours, on all days; we are credited, in short, with being "society's" most obliged and humble servants, slavishly ready to do whatever is told us, and to take for payment whatever cannot be conveniently bestowed upon the professional man on the one hand or the co-operative stores on the other. To find a man or woman "in society" content to be publicly seen in friendly talk with a pharmacist, or indeed permitting the association of their children with ours at a public school, is to see a phenomenon of rare order. The doctor is the lady's and sometimes the gentleman's hero; the pharmacist is the tradesman to both.

Such, I fear is the view very generally taken of us by others, and I need scarcely say this presentiment does not coincide with the one I offered last year. Shall I endeavour to account for the difference before passing to other reflections?

With my already declared estimate of ourselves, and of our art (so different from my lady's), it is natural I should conceive that the phenomenon may be traced through a course that lies mainly outside us; and remembering how many-headed is that great outside public, how prone to the instinct of speciation, and how prone is each species to become absorbed in matters of its own concern, taking impressions of other things mainly at second hand, seldom by original effort; I have thought that the first step should consist in the search for that section of the outside world which is likely to be chiefly responsible for the delivery of the initiatory bias.

A very short consideration leads to the suggestion that the public would almost instinctively assume that the doctors would know more about pharmacy and pharmacists than anyone else, and therefore that what they thought about us, and the attitude they assumed towards us, would be the proper thing to adopt and to imitate. And the public would have much to justify such an assumption.

More or less the story is known to all (and the more it is remembered the better) that for a long period, until in fact quite recent times, pharmacy constituted both practically as well as theoretically an integral portion of the medical art, and the pharmacist and the physician were one man. It is true this latter condition no longer obtains; it has been found desirable to entrust the different departments to distinct sets of hands in order that each may be worked to its fullest perfection, and under the completest personal responsibility. But the art remains the same, one portion being no more capable of repudiating another or declaring its independence of the rest than is the eye or the heart of the human body.

And hence this assumption of a kind of perpetual alliance between the professors of all its departments would be both instinctive and reasonable, and the estimate of the one by the others would be deemed authoritative.

Whatever, then, the public estimate of us may be, I think it is mainly the echo and the reflection of that previously adopted by our neighbours the doctors. I do not mean that they would pronounce as right the treatment which I have asserted so many of us receive at the hands of the public, but that their general tone and manner towards us have furnished the germ which has thus fructified.

But does our experience with the profession justify this interpretation of their views towards us?

I have heard of cases, and have experience of cases, in which individual members of the profession have manifested, by their thoughtful treatment of all pharmaceutical matters, an appreciation of their importance so high and just, and a respect for those engaged in them so fair, that, were the question to be answered from such examples, the reply would be to the effect that there is no justification for it whatever. I fear, however, that these cases are exceptional.

Of the large majority, some, the greater proportion, are as nearly as possible indifferent to ourselves and to our work.

There exists, however, a third section of the profession, and I trust it is a diminishing one, that holds us at a very low estimate, that professes to believe us systematically familiar with mean doings, and open to mean temptations.

From the first of these divisions I pass with a cordial expression of respect, my chief hopes for the bettering of pharmacy in the future resting with its honoured members—from the last with a hope that they may be speedily delivered from their delusion; and our business for the present lies with the indifferentism that remains, and which is unfortunately only something less damaging than actual hostility. How is it to be accounted for?

I believe it to be mainly due to want of knowledge in two important directions. This large majority of medical men do not know enough of *our* subjects to appreciate them at their proper value, and they do not know the extent of our professional qualifications sufficiently well to give us due credit for them. Notwithstanding the fact to which I have already referred, the essential oneness of all the subjects that together make up the art of medicine, in no modern medical school do chemistry, botany and pharmacy rank in educational importance with, let us say, anatomy, surgery and medical practice; the former are the off-subjects, and are very generally done any-how or no-how; the latter are among the prime subjects and must be done well. The traditions of the school enlist all the student's enthusiasm for what are called the medical subjects proper, and as an inevitable consequence, a sentiment near akin to contempt pervades his view of the rest. Caring but little for them in the abstract, and taught to think but little of their practical value to his art, the student of medicine when he becomes the professor is but little likely to respect very highly even those he is compelled to admit as their recognized professors, and from the curious separation that has hitherto characterized the training of the pharmaceutical and the medical student, all that the latter knows of the former amounts to but hearsay, and he finds no particular reason in after life to mature or enlarge his information.

For this state of things we must ourselves take some share of blame. There is no doubt that ignorance of matters that should have ranged within our knowledge did, in past times, prevail, and, since miraculous changes in social phenomena do not frequently occur, that ignorance may not have entirely yielded yet; but a great effort for improvement has been made, an effort be it remembered entirely from within our own body, and its practical results have been sufficiently remarkable to suffice in a large degree to absolve us from that portion of the blame.

But the very circumstance that appears to stamp pharmaceutical progress as unique, and to give it a special dignity, I mean its self-originating and self-sustained character, has largely tended to limit all knowledge of it to those who have specially watched the phenomenon or taken part in it.

The policy of those who initiated, as of those who continued the effort was one that all can respect for its independence, but which I cannot but fear time and experience will show to have been, in this one important respect, unwise. It has served to intensify isolation where unification should prevail. The withdrawal of ourselves and our educational processes from the general professional ken has tended to encourage the elimination of the sciences we specially cultivate from the complete medical curriculum, and to foster the notion I have already deplored that they are accessories of inferior value, and non-essential to medical culture. For this we must still bear our share of the blame.

But wheresoever the blame should chiefly lie I think that the fact of the practical isolation of pharmacy and its professors, from the rest of medicine is due to the general defective acquaintance on the part of the professed medical man with both our subjects and our men.

I must now pass to a consideration of the loss to the art of medicine that accrues from so extended an indifference to the pharmaceutical sciences. It would perhaps be in better taste to let others speak to this point rather than myself. I am content, therefore, simply to remind you of the frequent publicly expressed lament of many distinguished physicians that so much of their practice is still perforce empirical, and of their equally emphatic rejoicings when some ardent student of science has succeeded in wresting from its mysteries some secret that has offered a glimmer of firmer resting ground for their doctrines. The teaching of her highest authorities tells us that medicine cannot afford to fling away the help of her natural allies; that she is exposed to constant attack at almost every point; that her growth is not in perfect comeliness and undisturbed proportions, but is liable to distortions and excrescences of formidable type; and that her best hopes for future progress rest in the patient scientific work of her acutest and largest-brained sons—men who have the power to enlist within their sympathies every department of knowledge that can bring its modicum of truth and focus all upon that one supreme point, the great problem, life.

I think that among the first regions such men would wish to explore are the very subjects in which we are daily engaged; and with such aspirations animating the great mind of medicine on the one hand, and such opportunities existing for practical co-operation on the other, is it not the simplest of all possible deductions that an effort serving to bring all into better mutual estimation and closer mutual confidence, must be attended with a fair hope of distinct gain to the art itself?

So far I have attempted to show what the public estimate of us is; who are chiefly responsible for it; the probable causes that have led to it, and the mischief to medicine that attends it.

One more consideration mnst be stated in order to show that the error is, as I have said, of great practical interest to the public itself.

We are not above the influence of that estimate.

Who in this world, whether the question be asked of individuals or of communities, is so strong, either in good or evil as to be able to resist such influence? Is "the publican" likely to become a patriot for being daily declared to be an outcast? Branded as a social enemy, an enemy he will continue or become. Should we presume to expect brave deeds in the field if we systematically treated our soldiers as cowards? Brave deeds alone being assumed as possible, brave deeds are done. In short the opinion of society reacts in a thousand ways upon society's elements; and I fear the constant treatment to which some of us are subjected,—that says more forcibly than words can say, "You druggists are but hirelings, labouring like other hirelings for greed; take your pay and be thankful"—exerts a power for degradation that cannot fail to promote the very condition it professes to reprobate.

I say that for its own sake the public should make haste to see that we are of stuff much better than this.

I am quite aware that at every step of these statements their accuracy may be challenged; I have attempted to do this myself in many ways, and during the process have had to admit, from our own side, how often my standard of pharmaceutical excellence is missed, and that ignorance, carelessness and looseness of principle are to be found amongst us; and from the other side, that many just and considerate individuals can be found in English society, as also doctors whose scientific culture is as ample, and whose disposition to make the most of ours is as generous as heart could desire. Nevertheless, having taken these and kindred facts into full consideration, I allow the statements to stand as what I believe to be the truth.

But to another challenge I have perhaps also laid myself fairly open, namely, to suggest some remedy for the condition of things I profess to have studied and to deplore. To this challenge I have but what may appear a feeble reply, I am prepared with no mature scheme, and can offer nothing that can claim to be regarded as a cure for all that is wrong, but being most anxious to see ground broken in the direction that appears to me most hopeful for the extinction of the isolation that besets us and thus give opportunity for a clearer view of ourselves and our doings to the rest of the profession, I am ready to suggest a first step. It is, that every student in medicine, whatever department of the art he may be aiming for as the sphere of his ultimate work, be brought at some period of his training through one single portal. So many practical objections have been found to exist against the mingling of medical and pharmaceutical students during their attendance at classes or during any portion of their actual studies, that I think the portal would have to consist of one of the sets of examinations; but if that examination could be made a common one for all, whether ultimately destined for Medicine or Pharmacy, the step would be a useful one. It would serve to declare with authority that certain scientific studies were equally essential in all the departments of the medical art; and it would demand of every student that he attain the required standard of proficiency in them. He would thus be prepared by actual personal knowledge (not through the traditions of his school) to estimate aright the proportionate value of those attainments towards his full professional equipment; he would realize the serious amount of effort required to achieve that knowledge, and he would naturally conceive a feeling of respect for all who had laboured for its acquisition even as he himself had laboured.

Whether such an experiment would be attended with results proportionate to the distinctness of the change, requires a better prophet than myself to declare. As far as we are concerned it would be the commencement of a reversal of much of our past policy. It would tend *from* isolation *towards* unification, *from* estrangement *towards* co-operation, *from* suspicion *towards* trust; but these very words seem to me to be full of hope.

One possible comment upon the suggestion itself I should like to anticipate; it may appear to some to involve the placing of our examinations in the hands of the medical profession.

Were this the only course open for adoption, I should not shrink from its close consideration, nor fail to entertain it with great hope of ultimate benefit; but at present I do not think this by any means a necessary consequence. The story of our own progress, and my personal knowledge of the completeness of the organization that lies within our midst, suggest rather the alternative, that for every man's certificate of qualification in *our* subjects he might be required to come to *our* examinations; I say "at present," for in speaking of "ourselves" and "medical men" as distinct organizations I shall hope to be using but the language of to-day.

My subject, however, now approaches somewhat too nearly the region of pharmaceutical politics to be continued here; the arena for its discussion in detail lies elsewhere. But I sincerely hope and think that in urging it from this place to the point at which I now leave it, I have acted in sympathy with the pervading spirit of the Conference. To this extent, at any rate, I know that I must carry with me the sympathy of all its members, namely, in a warm desire to exalt the dignity of Pharmacy and in an earnest hope that we pharmacists may ever be found, as truly in fact as in aspiration, Pharmacy's worthy representatives.

Mr. W. H. Maleham (Sheffield) said the members of the Conference were much indebted for the exhaustive address delivered by the President, Mr. Schacht, and he had great pleasure in moving a vote of thanks to the President for his valuable address. The time was rapidly coming when they must make a stand against the attacks launched against them, and it was by such addresses that they could gain valuable information to aid them in repelling opposition.

Mr. G. W. Sandford seconded the motion, and observed how ardently the President loved the science he had adopted as his calling, and how anxious he was not only to elevate pharmacy but pharmacists. He could not refrain from saying, as a delegate of the Pharmaceutical Society of Great Britain, how heartily that Society appreciated the work of the Conference. It was his privilege to be connected with the Pharmaceutical Council, and he thought he was the President when this Conference was established. The objects of the Conference and the objects of the Society were identical, and he thought he might congratulate the Members of the Conference on having throughout the course of their work done much towards elevating pharmacy and pharmacists. Regretting that they would soon see the end of Mr. Schacht's presidency, yet hoping the same good work would continue, he must say the Pharmaceutical Conference deserved great credit for the results it had already achieved.

Mr. R. Reynolds, Vice-President, in putting the motion to the Conference, said it was an easy task when they were all agreed, and referred in terms of eulogy to Mr. Schacht's philosophical condideration of the position of pharmacy and his great interest in the welfare and elevation of pharmacists.

The motion was carried unanimously.

The President, in acknowledging the resolution, thanked the members of the Conference for the expressions of emotion that had graced the vote, and said he was very grateful for their approval. He wished to say, however, that it must be understood that any expression of opinion on matters he had thought fit to introduce must be regarded simply as his opinion, for he should be very sorry to commit the Conference, outside those walls, to opinions which were only held by an individual. In expressing those opinions he wished rather to suggest the present position to maturer intellects, so that these questions, might be pondered, not only for the benefit of pharmacists but of the community.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The meeting of the above Association commenced on Monday, August 18, at Sheffield, under the Presidency of G. J. Allman, M.D., LL.D., F.R.SS.L. and E., M.R.I.A., Pres. L.S., who delivered the opening address:—

The President's Address.

It is no easy thing to find material suited to an occasion like the present. For on the one hand there is risk that a presidential address may be too special for an audience necessarily large and general, while on the other hand it may treat too much of generalities to take hold of the sympathies and command the attention of the hearers.

It may be supposed that my subject should have been suggested by the great manufacturing industries of the town which has brought us together; but I felt convinced that a worker in only the biological sciences could not do justice to the workers in so very different a field.

I am not therefore going to discourse to you of any of those great industries which make civilized society what it is,—of those practical applications of scientific truth which within the last half century have become developed with such marvellous rapidity, and which have already become interwoven with our everyday life, as the warp of the weaver is interwoven with the woof. Such subjects must be left to other occupiers of this chair, from whom they may receive that justice which I could not pretend to give them; and I believe I shall act most wisely by keeping to a field with which my own studies have been more directly connected.

I know that there are many here present from whom I have no right to expect that previous knowledge which would justify me in dispensing with such an amount of elementary treatment as can alone bring my subject intelligibly before them, and my fellow members of the British Association who have the advantage of being no novices in that department of biology with which I propose to occupy you, will pardon me if I address myself mainly to those for whom the field of research on which we are about to enter has now been opened for the first time.

I have chosen, then, as the matter of my address to you to-night, a subject in whose study there has during the last few years prevailed an unwonted amount of activity, resulting in the discovery of many remarkable facts, and the justification of many significant generalizations. I propose, in short, to give you in as untechnical a form as possible some account of the most generalized expression of living matter, and of the results of the more recent researches into its nature and phenomena.

More than forty years have now passed away since the French naturalist Dujardin drew attention to the fact that the bodies of some of the lowest members of the animal kingdom consist of a structureless, semi-fluid, contractile substance, to which he gave the name of Sarcode. A similar substance occurring in the cells of plants was afterwards studied by Hugo von Mohl, and named by him Protoplasm. It remained for Max Schultze to demonstrate that the sarcode of animals and the protoplasm of plants were identical.

The conclusions of Max Schultze have been in all respects confirmed by subsequent research, and it has further been rendered certain that this same protoplasm lies at the base of all the phenomena of life, whether in the animal or the vegetable kingdom. Thus has arisen the most important and significant generalization in the whole domain of biological science.

Within the last few years protoplasm has again been made a subject of special study, unexpected and often startling facts have been brought to light and a voluminous literature has gathered round this new centre of research. I believe, therefore, that I cannot do better than call your attention to some of the more important results of these inquiries, and endeavour to give you some knowledge of the properties of protoplasm, and of the part it plays in the two great kingdoms of organic nature.

As has just been said, protoplasm lies at the base of every vital phenomenon. It is, as Huxley has well expressed it, "the physical basis of life." Wherever there is life, from its lowest to its highest manifestations, there is protoplasm; wherever there is protoplasm, there too is life. Thus co-extensive with the whole of organic nature —every vital act being referable to some mode or property of protoplasm—it becomes to the biologist what the ether is to the physicist; only that instead of being a hypothetical conception, accepted as a reality from its adequacy in the explanation of phenomena, it is a tangible and visible reality, which the chemist may analyse in his laboratory, the biologist scrutinize beneath his microscope and his dissecting needle.

The chemical composition of protoplasm is very complex, and has not been exactly determined. It may, however, be stated that protoplasm is essentially a combination of albuminoid bodies, and that its principal elements are, therefore, oxygen, carbon, hydrogen, and nitrogen. In its typical state it presents the condition of a semi-fluid substance—a tenacious, glairy liquid, with a consistence somewhat like that of the white of an unboiled egg. While we watch it beneath the microscope movements are set up in it; waves traverse its surface, or it may be seen to flow away in streams, either broad and attaining but a slight distance from the main mass, or else stretching away far from their source, as narrow liquid threads, which may continue simple, or may divide into branches, each following its own independent course; or the streams may flow one into the other, as streamlets would flow into rivulets and rivulets into rivers, and this not only where gravity would carry them, but in a direction diametrically opposed to gravitation; now we see it spreading itself out on all sides into a thin liquid stratum, and again drawing itself together within the narrow limits which had at first confined it, and all this without any obvious impulse from without which would send the ripples over its surface or set the streams flowing from its margin. Though it is certain that all these phenomena are in response to some stimulus exerted on it by the outer world, they are such as we never meet with in a simply physical fluid—they are spontaneous movements resulting from its proper irritability, from its essential constitution as living matter.

Examine it closer, bring to bear on it the highest powers of your microscope—you will probably find disseminated through it countless multitudes of exceedingly minute granules; but you may also find it absolutely homogeneous, and, whether containing granules or not, it is certain that you will find nothing to which the term *organization* can be applied. You have before you a glairy, tenacious fluid, which, if not absolutely homogeneous, is yet totally destitute of structure.

And yet no one who contemplates this spontaneously moving matter can deny that it is alive. Liquid as it is, it is a living liquid; organless and structureless as it is, it manifests the essential phenomena of life.

The picture which I have thus endeavoured to trace for you in a few leading outlines is that of protoplasm in its most generalized aspect. Such generalizations, however, are in themselves unable to satisfy the conditions demanded by an exact scientific inquiry, and I propose now, before passing to the further consideration of the place and purport of protoplasm in nature, to bring before you some definite examples of protoplasm, such as are actually met with in the organic world.

A quantity of a peculiar slimy matter was dredged in the North Atlantic by the naturalists of the exploring ship "Porcupine" from a depth of from 5000 to 25,000 feet. It is described as exhibiting, when examined on the spot, spontaneous movements, and as being obviously endowed with life. Specimens of this, preserved in spirits, were examined by Professor Huxley, and declared by him to consist of protoplasm, vast masses of which must thus in a living state extend over wide areas of sea bottom. To this wonderful slime Huxley gave the name of *Bathybius Haeckelii.*

Bathybius has since been subjected to an exhaustive examination by Professor Haeckel, who believes that he is able to confirm in all points the conclusions of Huxley, and arrives at the conviction that the bottom of the open ocean, at depths below 5000 feet, is covered with an enormous mass of living protoplasm, which lingers there in the simplest and most primitive condition, having as yet acquired no definite form. He suggests that it may have originated by spontaneous generation, but leaves this question for future investigators to decide.

The reality of Bathybius, however, has not been universally accepted. In the more recent investigations of the "Challenger" the explorers have failed in their attempts to bring further evidence of the existence of masses of amorphous protoplasm spreading over the bed of the ocean. They have met with no trace of Bathybius in any of the regions explored by them, and they believe that they are justified in the conclusion that the matter found in the dredgings of the "Porcupine" and preserved in spirits for further examination was only an inorganic precipitate due to the action of the alcohol.

It is not easy to believe, however, that the very elaborate investigations of Huxley and Haeckel can be thus disposed of. These, moreover, have received strong confirmation from the still more recent observations of the Arctic voyager, Bessels, who was one of the explorers of the ill-fated "Polaris," and who states that he dredged from the Greenland seas masses of living undifferentiated protoplasm. Bessels assigns to these the name of Protobathybius, but they are apparently indistinguishable from the Bathybius of the "Porcupine." Further arguments against the reality of Bathybius will therefore be needed before a doctrine founded on observations so carefully conducted shall be relegated to the region of confuted hypotheses.

Assuming, then, that Bathybius, however much its supposed wide distribution may have been limited by more recent researches, has a real existence, it presents us with a condition of living matter the most rudimental it is possible to conceive. No law of morphology has as yet exerted itself in this formless slime. Even the simplest individualization is absent. We have a living mass, but we know not where to draw its boundary lines; it is living matter, but we can scarcely call it a living being.

We are not, however, confined to Bathybius for examples of protoplasm in a condition of extreme simplicity. Haeckel has found, inhabiting the fresh waters in the neighbourhood of Jena, minute lumps of protoplasm, which when placed under the microscope were seen to have no constant shape, their outline being in a state of perpetual change, caused by the protrusion from various parts of their surface of broad lobes and thick finger-like projections, which, after remaining visible for a time, would be withdrawn, to make their appearance again on some other part of the surface.

These changeable protrusions of its substance, without fixed position or definite form, are eminently characteristic of protoplasm in some of its simplest conditions. They have been termed "Pseudopodia," and will frequently come before you in what I have yet to say.

To the little protoplasmic lumps thus constituted, Haeckel has given the name of *Protamœba primitiva*. They may be compared to minute detached pieces of Bathybius. He has seen them multiplying themselves by spontaneous division into two pieces, which, on becoming independent, increase in size and acquire all the characters of the parent.

Several other beings as simple as *Protamœba* have been described by various observers, and especially by Haeckel, who brings the whole together into a group to which he gives the name of MONERA, suggested by the extreme simplicity of the beings included in it.

But we must now pass to a stage a little higher in the development of protoplasmic beings. Widely distributed in the fresh and salt waters of Britain, and probably of almost all parts of the world, are small particles of protoplasm closely resembling the *Protamœba* just described. Like it, they have no definite shape, and are perpetually changing their form, throwing out and drawing in thick lobes and finger-like pseudopodia, in which their body seems to flow away over the field of the microscope. They are no longer, however, the homogeneous particle of protoplasm which forms the body of *Protamœba*. Towards the centre a small globular mass of firmer protoplasm has become differentiated off from the remainder, and forms what is known as a nucleus, while the protoplasm forming the extreme outer boundary differs slightly from the rest, being more transparent, destitute of granules, and apparently somewhat firmer than the interior. We may also notice that at one spot a clear spherical space has made its appearance, but that while we watch it has suddenly contracted and vanished, and after a few seconds has begun to dilate so as again to come into view, once more to disappear, then again to return, and all this in regular rhythmical sequence. This little rhythmically pulsating cavity is called the "contractile vacuole." It is of very frequent occurrence among those beings which lie low down in the scale of life.

We have now before us a being which has arrested the attention of naturalists almost from the commencement of microscopical observation. It is the famous *Amœba*, for which ponds and pools and gutters on the house-roof have for the last two hundred years been ransacked by the microscopist, who has many a time stood in amazement at the undefinable form and Protean changes of this particle of living matter. It is only the science of our own days, however, which has revealed its biological importance, and shown that in this little soft nucleated particle we have a body whose significance for the morphology and physiology of living beings cannot be overestimated, for in *Amœba* we have the essential characters of a CELL, the morphological unit of organization, the physiological source of specialized function.

The term "cell" has been so long in use that it cannot now be displaced from our terminology; and yet it tends to convey an incorrect notion, suggesting, as it does, the idea of a hollow body or vesicle, this having been the form under which it was first studied. The cell, however, is essentially a definite mass of protoplasm having a nucleus imbedded in it. It may, or may not, assume the form of a vesicle; it may, or may not, be protected by an enveloping membrane; it may, or may not, contain a contractile vacuole; and the nucleus may, or may not, contain within it one or more minute secondary nuclei or "nucleoli."

Haeckel has done good service to biology in insisting on the necessity of distinguishing such non-nucleated forms as are presented by *Protamœba* and the other *Monera* from the nucleated forms as seen in *Amœba*. To the latter he would restrict the word *cell*, while he would assign that of "cytode" to the former.

Let us observe our *Amœba* a little closer. Like all living beings it must be nourished. It cannot grow as a crystal would grow, by accumulating on its surface molecule after molecule of matter. It must *feed*. It must take into its substance the necessary nutriment; it must assimilate this nutriment and convert it into the material of which it is itself composed.

If we seek, however, for a mouth by which the nutriment can enter into its body, or a stomach by which this nutriment can be digested, we seek in vain. Yet watch it for a moment as it lies in a drop of water beneath our microscope. Some living denizen of the same drop is in its neighbourhood, and its presence exerts on the protoplasm of the *Amœba* a special stimulus which gives rise to the movements necessary for the prehension of nutriment. A stream of protoplasm instantly runs away from the body of the *Amœba* towards the destined prey, envelops it in its current, and then flows back with it to the central protoplasm, where it sinks deeper and deeper into the soft yielding mass, and becomes dissolved, digested and assimilated in order that it may increase the size and restore the energy of its captor.

But again, like all living things, *Amœba* must multiply itself, and so after attaining a certain size its nucleus divides into two halves, and then the surrounding protoplasm becomes similarly cleft, each half retaining one half of the original nucleus. The two new nucleated masses which thus arise now lead an independent life, assimilate nutriment, and attain the size and characters of the parent. .

We have just seen that in the body of an *Amœba* we have the type of a cell. Now both the fresh waters and the sea contain many living beings beside *Amœba* which never pass beyond the condition of a simple cell. Many of these, instead of emitting the broad lobe-like pseudopodia of *Amœba*, have the faculty of sending out long thin threads of protoplasm, which they can again retract, and by the aid of which they capture their prey or move from place to place. Simple structureless protoplasm as they are, many of them fashion for themselves an outer membranous or calcareous case, often of symmetrical form and elaborate ornamentation, or construct a silicious skeleton of radiating spicula, or crystal clear concentric spheres of exquisite symmetry and beauty.

Some move about by the aid of a flagellum, or long whip-like projection of their bodies, by which they lash the surrounding waters, and which, unlike the pseudopodia of *Amœba*, cannot, during active life, be withdrawn into the general protoplasm of the body; while among many others locomotion is effected by means of cilia—microscopic vibratible hairs, which are distributed in various ways over the surface, and which, like the pseudopodia and flagella, are simple prolongations of their protoplasm.

In every one of these cases the entire body has the morphological value of a cell, and in this simple cell reside the whole of the properties which manifest themselves in the vital phenomena of the organism.

The part fulfilled by these simple unicellular beings in the economy of nature has at all times been very great, and many geological formations, largely built up of their calcareous or silicious skeletons, bear testimony to the multitudes in which they must have swarmed in the waters of the ancient earth.

Those which have thus come down to us from ancient times owe their preservation to the presence of the hard persistent structures secreted by their protoplasm, and must, after all, have formed but a very small proportion of the unicellular organisms which peopled the ancient world, and there fulfilled the duties allotted to them in nature, but whose soft, perishable bodies have left no trace behind.

In our own days similar unicellular organisms are at work, taking their part silently and unobtrusively in the great scheme of creation, and mostly destined, like their predecessors, to leave behind them no record of their existence. The Red Snow Plant, to which is mainly due the beautiful phenomenon by which tracts of Arctic and Alpine snow become tinged of a delicate crimson, is a microscopic organism whose whole body consists of a simple spherical cell. In the protoplasm of this little cell must reside all the essential attributes of life; it must grow by the reception of nutriment; it must repeat by multiplication that form which it has itself inherited from its parent; it must be able to respond to the stimulus of the physical conditions by which it is surrounded. And there it is, with its structure almost on the bounds of extremest simplification, taking its allotted part in the economy of nature, combining into living matter the lifeless elements which lie around it, redeeming from sterility the regions of never-thawing ice, and peopling with its countless millions the wastes of the snow land.

But organization does not long rest on this low stage of unicellular simplicity, for as we pass from these lowest forms into higher, we find cell added to cell, until many millions of such units become associated in a single organism, where each cell, or each group of cells, has its own special work, while all combine for the welfare and unity of the whole.

In the most complex animals, however, even in man himself, the component cells, notwithstanding their frequent modification and the usual intimacy of their union, are far from losing their individuality. Examine under the microscope a drop of blood freshly taken from the human subject, or from any of the higher animals. It is seen to be composed of a multitude of red corpuscles, swimming in a nearly colourless liquid, and along with these, but in much smaller numbers, somewhat larger colourless corpuscles. The red corpuscles are modified cells, while the colourless corpuscles are cells still retaining their typical form and properties. These last are little masses of protoplasm, each enveloping a central nucleus. Watch them. They will be seen to change their shape; they will project and withdraw pseudopodia, and creep about like an *Amœba*. But, more than this, like an *Amœba* they will take in solid matter as nutriment. They may be fed with coloured food, which will then be seen to have accumulated in the interior of their soft transparent protoplasm; and in some cases the colourless blood corpuscles have actually been seen to devour their more diminutive companions, the red ones.

Again, there are certain cells filled with peculiar coloured matters, and called pigment cells, which are especially abundant, as constituents of the skin in fishes, frogs and other low vertebrate, as well as many invertebrate animals. Under certain stimuli, such as that of light, or of emotion, these pigment cells change their form, protrude or retract pseudopodial prolongations of their protoplasm, and assume the form of stars or of irregularly lobed figures, or again draw themselves together into little globular masses. To this change of form in the pigment cell the rapid change of colour so frequently noticed in the animals provided with them is to be attributed.

The animal egg, which in its young state forms an element in the structure of the parent organism, possesses in the relations now under consideration a peculiar interest. The egg is a true cell, consisting essentially of a lump of protoplasm enclosing a nucleus, and having a nucleolus included in the interior of the nucleus. While still very young it has no constant form, and is perpetually changing its shape. Indeed, it is often impossible to distinguish it from an *Amœba;* and it may, like an *Amœba*, wander from place to place by the aid of its pseudopodial projections. I have shown elsewhere that the primitive egg of the remarkable hydroid *Myriothela* manifests amœboid motions: while Haeckel has shown that in the sponges certain amœba-like organisms, which are seen wandering about in the various canals and cavities of their bodies, and had been until lately regarded as parasites which had gained access from without, are really the eggs of the sponge; and a similar amœboid condition is presented by the very young eggs of even the highest animals.

Again, Reichenbach has proved that during the development of the crayfish the cells of the embyro throw out pseudopodia by which, exactly as in an Amœba, the yolk spheres which serve as nutriment for the embryo are surrounded and engulphed in the protoplasm of the cells.

I had shown some years ago that in *Myriothela* pseudopodial processes are being constantly projected from the walls of the alimentary canal into its cavity. They appear as direct extensions of a layer of clear, soft homogeneous protoplasm which lies over the surface of the naked cells lining the cavity, and which I now regard as the "Hautschicht," or cortical layer of these cells. I then suggested that the function of these pseudopodia lay in seizing, in the manner of an amœba, such alimentary matter as may be found in the contents of the canal, and applying it to the nutrition of the hydroid.

What I had thus suggested with regard to *Myriothela* has been since proved in certain planarian worms by Metschnikoff, who has seen the cells which line the alimentary canal in these animals act like independent Amœbæ, and egulph in their protoplasm such solid nutriment as may be contained in the canal. When the Planaria was fed with colouring matter these amœboid cells became gorged with the coloured particles just as would have happened in an amœba when similarly fed.

But it is not alone in such loosely aggregated cells as those of the blood, or in the amœboid cells of the alimentary canal, or in such scattered constituents of the tissues as the pigment cells or in cells destined for an ultimate state of freedom, as the egg, that there exists an independence. The whole complex organism is a society of cells, in which every individual cell possesses an independence, an autonomy, not at once so obvious as in the blood cells, but not the less real. With this autonomy of each element there is at the same time a subordination of each to the whole, thus establishing a unity in the entire organism, and a concert and harmony between all the phenomena of its life.

In this society of cells each has its own work to perform, and the life of the organism is made up of the lives of its component cells. Here it is that we find most distinctly expressed the great law of the physiological division of labour. In the lowest organisms, where the whole being consists of a single cell, the performance of all the processes which constitute its life must devolve on the protoplasm of this one cell; but as we pass to more highly organized beings, the work becomes distributed among a multitude of workers. These workers are the cells which now make up the complex organism. The distribution of labour, however, is not a uniform one, and we are not to suppose that the work performed by each cell is but a repetition of that of every other. For the life processes, which are accumulated in the single cell of the unicellular organism become in the more complex organism differentiated, some being intensified and otherwise modified and allocated to special cells, or to special groups of cells, which we call organs, and whose proper duty is now to take charge of the special processes which have been assigned to them. In all this we have a true division of labour,—a division of labour, however, by no means absolute; for the processes which are essential to the life of the cell must still continue common to all the cells of the organism. No cell, however great may be the differentiation of function in the organism, can dispense with its irritability, the one constant and essential property of every living cell. There thus devolves on each cell or group of cells some special work which contributes to the well-being of all, and their combined labours secure the necessary conditions of life for every cell in the community, and result in those complex and wonderful phenomena which constitute the life of the higher organisms.

We have hitherto considered the cell only as a mass of active nucleated protoplasm, either absolutely naked or partially enclosed in a protective case, which still permits free contact of the protoplasm with the surrounding medium. In very many instances, however, the protoplasm becomes confined within resisting walls, which entirely shut it in from all direct contact with the medium which surrounds it. With the plant this is almost always so after the earliest stages of its life. Here the protoplasm of the cells is endowed with the faculty of secreting over its surface a firm, resisting membrane, composed of cellulose, a substance destitute of nitrogen, thus totally different from the contained protoplasm, and incapable of manifesting any of the phenomena of life.

Within the walls of cellulose the protoplasm is now closely imprisoned, but we are not on that account to suppose that it has lost its activity, or has abandoned its work as a living being. Though it is now no longer in direct contact with the surrounding medium, it is not the less dependent on it, and the reaction between the imprisoned protoplasm and the outer world is still permitted by the permeability of the surrounding wall of cellulose.

When the protoplasm thus becomes surrounded by a cellulose wall it seldom retains the uniform arrangement of its parts which is often found in the naked cells. Minute cavities or vacuoles make their appearance in it; these increase in size and run one into the other, and may finally form one large cavity in the centre, which becomes filled with a watery fluid, known as the Cell Sap. This condition of the cell was the first observed, and it was it which suggested the often inapplicable term "cell." By the formation of this central sap cavity the surrounding protoplasm is pushed aside, and pressed against the cellulose wall, over which it now extends as a continuous layer. The nucleus either continues near the centre, enveloped by a layer of protoplasm, which is connected by radiating bands of protoplasm with that of the walls, or it accompanies the displaced protoplasm, and lies embedded in this on the walls of the cell.

We have abundant evidence to show that the imprisoned protoplasm loses none of its activity. The *Characeæ* constitute an exceedingly interesting group of simple plants, common in the clear water of ponds and of slowly running streams. The cells of which they are built up are comparatively large, and, like almost all vegetable cells, are each enclosed in a wall of cellulose. The cellulose is perfectly transparent, and if the microscope, even with a low power, be brought to bear on one of these cells, a portion of its protoplasm may be seen in active rotation flowing up one side of the long tubular cell and down the other, and sweeping on with it such more solid particles as may become enveloped in its current. In another water plant, the *Valisneria spiralis*, a similar active rotation of the protoplasm may be seen in the cells of the leaf, where the continuous stream of liquid protoplasm sweeping along the green granules of chlorophyll, and even carrying the globular nucleus with it in its current, presents one of the most beautiful of the many beautiful phenomena which the microscope has revealed to us.

In many other cells with large sap cavities, such as those which form the stinging hairs of nettles and other kinds of vegetable hairs, the protoplasmic lining of the wall may send off into the sap cavity projecting ridges and strings, forming an irregular network, along which, under a high power of the microscope, a slow streaming of granules may be witnessed. The form and position of this protoplasmic network undergo constant changes, and the analogy with the changes of form in an *Amœba* becomes obvious. The external wall of cellulose renders it impossible for the confined protoplasm to emit, like a naked *Amœba*, pseudopodia from its outer side; but on the inner side there is no obstacle to the extension of the protoplasm, and here the cavity of the cell becomes more or less completely traversed by protoplasmic projections from the wall. These often stretch themselves out in the form of thin filaments, which, meeting with a neighbouring one, become fused into it; they show currents of granules streaming along their length, and after a time become withdrawn and disappear. The vegetable cell, in short, with its surrounding wall of cellulose, is in all essential points a closely imprisoned Rhizopod.

Further proof that the imprisoned protoplasm has lost by its imprisonment none of its essential irritability, is afforded by the fact that if the transparent cell of a Nitella, one of the simple water-plants just referred to, be touched under the microscope with the point of a blunt needle, its green protoplasm will be seen to recede, under the irritation of the needle, from the cellulose wall, If the cellulose wall of the comparatively large cell which forms the entire plant in a Vaucheria, a unicellular alga, very common in shallow ditches, be ruptured under the microscope, its protoplasm will escape, and may then be often seen to throw out pseudopodial projections and exhibit amœboid movements.

Even in the higher plants, without adducing such obvious and well-known instances as those of the Sensitive Plant and Venus's Flytrap, the irritability of the protoplasm may be easily rendered manifest. There are many herbaceous plants in which if the young succulent stem of a vigorously growing specimen receive a sharp blow, of such a nature, however, as not to bruise its tissues, or in any way wound it, the blow will sometimes be immediately followed by a drooping of the stem commencing at some distance above the point to which the stroke had been applied: its strength appears to have here suddenly left it, it is no longer able to bear its own weight, and seems to be dying. The protoplasm, however, of its cells, is in this instance not killed, it is only stunned by the violence of the blow, and needs time for its restoration.

After remaining, it may be for some hours, in this drooping and flaccid state, the stem begins to raise itself, and soon regains its original vigour. This experiment will generally succeed well in plants with a rather large terminal spike or raceme when the stroke is applied some little distance below the inflorescence shortly before the expansion of the flower.

In the several instances now adduced the protoplasm is in the mature state of the plant entirely included within a wall of cellulose. Some recent beautiful observations, however, of Mr. Francis Darwin, have shown that even in the higher plants truly naked protoplasm may occur. From the cells of certain glandular hairs contained within the cup-like receptacles formed by the united bases of two opposite leaves in the Teazel (*Dipsacus*) he has seen emitted long pseudopodia-like projections of the protoplasm. What may be the significance of this very exceptional phenomenon is still undetermined. It is probably, as Mr. Darwin supposes, connected with the absorption of nitrogenous matter.

That there is no essential difference between the protoplasm of plants and that of animals is rendered further evident by other motor phenomena, which we are in the habit of regarding as the exclusive attribute of animals. Many of the more simply organized plants give origin to peculiar cells called "spores," which separate from the parent, and, like the seeds of the higher plants, are destined to repeat its form. In many cases these spores are eminently locomotive. They are then termed "swarm-spores," and their movements are brought about, sometimes by changes of shape, when they move about in the manner of an *Amœba*, but more frequently by minute vibratile cilia, or by more strongly developed flagella or whip-like projections of their protoplasm. These cilia and flagella are absolutely indistinguishable from similar structures widely distributed among animals, and by their vibratory or lashing strokes upon the surrounding water the swarm-spores are rapidly carried from place to place. In these motions they often present a curious semblance of volition, for if the swarm-spore meet with an obstacle in its course, it will, as if to avoid it, change the direction of its motion, and retreat by a reversion of the stroke of its cilia. They are usually attracted by light, and congregate at the light side of the vessel which contains them, though in some cases light has the opposite effect on them and they recede from it.

Another fact may here be adduced to show the uniform character of protoplasm and how very different are its properties from those of lifeless matter, namely, the faculty which all living protoplasm possesses of resisting the entrance of colouring matter into its substance. As many here present are aware, microscopists are in the habit of using in their investigations various colouring matters, such as solutions of carmine. These act differently on the different tissues, staining some, for example, more deeply than others, and thus enabling the histologist to detect certain elements of structure which would otherwise remain unknown. Now if a solution of carmine be brought into contact with living protoplasm, this will remain, so long as it continues alive, unaffected by the colouring matter. But if the protoplasm be killed the carmine will at once pervade its whole substance, and stain it throughout with a colour more intense than even that of the colouring solution itself.

But no more illustrative example can be offered of the properties of protoplasm as living matter, independently of any part it may take in organization, than that presented by the Myxomycetæ.

The Myxomycetæ constitute a group of remarkable organisms, which from their comparatively large size and their consisting, during a great part of their lives, of naked protoplasm, have afforded a fine field for research, and have become one of the chief sources from which our knowledge of the nature and phenomena of protoplasm has been derived.

They have generally been associated by botanists with the Fungi, but though their affinities with these are perhaps closer than with any other plants, they differ from them in so many points, especially in their development, as to render this association untenable. They are found in moist situations, growing on old tan or on moss, or decaying leaves or rotten wood, over which they spread in the form of a network of naked protoplasmic filaments, of a soft creamy consistence and usually of a yellowish colour.

Under the microscope the filaments of the network exhibit active spontaneous movements, which in the larger branches are visible under an ordinary lens, or even by the naked eye. A succession of undulations may then be noticed passing along the course of the threads. Under higher magnifying powers, a constant movement of granules may be seen flowing along the threads, and streaming from branch to branch of this wonderful network. Here and there offshoots of the protoplasm are projected, and again withdrawn in the manner of the pseudopodia of an *Amœba*, while the whole organism may be occasionally seen to abandon the support over which it had grown, and to creep over neighbouring surfaces, thus far resembling in all respects a colossal ramified *Amœba*. It is also curiously sensitive to light, and may be sometimes found to have retreated during the day to the dark side of the leaves, or into the recesses of the tan over which it had been growing, and again to creep out on the approach of night.

After a time there arise from the surface of this protoplasmic net oval capsules or spore-cases, in which are contained the spores or reproductive bodies of the Myxomycetæ. When the spore-case has arrived at maturity, it bursts and allows the spores to escape. These are in the form of spherical cells, each included in a delicate membranous wall, and when they fall into water the wall becomes ruptured, and the little cell creeps out. This consists of a little mass of protoplasm with a round centre nucleus, enclosing a nucleolus and with a clear vacuole, which exhibits a rhythmically pulsating movement. The little naked spore thus set at liberty is soon seen to be drawn out at one point into a long vibratile whip-like flagellum, which by its lashing action carries the spore from place to place. After a time the flagellum disappears, and the spore may now be seen emitting and withdrawing finger-like pseudopodia, by means of which it creeps about like an *Amœba*, and like an *Amœba* devours solid particles by engulphing them in its soft protoplasm.

So far these young amœba-like Myxomycetæ have enjoyed each an independent existence. Now, however, a singular and significant phenomenon is presented. Two or more of these Myxamœbæ, as they have been called, approach one another, come into contact, and finally become completely fused together into a single mass of protoplasm, in which the components are no longer to be distinguished. To the body thus formed by the fusion of the Myxamœbæ the name of "plasmodium" has been given.

The plasmodium continues, like the simple amœbiform bodies of which it is composed, to grow by the ingestion and assimilation of solid nutriment, which it envelops in its substance; it throws out ramifying and mosculating processes, and finally becomes converted into a protoplasmic network, which in its turn gives rise to spore-cases with their contained spores and thus completes the cycle of its development.

Under certain external conditions the Myxomycetæ have been observed to pass from an active mobile state into a resting state, and this may occur both in the amœbiform spores and in the plasmodium. When the plasmodium is about to pass into a resting state, it usually withdraws its finer branches and expels such solid ingesta as may be included in it. Its motions then gradually cease, it breaks up into a multitude of polyhedral cells, which, however, remain connected, and the whole body dries into a horny brittle mass, known by the name of 'sclerotium.'

In this condition, without giving the slightest sign of life, the sclerotium may remain for many months. Life, however, is not destroyed, its manifestations are only suspended, and if after an indefinite time the apparently dead sclerotium be placed in water, it immediately begins to swell up, the membranous covering of its component cells becomes dissolved and disappears, and the cells themselves flow together into an active amœboid plasmodium.

We have already seen that every cell possesses an autonomy or independent individuality, and from this we should expect that, like all living beings, it had the faculty of multiplying itself, and of becoming the parent of other cells. This is truly the case, and the process of cell-multiplication has of late years been studied, with the result of adding largely to our knowledge of the phenomena of life.

The labours of Strasburger, of Auerbach, of Oscar Hertwig, of Eduard van Beneden, Bütschli, Fol, and others, here come prominently before us, but neither the time at my disposal nor the purport of this address will allow me to do more than call your attention to some of the more striking results of their investigations.

By far the most frequent mode of multiplication among cells shows itself in a spontaneous division of the protoplasm into two separate portions, which then become independent of one another, so that instead of the single parent cell two new ones have made their appearance. In this process the nucleus usually takes an important part. Strasburger has studied it with great care in certain plant cells, such as the so-called "corpuscula" or "secondary embryo-sacs" of the Coniferæ and the cells of Spirogyra; and has further shown a close correspondence between cell division in animals and that in plants.

It may be generally stated as the results of his observations on the corpuscula of the Coniferæ, that the nucleus of the cell about to divide assumes a spindle shape, and at the same time presents a peculiar striated differentiation, as if it were composed of parallel filaments reaching from end to end of the spindle. These filaments become thickened in the middle and there form by the approximation of the thickened portions a transverse plate of protoplasm (the "nucleus-plate"). This soon splits into two halves, which recede from one another towards the poles of the spindle, travelling in this course along the filaments, which remain continuous from end to end. When arrived near the poles they form there two new nuclei, still connected with one another by the intervening portion of the spindle.

In the equator of this intervening portion there is now formed in a similar way a second plate of protoplasm (the "cell-plate"), which, extending to the walls of the dividing cell, cuts the whole protoplasm into two halves, each half containing one of the newly formed nuclei. This partition plate is at first single, but it soon splits into two laminæ, which become the apposed bounding surfaces of the two protoplasm masses into which the mother cell has been divided. A wall of celluose is then all at once secreted between them, and the two daughter cells are complete.

It sometimes happens in the generation of cells that a young brood of cells arises from the parent cell by what is called "free cell formation." In this only a part of the protoplasm of the mother cell is used up in the production of the offspring. It is seen chiefly in the formation of the spore of the lower plants, in the first foundation of the embryo in the higher, and in the formation of the endosperm—a cellular mass which serves as the first nutriment for the embryo—in the seeds of most Phanerogams. The formation of the endosperm has been carefully studied by Strasburger in the embryo-sac of the kidney bean, and may serve as an example of the process of free cell formation. The embyro-sac is morphologically a large cell with its protoplasm, nucleus, and cellulose wall, while the endosperm which arises within it is composed of a multitude of minute cells united into a tissue. The formation of the endosperm is preceded by the dissolution and disappearance of the nucleus of the embryo-sac, and then in the midst of the protoplasm of the sac several new nuclei make their appearance. Around each of these as a centre the protoplasm of the mother cell is seen to have become differentiated in the form of a clear spherule, and we have thus corresponding to each of the new nuclei a young naked cell, which soon secretes over its surface a membrane of cellulose. The new cells, when once formed, multiply by division, press one on the other, and so combining into a cellular mass, constitute the completed endosperm.

Related to the formation of new cells, whether by division or by free cell formation, is another very interesting phenomenon of living protoplasm known as "rejuvenescence." In this the whole protoplasm of a cell, by a new arrangement of its parts, assumes a new shape and acquires new properties. It then abandons its cellulose chamber, and enters on a new and independent life in the surrounding medium.

A good example of this is afforded by the formation of swarm-spores in Oedogonium, one of the fresh-water Algæ. Here the whole of the protoplasm of an adult cell contracts, and by the expulsion of its cell sap changes from a cylindrical to a globular shape. Then one spot becomes clear, and a pencil of vibratile cilia here shows itself. The cellulose wall which had hitherto confined it now becomes ruptured, and the protoplasmic sphere, endowed with new faculties of development and with powers of active locomotion, escapes as a swarm spore, which, after enjoying for a time the free life of an animal, comes to rest, and develops itself into a new plant.

The beautiful researches which have within the last few years been made by the observers already mentioned, on the division of animal cells, show how close is the agreement between plants and animals in all the leading phenomena of cell division, and afford one more proof of the essential unity of the two great organic kingdoms.

There is one form of cell which, in its relation to the organic world possesses a significance beyond that of every other, namely, the egg. As already stated, the egg is, wherever it occurs, a typical cell, consisting essentially of a globule of protoplasm enveloping a nucleus (the "germinal vesicle"), and with one or more nucleoli (the "germinal spots") in the interior of the nucleus. This cell, distinguishable by no tangible characters from thousands of other cells, is nevertheless destined to run through a definite series of developmental changes, which have as their end the building up of an organism like that to which the egg owes its origin.

It is obvious that such complex organisms as thus result—composed, it may be, of countless millions of cells—can be derived from the simple egg cell only by a process of cell multiplication. The birth of new cells derived from the primary cell or egg thus lies at the basis of embryonic development. It is here that the phenomena of cell multiplication in the animal kingdom can in general be most satisfactorily observed, and the greater number of recent researches into the nature of these phenomena have found their most fertile field in the early periods of the development of the egg.

A discussion of the still earlier changes which the egg undergoes in order to bring it into the condition in which cell multiplication may be possible, would, however full of interest, be here out of place; and I shall therefore confine myself to the first moments of actual development—to what is called "the cleavage of the egg"—which is nothing more than a multiplication of the egg cell by repeated division. I shall further confine myself to an account of this phenomenon as presented in typical cases leaving out of consideration certain modifications whish would only complicate and obscure our picture.

The egg, notwithstanding the preliminary changes to which I have alluded, is still, at the commencement of development, a true cell. It has its protoplasm and its nucleus, and it is, as a rule, enveloped in a delicate membrane. The protoplasm forms what is known as the vitellus, or yolk, and the surrounding membrane is called the "vitellary membrane." The division which is now about to take place in it is introduced by a change of form in the nucleus. This becomes elongated, and assumes the shape of a spindle, similar to what we have already seen in the cell division of plants. On each pole of the spindle transparent protoplasm collects, forming here a clear spherical area.

At this time a very striking and characteristic phenomenon is witnessed in the egg. Each pole of the spindle has become the centre of a system of rays which stream out in all directions into the surrounding protoplasm. The protoplasm thus shows, enveloped in its mass, two sun-like figures, whose centres are connected to one another by the spindle-shaped nucleus. To this, with the sun-like rays streaming from its poles, Auerbach gives the name of "Karyolitic figure," suggested by its connection with the breaking up of the original nucleus, to which our attention must next be directed.

A phenomenon similar to one we have already seen in cell division among plants now shows itself. The nucleus becomes broken up into a number of filaments, which lie together in a bundle, each filament stretching from pole to pole of the spindle. Exactly in its central point every filament shows a knot-like enlargement, and from the close approximation of the knots there results a thick zone of protoplasm in the equator of the spindle. Each knot soon divides into two halves, and each half recedes from the equator and travels along the filament towards its extremity. When arrived at the poles of the spindle each set of half knots becomes fused together into a globular body, while the intervening portion of the spindle becoming torn up, and gradually drawn into the substance of the two globular masses, finally disappears. And now, instead of the single fusiform nucleus whose changes we have been tracing, we have two new globular nuclei, each occupying the place of one of its poles, and formed at its expense. The egg now begins to divide along a plane at right angles to a line connecting the two nuclei. The division takes place without the formation of a cell plate such as we saw in the division of the plant cell, and is introduced by a constriction of its protoplasm, which commences at the circumference just within the vitelline membrane, and, extending towards the centre, divides the whole mass of protoplasm into two halves, each including within it one of the new nuclei. Thus the simple cell which constituted the condition of the egg at the commencement of development becomes divided into two similar cells. This forms the first stage of cleavage. Each of these two young cells divides in its turn in a direction at right angles to the first division-plane, while by continued repetition of the same act the whole of the protoplasm or yolk becomes broken up into a vast multitude of cells, and the unicellular organism—the egg, with which we began our history—has become converted into an organism composed of many thousands of cells. This is one of the most widely distributed phenomena of the organic world. It is called "the cleavage of the egg," and consists essentially in the production, by division, of successive broods of cells from a single ancestral cell—the egg.

It is no part of my purpose to carry on the phenomena of development further than this. Such of my hearers as may desire to become acquainted with the further history of the embryo, I would refer to the excellent address delivered two years ago at the Plymouth meeting of the Association by one of my predecessors in this chair—Professor Allen Thompson.

That protoplasm, however, may present a phenomenon the reverse of that in which a simple cell becomes multiplied into many, is shown by a phenomenon already referred to—the production of plasmodia in the Myxomycetæ by the fusion into one another of cells originally distinct.

The genus Myriothela will afford another example in which the formation of plasmodia becomes introduced into the cycle of development. The primitive eggs are here, as elsewhere, true cells with nucleolated nuclei, but without any boundary membrane. They are formed in considerable numbers, but remain only for a short time separate and distinct. After this they begin to exhibit amœboid changes of shape, project pseudopodial prolongations which coalesce with those of others in their vicinity, and finally a multitude of these primitive ova become fused together into a common plasmodium, in which, as in the simple egg cell of other animals, the phenomena of development take place.

In many of the lower plants a very similar coalescence is known to take place between the protoplasmic bodies of separate cells, and constitutes the phenomenon of conjugation. Spirogyra is a genus of Algæ, consisting of long green threads common in ponds. Every thread is composed of a series of cylindrical chambers of transparent cellulose placed end to end, each containing a sac of protoplasm with a large quantity of cell sap, and with a green band of chlorophyll wound spirally on its walls. When the threads have attained their full growth they approach one another in pairs, and lie in close proximity, parallel one to the other. A communication is then established by means of short connecting tubes between the chambers of adjacent filaments, and across the channel thus formed the whole of the protoplasm of one of the conjugating chambers passes into the cavity of the other, and then immediately fuses with the protoplasm it finds there. The single mass thus formed shapes itself into a solid oval body, known as a "zygospore.' This now frees itself from the filament, secretes over its naked surface a new wall of cellulose, and, when placed in the conditions necessary for its development, attaches itself by one end, and then, by repeated acts of cell division, grows into a many-celled filament like those in which it originated.

The formation of plasmodia, regarded as a coalescence and absolute fusion into one another of separate naked masses of protoplasm, is a phenomenon of great significance. It is highly probable that, notwithstanding the complete loss of individuality in the combining elements, such differences as may have been present in these will always find itself expressed in the properties of the resulting plasmodia—a fact of great importance in its bearing on the phenomena of inheritance. Recent researches, indeed, render it almost certain that fertilization, whether in the animal or the vegetable kingdom, consists essentially in the coalescence and consequent loss of individuality of the protoplasmic contents of two cells.

In by far the greater number of plants the protoplasm of most of the cells which are exposed to the sunlight undergoes a curious and important differentiation, part of it becoming separated from the remainder in the form usually of green granules, known as chlorophyll granules. The chlorophyll granules thus consist of true protoplasm, their colour being due to the presence of a green colouring matter, which may be extracted, leaving behind the colourless protoplasmic base.

The colouring matter of chlorophyll presents under the spectroscope a very characteristic spectrum. For our knowledge of its optical properties, on which time will not now permit me to dwell, we are mainly indebted to the researches of your townsman, Dr. Sorby, who has made these the subject of a series of elaborate investigations, which have contributed largely to the advancement of an important department of physical science.

That the chlorophyll is a living substance, like the uncoloured protoplasm of the cell, is sufficiently obvious. When once formed, the chlorophyll granule may grow by intussusception of nutriment to many times its original size, and may multiply itself by division.

To the presence of chlorophyll is due one of the most striking aspects of external nature—the green colour of the vegetation which clothes the surface of the earth; and with its formation is introduced a function of fundamental importance in the economy of plants, for it is on the cells which contain this substance that devolves the faculty of decomposing carbonic acid. On this depends the assimilation of plants, a process which becomes manifest externally by the exhalation of oxygen. Now it is under the influence of light on the chlorophyll-containing cells that this evolution of oxygen is brought about. The recent observations of Draper and of Pfeffer have shown that in this action the solar spectrum is not equally effective in all its parts; that the yellow and least refrangible rays are these which act with most intensity; that the violet and other highly refrangible rays of the visible spectrum take but a very subordinate part in assimilation; and that the invisible rays which lie beyond the violet are totally inoperative.

In almost every grain of chlorophyll one or more starch granules may be seen. This starch is chemically isomeric with the cellulose cell wall, with woody fibre, and other hard parts of plants, and is one of the most important products of assimilation. When plants whose chlorophyll contains starch are left for a sufficient time in darkness, the starch is absorbed and completely disappears; but when they are restored to the light the starch reappears in the chlorophyll of the cells.

With this dependence of assimilation on the presence of chlorophyll a new physiological division of labour is introduced into the life of plants. In the higher plants, while the work of assimilation is allocated to the chlorophyll-containing cells, that of cell division and growth devolves on another set of cells, which, lying deeper in the plant, are removed from the direct action of light, and in which chlorophyll is therefore never produced. In certain lower plants, in consequence of their simplicity of structure and the fact that all the cells are equally exposed to the influence of light, this physiological division of labour shows itself in a somewhat different fashion. Thus in some of the simple green algæ, such as *Spirogyra* and *Hydrodictyon*, assimilation takes place as in other cases during the day, while their cell division and growth takes place chiefly, if not exclusively, at night. Strasburger, in his remarkable observations on cell divisions in *Spirogyra*, was obliged to adopt an artificial device in order to compel the *Spirogyra* to postpone the division of its cells to the morning.

Here the functions of assimilation and growth devolve on one and the same cell, but while one of these functions is exercised only during the day, the time for the other is the night. It seems impossible for the same cell at the same time to exercise both functions, and these are here accordingly divided between different periods of the twenty-four hours.

The action of chlorophyll in bringing about the decomposition of carbonic acid is not, as was recently believed, absolutely confined to plants. In some of the lower animals, such as *Stentor* and other infusoria, the Green Hydra, and certain green planariæ and other worms, chlorophyll is differentiated in their protoplasm, and probably always acts here under the influence of light exactly as in plants.

Indeed, it has been proved by some recent researches of Mr. Geddes, that the green planariæ when placed in water and exposed to the sunlight give out bubbles of gas which contain from 44 to 55 per cent. of oxygen. Mr. Geddes has further shown that these animals contain granules of starch in their tissues, and in this fact we have another striking point of resemblance between them and plants.

A similar approximation of the two organic kingdoms has been shown by the beautiful researches of Mr. Darwin—confirmed and extended by his son, Mr. Francis Darwin—on Drosera and other so-called carnivorous plants. These researches, as is now well known, have shown that in all carnivorous plants there is a mechanism fitted for the capture of living prey, and that the animal matter of the prey is absorbed by the plant after having been digested by a secretion which acts like the gastric juice of animals.

Again, Nägeli has recently shown that the cell of the yeast fungus contains about 2 per cent. of peptine, a substance hitherto known only as a product of the digestion of azotized matter by animals.

Indeed, all recent research has been bringing out in a more and more decisive manner the fact that there is no dualism in life—that the life of the animal and the life of the plant are, like their protoplasm, in all essential points identical.

But there is, perhaps, nothing which shows more strikingly the identity of the protoplasm in plants and animals, and the absence of any deep-pervading difference between the life of the animal and that of the plant, than the fact that plants may be placed, just like animals, under the influence of anæsthetics.

When the vapour of chloroform or of ether is inhaled by the human subject, it passes into the lungs, where it is absorbed by the blood and thence carried by the circulation to all the tissues of the body. The first to be affected by it is the delicate nervous element of the brain, and loss of consciousness is the result. If the action of the anæsthetic be continued, all the other tissues are in their turn attacked by it and their irritability arrested. A set of phenomena entirely parallel to these may be presented by plants.

We owe to Claude Bernard a series of interesting and most instructive experiments on the action of ether and chloroform on plants. He exposed to the vapour of ether a healthy and vigorous sensitive plant, by confining it under a bell-glass into which he introduced a sponge filled with ether. At the end of half an hour the plant was in a state of anæsthesia, all its leaflets remained fully extended, but they showed no tendency to shrink when touched. It was then withdrawn from the influence of the ether, when it gradually recovered its irritability, and finally responded, as before, to the touch.

It is obvious that the irritability of the protoplasm was here arrested by the anæsthetic, so that the plant became unable to give a response to the action of an external stimulus.

It is not, however, the irritability of the protoplasm of only the motor elements of plants that anæsthetics are capable of arresting. These may act also on the protoplasm of those cells whose function lies in chemical synthesis, such as is manifested in the phenomena of the germination of the seed and in nutrition generally, and Claude Bernard has shown that germination is suspended by the action of ether or chloroform.

Seeds of cress, a plant whose germination is very rapid, were placed in conditions favourable to a speedy germination, and while thus placed were exposed to the vapour of ether. The germination, which would otherwise have shown itself by the next day, was arrested. For five or six days the seeds were kept under the influence of the ether, and showed during this time no disposition to germinate. They were not killed, however, they only slept, for on the substitution of common air for the etherized air with which they had been surrounded, germination at once set in and proceeded with activity.

Experiments were also made on that function of plants by which they absorb carbonic acid and exhale oxygen, and which, as we have already seen, is carried on through the agency of the green protoplasm or chlorophyll, under the influence of light—a function which is commonly, but erroneously, called the respiration of plants.

Aquatic plants afford the most convenient subjects for such experiments. If one of these be placed in a jar of water holding ether or chloroform in solution, and a bell-glass be placed over the submerged plant, we shall find that the plant no longer absorbs carbonic acid or emits oxygen. It remains, however, quite green and healthy. In order to awaken the plant, it is only necessary to place it in non-etherized water, when it will begin once more to absorb carbonic acid and exhale oxygen under the influence of sunlight.

The same great physiologist has also investigated the action of anæsthetics on fermentation. It is well known that alcoholic fermentation is due to the presence of a minute fungus, the yeast fungus, the living protoplasm of whose cells has the property of separating solutions of sugar into alcohol, which remains in the liquid, and carbonic acid, which escapes into the air.

Now, if the yeast plant be placed along with sugar in etherized water it will no longer act as a ferment. It is anæsthesiated, and cannot respond to the stimulus which, under ordinary circumstances, it would find in the presence of the sugar. If, now, it be placed on a filter, and the ether washed completely away, it will, on restoration to a saccharine liquid, soon resume its duty of separating the sugar into alcohol and carbonic acid.

Claude Bernard has further called attention to a very significant fact which is observable in this experiment. While the proper alcoholic fermentation is entirely arrested by the etherization of the yeast plant, there still goes on in the saccharine solution a curious chemical change, the cane sugar of the solution being converted into grape sugar, a substance identical in its chemical composition with the cane sugar, but different in its molecular constitution. Now it is well known from the researches of Bertholet that this conversion of cane sugar into grape sugar is due to a peculiar inversive ferment, which, while it accompanies the living yeast plant, is itself soluble and destitute of life. Indeed it has been shown that in its natural conditions the yeast fungus is unable of itself to assimilate cane sugar, and that in order that this may be brought into a state fitted for the nutrition of the fungus, it must be first digested and converted into grape sugar, exactly as happens in our own digestive organs. To quote Claude Bernard's graphic account:—

"The fungus ferment has thus beside it in the same yeast a sort of servant given by nature to effect this digestion. The servant is the unorganized inversive ferment. This ferment is soluble, and as it is not a plant, but an unorganized body destitute of sensibility, it has not gone to sleep under the action of the ether, and thus continues to fulfil its task."

In the experiment already recorded on the germination of seeds the interest is by no means confined to that which attaches itself to the arrest of the organizing functions of the seed, those, namely, which manifest themselves in the development of the radicle and plumule and other organs of the young plant. Another phenomenon of great significance becomes at the same time apparent—the anæsthetic exerts no action on the concomitant chemical phenomena which in germinating seeds show themselves in the transformation of starch into sugar under the influence of diastase (a soluble and non-living ferment which also exists in the seed), and the absorption of oxygen with the exhalation of carbonic acid. These go on as usual, the anæsthesiated seed continuing to respire, as proved by the accumulation of carbonic acid in the surrounding air. The presence of the carbonic acid was rendered evident by placing in the same vessel with the seeds which were the object of the experiment a solution of barytes, when the carbonate became precipitated from the solution in quantity equal to that produced in a similar experiment with seeds germinating in unetherized air.

So, also, in the experiment which proves the faculty possessed by the chlorophyllian cells of absorbing carbonic acid and exhaling oxygen under the influence of light may be arrested by anæsthetics, it could be seen that the plant, while in a state of anæsthesia, continued to respire in the manner of animals: that is, it continued to absorb oxygen and exhale carbonic acid. This is the true respiratory function which was previously masked by the predominant function of assimilation, which devolves on the green cells of plants, and which manifests itself under the influence of light in the absorption of carbonic acid and the exhalation of oxygen.

It must not, however, be supposed that the respiration of plants is entirely independent of life. The conditions which bring the oxygen of the air and the combustible matter of the respiring plant into such relations as may allow them to act on one another are still under its control, and we must conclude that in Claude Bernard's experiment the anæsthesia had not been carried so far as to arrest such properties of the living tissues as are needed for this.

The quite recent researches of Schützenberger, who has investigated the process of respiration as it takes place in the cell of the yeast fungus, have shown that vitality is a factor in this process. He has shown that fresh yeast, placed in water, breathes like an aquatic animal, disengaging carbonic acid, and causing the oxygen contained in the water to disappear. That this phenomenon is a function of the living cell is proved by the fact that, if the yeast be first heated to 60° C. and then placed in the oxygenated water, the quantity of oxygen in the water remains unchanged; in other words, the yeast ceases to breathe.

Schützenberger has further shown that light exerts no influence on the respiration of the yeast cell—that the absorption of oxygen by the cell takes place in the dark exactly as in sunlight. On the other hand, the influence of temperature is well marked. Respiration is almost entirely arrested at temperatures below 10° C., it reaches its maximum at about 40° C., while at 60° C., it again ceases.

All this proves that the respiration of living beings is identical, whether manifested in the plant or in the animal. It is essentially a destructive phenomenon—as much so as the burning of a piece of charcoal in the open air, and, like it, is characterized by the disappearance of oxygen and the formation of carbonic acid.

One of the most valuable results of the recent careful application of the experimental method of research to the life phenomena of plants is thus the complete demolition of the supposed antagonism between respiration in plants and that in animals.

I have thus endeavoured to give you in a few broad outlines a sketch of the nature and properties of one special modification of matter, which will yield to none other in the interest which attaches to its study, and in the importance of the part allocated to it in the economy of nature. Did the occasion permit I might have entered into many details which I have left untouched; but enough has been said to convince you that in protoplasm we find the only form of matter in which life can manifest itself; and that, though the outer conditions of life—heat, air, water, food—may all be present, protoplasm would still be needed, in order that these conditions may be utilized, in order that the energy of lifeless nature may be converted into that of the countless multitudes of animal and vegetable forms which dwell upon the surface of the earth or people the great depths of its seas.

We are thus led to the conception of an essential unity in the two great kingdoms of organic nature—a structural unity, in the fact that every living being has protoplasm as the essential matter of every living element of its structure; and a physiological unity, in the universal attribute of irritability which has its seat in this same protoplasm, and is the prime mover of every phenomenon of life.

(*To be continued.*)

Correspondence.

Messrs. McIlwaine and Marshall.—We are not aware that any such code of rules has been published.

E. Ware.—Artemisia vulgaris.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Radclyffe, Wheeler, George, Reynolds, McIlwaine and Marshall, Ware, Jarmay, Talbot, J. K. Nicol, Secretary of Leicester Association, Inquirer, Pendennis, Country Apprentice, H. S. N.

"THE MONTH."

When those industrious little insects, the bees, cease working, or at all events collect but little honey, on account of the weather, it is hardly to be expected that flowers under such circumstances should prove more attractive to human beings, unless, like the Ligurian bees, they defy the weather. Studying plants under an umbrella is by no means an agreeable operation, and as sunny skies seem out of the question at present, our floral calendar this month may well be a short one.

The terrific thunderstorm early in this month, which spent its fury chiefly in the neighbourhood of Kew and Richmond, committed such havoc, that the conservatories have had to be closed against the public for repairs, no less than 16,000 panes of glass having been destroyed. The house containing medicinal plants, however, appears to have been comparatively uninjured, although great damage was done in its immediate neighbourhood.

In the Economic House, at Kew, the cacao tree has the upper portion of its diminutive trunk and the lower branches studded with little white flowers, the size of which is absurdly small when compared with the large fruit, which is often a foot in length. The Indian variety of the arrowroot and the papaw tree (male plant) are also in flower, and the *Guizotia oleifera*, which yields the niger seed of commerce, is covered with handsome yellow flowers bearing some resemblance to those of the corn marigold (*Chrysanthemum segetum*). *Cinchona anglica* is now in bud, and will shortly expand its flowers. *Chloranthus officinalis*, used in Java as an aromatic stimulant in typhus fever, is also opening its minute green flowers. *Adenanthera pavonina*, which yields the bright scarlet seeds often used as necklaces, and which are used by jewellers in the east as weights, since they weigh almost uniformly 4 grains, is just showing its small yellowish flowers; these are most disappointing when compared with the brilliant colour and polish of the seeds.

On the outside wall of the Economic House the jalap plant may be seen flowering freely. In the Herbaceous Ground several American medicinal plants may now be seen in blossom, including *Eupatorium purpureum*, *Liatris spicata*, *Leptandra virginica* and *Monarda didyma*. *Leptandra virginica* is not unlike the ordinary *Veronica gentianoides* grown in gardens, but is a taller plant with rather smaller flowers. It has, however, a very pretty and neat appearance and seems to flourish well in the open air. Now that the root, or rather its active principle, leptandrin, is coming into use in this country, it might be worth cultivating. *Monarda didyma* is a very handsome plant; its head of brilliant crimson flowers and bracts forming a most striking object when surrounded by plenty of green foliage. The upper lip of the ringent corolla is remarkably long and narrow and conceals the two anthers.

At Mr. Ware's Nursery, at Tottenham, may now be seen in flower a mass of *Nardostachys Jatamansi*, the plant supposed to be the spikenard of Scripture. It is said to bear cultivation well. It is not, however, a very handsome plant. The leaves are lanceolate and the flower stems are only 3—6 inches long, terminated by a cluster of small and not very attractive violet-coloured blossoms. The odour of the root somewhat resembles that of patchouli.

Other medicinal plants in blossom now are *Althœa officinalis*, *Cannabis sativa*, *Lactuca virosa*, *Artemisia Absinthium*, *Lobelia syphilitica* and *Origanum Dictamnus*.

On chalky or calcareous banks the wild marjoram, *Origanum vulgare*, may now be seen giving quite a gay appearance to the waste places where it grows in any abundance; indeed it is to this fact that it owes its name, derived from two Greek words *oros* and *ganos*, meaning mountain joy.

This plant has a very ancient reputation, as it was used by the Greeks, both internally and for fomentations, and considered as a remedy for narcotic poisons, such as opium and hemlock. Gerarde speaks of it as being a diuretic, useful in dropsy, and externally of service in some skin diseases.

The English or wild marjoram propagates itself extensively by slender stolons. Two forms are recognized in 'English Botany,' one with ovate few-flowered spikes, and the other with few prismatic many-flowered spikes. Specimens with pale pink and white flowers may occasionally be met with.

The marjoram used as a sweet herb is not this plant, but *O. Majorana* or *O. Onites*. The former has small, roundish spikes and small, stalked, elliptical, smooth leaves, and the latter, oblong spikes and downy cordate leaves. Neither have the pretty appearance of the wild marjoram, which is largely due to the coloured bracts that subtend the flowers.

There are few, probably, do not—

"Know a bank where the wild thyme blows."

But a few other facts connected with thyme do not appear to be so generally known as might be expected in these days of advanced education. In the advertisement columns of a contemporary may be noticed the statement that thymol is obtained from "wild thyme (*Origanum vulgare*)." Wild thyme (*Thymus Serpyllum*, L.) includes two forms, which by some authors are regarded as species. The form described in 'Babington's Manual' under the name of *T. Serpyllum*, L., forms dense cushions, consisting in great measure of barren shoots with comparatively few short, erect flowering stems rising one or two inches above the tuft. The other *Thymus Chamœdrys* grows in loose tufts with long slender flowering stems, five or six inches or more in height, and has altogether a different habit, by which, indeed, rather than by any good botanical characters, it is distinguished. In the latter plant the upper corolla lip is more rounded and less notched than in *T. Serpyllum*. The common thyme of the gardens, *Thymus vulgaris*, L., is distinguished by its erect habit and revolute leaves, and is a native of the South of Europe. It is from this plant that the *Oleum origani* of the shops is obtained, and of which, when pure, thymol is said to form about one half. Thymol has, however, been obtained of late years from the essential oil of the seeds of *Ptychotis Ajowan*, an umbelliferous plant grown in India. The lemon thyme used as a culinary herb is *Thymus citriodorus*, Schreb.

A good idea of the variety of forms to which plants are subject may be obtained by studying the varieties of the common dandelion. The true naturalist will not be satisfied with knowing merely the typical form of any species, but will seek a knowledge of the life-history of the commoner plants which come under his daily notice. With regard to the dandelion it would be an interesting inquiry as to which of the various forms yield the largest amount and best quality of extract, and how far the medicinal properties and forms of the plant are affected by the circumstances under which it grows.

In Sowerby's 'English Botany,' four varieties are described, α *genuinum*, with bright green decidedly runcinate leaves, and the outer bracts of the involucre recurved; β *erythrospermum*, having dull green, deeply runcinate leaves, the segments reaching almost to the midrib, and the outer bracts of the involucre spreading horizontally; γ *lævigatum*, with dull green leaves, deeply pinnatifid with triangular strap-shaped lobes, and the outer bracts loosely adpressed to the involucre; and δ *palustre*, with dull green leaves, having few broad spreading lobes, or almost entire. Var. β prefers a dry sandy soil, and flowers in early summer. Var. δ grows in moist situations and flowers in the beginning of autumn. Those who are interested in knowing more of our common plants, will find useful monthly notes in our excellent contemporary *Science Gossip*, under the heading of "Botanical Work for the Month."

In the *Bulletin de la Société de Pharmacie de Bordeaux*, M. Léon Périer gives an account of the hairs found on the leaves of digitalis. The structure of these hairs enables the microscopist to recognize the leaves of digitalis, even when powdered, from those of henbane, tobacco, aconite, stramonium, hemlock, etc., with the greatest ease, as anyone may find who will take the trouble to compare the hairs of these plants, first in their perfect state and then as found in powdered leaves.

The present number of 'Medicinal Plants' contains figures of *Balsamodendron Myrrha*, *Aloe spicata*, *Roccella tinctoria*, *Cetraria islandica*, *Claviceps purpurea*, *Fucus vesiculosus*, *Chondrus crispus* and *Gracilaria lichenoides*. Much light has been thrown upon the plants producing myrrh and the allied gum-resins mixed with it, by the excellent specimens collected by Mr. Wykeham Perry, and presented to Kew Gardens, where the bissa-bol plant is still growing, although the myrrh plant is unfortunately dead. The authors think that *B. Kafal* will probably turn out to be the plant yielding bissa-bol. Until the specimen at Kew flowers, however, this point cannot be satisfactorily determined. Those who choose to supplement the article on myrrh by the information contained on p. 81 of the current volume of this Journal will be in possession of the most recent contributions to our knowledge of this interesting subject. *Aloe spicata*, the drawing of which is a very characteristic one, has not previously been figured. The authors have followed Mudd in uniting *Roccella phycopsis*, Ach., and *R. tinctoria*, DC., and perhaps rightly so. So far as the writer has observed *R. phycopsis*, Ach., is the only form which occurs in this country, and may be readily distinguished when gathered by the yellowish colour of its point of attachment to the rock; that of *R. fuciformis* and of *R. tinctoria* (at all events in dried specimens) being always white. No notice is taken of *Roccella Montagnei*, Bél., as a plant yielding litmus or archil, although a large quantity arrives in this country for commercial purposes. This species is easily distinguished from *R. fuciformis* by its soft texture. *Variolaria*, which the authors quote, is now not recognized as a genus of lichens. The article on ergot is a remarkably clear and concise *résumé* both of the botany and chemistry of the subject and is brought up to the most recent date. It may interest some readers to know that specimens of all the chemical principles obtained from ergot by Dragendorff, as well as crystallized ergotinine prepared by Tanret, may be seen in the Museum of the Pharmaceutical Society. The drawing of *Fucus vesiculosus* is a remarkably good one. The authors do not agree with Thuret in separating *Fucus platycarpus*, as a species. The two plants, besides differing in the shape of the organs of fructification, and in the latter plant being monœcious, may be seen growing together on the same shore and within a few yards of each other, preserving their distinctive characters.

From the anniversary report of the Royal Botanical Society, Regent's Park, it appears that 540 free students' and artists' tickets, for terms of one to six months each, have been issued during the year, and about 25,000 cut specimens given to the holders, besides which nearly 29,000 specimens of plants have been distributed to the several medical and art schools of the metropolis. The meteorological report of the same society shows that the mean temperature of the first six months of this year was 49·35 against 54·7 last year, and that the rain for the same period was in an excess of 3 inches over that of last year.

From the *Garden* we learn that in Germany nearly every town has its botanical garden for furnishing means of instruction in botany. Berlin has two, the larger of which supplies 120 institutions of learning, including 100 common schools, requiring 3,000,000 specimens. The plants are arranged in bundles and distributed in waggons. The flower described by the teacher is illustrated by a living specimen placed in the hand of each pupil. In a letter to the same journal, a correspondent suggests that the nosegays of flowers sent to hospitals should contain sweet smelling green plants along with the flowers, such as rosemary, lavender and gum cistus, an idea, which at first sight, when considered in connection with the ozone-producing power of some essential oils, would appear to be a very good one. It should not, however, be forgotten that the perfumes of some flowers are apt to cause headache and discomfort in peculiarly susceptible patients.

Most botanists are familiar with the odour possessed by the curious water plant *Chara fœtida*. This odour has recently been attributed to a kind of camphor, which its discoverer, Dr. Phipson,* has called characine. The name is perhaps ill-chosen, since he has obtained the substance also from *Palmella cruenta*, *Oscillaria autumnalis*, *O. tenuis* and *Nostoc*. It is obtained from *Palmella cruenta* (a purplish-red substance, found at the base of damp walls, etc.) by drying it in the air at less than summer heat, then placing it in a covered glass vessel; in thirty-six or more hours the characine forms a film on the water, and the clear decanted liquid is then shaken up with ether. On evaporation the ether leaves the characine as a white greasy substance having a strong marshy odour, lighter than water, and disappearing either by volatilization or oxidation. To this substance the marshy odour of fresh-water algæ in general is attributed by Dr. Phipson.

From the *Boston Journal of Chemistry* we learn that an analysis of a Florida orange gave 23·33 per cent. for the weight of the rind, 2·84 per cent. for the seeds and 73·83 per cent. for the pulp, the free acid in the latter consisting of about equal parts of malic and citric acids.

Reports from the Isle of Réunion state that most

* *Chemical News*, August 22, 1879, p. 86.

of the vanilla plantations there have been destroyed by a frightful cyclone of three days' duration, and that those which have not been destroyed are greatly damaged, so that there will be hardly any harvest this year; consequently, a high price for this article may be expected.

In a recent report on the Government plantations at Adelaide, South Australia, Dr. Schomburgk states that a great demand has arisen in that colony for the *Phytolacca decandra*, which is freely used by homœopaths in the treatment of diphtheria. The parts of the plant official in the Homœopathic Pharmacopœia are the roots and berries.

M. Colin, in the *Revue Hebdomadaire des Sciences*, states that santonin is a complete cure for the obstinate endemic diarrhœa of Cochin China, and that it acts by destroying the anguillulæ by which the disease is occasioned.

"There is no new thing under the sun," is a declaration generally accepted with the reverence due to the wise preacher who uttered it, but it was hardly to have been expected that the noble savage could claim priority of Dr. Maclagan in the use of salicin in the treatment of rheumatism. Nevertheless the special correspondent of the *Medical Times and Gazette* in Zululand relates that having, in the year 1861, prescribed the usual remedies for a Dutch woman suffering severely from rheumatic swellings and pain, and meeting her two months afterwards looking well and hearty, he was about to congratulate her when he was met by the exclamation, "De doktor goot had nict gehelp;" the interpretation of which is, "The doctor's medicine did not help a bit." Upon inquiring what had helped her, she said the old Hottentot shepherd had cured her with a decoction of the tips of willow, which fringe the banks of the Orange river. And yet, had a list of South African drugs, including "willow tips," been published at that time, it would probably not have attracted the least attention.

In a recent number of the *British Medical Journal* complaint is made by a correspondent of the variation in character of commercial euonymin, one specimen which was received from a first class house consisting of brown particles mixed with the greenish particles of euonymin in considerable quantity. The euonymin used by Professor Rutherford and made by a New York firm, did not contain the brown particles. From the description given it would appear as if the euonymin alluded to were a mixture of a watery and spirituous extract in powder. The euonymin prepared by the same process as podophyllin is a very hygroscopic substance and cannot easily be kept in a powdered state. It is time that some of our practical pharmacists should experiment as to the best means of making euonymin in a convenient and active form.

A correspondent of the *British Medical Journal* states that bromide of potassium given in doses of not more than 20 grains is a most valuable remedy for the sickness of pregnancy. Given in conjunction with other agents applicable to the local gastric irritation which may have ensued from the time sickness commenced, he has never found it to fail.

Another writer to the *Lancet* finds that hydrobromic acid in doses of 20 minims is very superior in its action to bromide of potassium in controlling the obstinate sickness arising from ulceration of the stomach.

In the *Louisville Medical News* sulphate of eserine has recently been recommended by Dr. Cheatham as a means of delaying the use of spectacles, so that they are not required for several years, this alkaloid having the power of stimulating the ciliary muscle and thus assisting accommodation. The strength used is one grain of the sulphate of eserine to an ounce of water. One drop of this solution is put in the eye at night or when required.

Professor Ladenberg, of Kiel University, has been studying the artificial production of atropine, and has succeeded in recombining tropic acid and tropine into atropine which is undistinguishable physically, chemically or physiologically from the original alkaloid. Among other interesting discoveries to which his inquiry has led is that of tropine being converted under special treatment with strong hydrochloric acid into a new oily base called tropidine, which bears a singular relation to conine and collidine. Thus, collidine has the formula $C_8H_{11}N$; tropidine $C_8H_{13}N$; and conine $C_8H_{15}N$.

H. Weidel (*Deut. Ch. Ges. Ber.*, xii., 410) has been repeating the experiment of Fleitmann, in the oxidation of berberine by means of nitric acid. Instead of obtaining oxalic acid, as reported by Fleitmann, he obtained a new tribasic nitrogenous acid, which he has named berberonic acid. It is prepared by heating berberine with eight or ten times its weight of nitric acid, concentrating the solution, and purifying the crystalline mass which separates on cooling by recrystallization from boiling water and conversion into a calcium salt. Upon decomposing this with an acid and crystallizing from hot water berberonic acid is obtained in groups of transparent prismatic crystals, sparingly soluble in alcohol and cold water, easily soluble in hot water, and insoluble in ether, benzene and chloroform. Freshly crystallized the composition is represented by the formula $C_8H_6NO_6+2H_2O$, but on exposure to air the crystals lose one molecule of water, and become opaque.

A test to distinguish between tartaric acid and citric acid is published by Cailletet (*Chem. Centralbl.*, 1879, p. 14), based upon the difference in the behaviour of these two acids towards a cold saturated solution of potassium bichromate, tartaric acid assuming a dark brown colour and giving off carbonic anhydride, whilst citric acid is affected only slowly and gives a light brown colour. If 10 c.c. of the potassium dichromate solution be added to a gram of pure citric acid the orange red colour is unaltered at the end of ten minutes; if 5 per cent. of tartaric acid be present a dark brown colour is produced, and if 1 per cent. a coffee-brown tint. Vinegar made from wine, and containing tartrate, may be distinguished by this test from vinegar made from fruit and beer or wood vinigar.

Another soluble albuminate of mercury for hypodermic use has been patented in Germany by a Mr. H. Drees. According to the specification it is prepared by mixing with an alkaline solution of albumen sufficient mercuric acetate to leave neither albumen nor mercury in excess, and removing excess of alkali together with the secondary salts produced in the reaction by dialysis or precipitation with carbonic acid gas and dilute alcohol. Or freshly precipitated mercuric oxide may be added to the alkaline solution of albumen, allowed to digest and the resulting albuminate separated as above. This albuminate is described as soluble in water rendered slightly alkaline by a trace of caustic alkalies, alkaline earths or ammonia.

Much confusion arises from the fact that benzol and benzin are often used as synonymous terms. In some works the name benzin is now applied to a light petroleum product. In the *Archiv der Pharmacie*, it is pointed out that benzol is soluble in one-half to three-quarters its weight of alcohol, while benzin (used in the sense just named) requires six times its weight, so that the two may be thus distinguished.

In the *Chemiker Zeitung*, Maumené states that he considers the best characteristic test for oils is the amount of heat liberated when 10 c.c. of concentrated sulphuric acid are mixed with 50 grams of the oil. The acid is added with a pipette and the mixture stirred with a thermometer. Under these conditions olive oil gives a temperature of 42° C. and linseed 103° C.

In the *Technologiste* it is stated that common rosin prevents the formation of acetic acid in fermented liquids without hindering alcoholic fermentation and the writer suggests that the peculiar effect of the hop may be due to its resinous matter rather than to its essential oil. The custom of using Burgundy pitch in lining beer-casks in Germany is thus evidently not without its value.

The *Lancet*, commenting upon a statement that has appeared in various journals to the effect that arsenic is present in paper collars, etc., states that it has been ascertained by analysis that arsenic is not present, but that the substance used for glazing or facing them is sulphate of baryta.

Mr. C. T. Gage, in *New Remedies* for this month, gives a paper on the structure and adulterations of powdered capsicum, with illustrations of the microscopical appearances of the drug. Out of seventeen samples analysed by him only three proved to be pure and free from adulteration, the chief adulterants being maize, wheat, oat and pea starches, with small quantities of black pepper, mustard and turmeric.

A writer in the *Deutsche Gartner-Zeitung* recalls the fact that a decoction of the stems and leaves of the tomato plant forms a useful insecticide for the greenhouse. He has found that when the decoction is syringed over plants attacked by insects it at once destroys black or green fly, caterpillars, etc., and that it leaves behind a peculiar odour which prevents insects from visiting the plants for a long time.

The *Scientific American*, which never misses an opportunity of extolling the progress of home industries in the United States, says that the manufacture of cream of tartar has so developed there that the imports of it from France have fallen in six years from 6,000,0C0 pounds yearly to none, whilst the price has been reduced from 32 to 24 cents per pound. In like manner the imports of citric acid from England have fallen from 250,000 pounds yearly to 27,000 pounds last year, the price having fallen to about one-half. In the case of borax the relations are even more completely reversed ; for in consequence of the development of the borax mines in Nevada, England now appears as a buyer of crude and refined borax in the United States market, where she used to be the principal seller.

In the *Moniteur Scientifique*, M. Bardy points out that the actual amount of acid contained in glacial acetic acid may be determined by the solubility of oil of turpentine in it. To a known volume of the acid 8 to 10 times its volume of the oil is added and the mixture stirred two or three times. If the mixture remains clear the acid contains 97 to 98 per cent. In order to obtain comparable results the samples operated on should be of the same temperature, 15° C. being most suitable. The author found that the percentage in the fifty-seven samples examined by him varied from 87 to 99·5 per cent.

In the same journal, M. Guyard describes the metal uralium, discovered by him in 1869 in commercial Russian platinum, as being, next to silver, the whitest metal known, and as malleable as platinum, but much more ductile and almost as soft as lead, while it is not volatile and its melting point is near that of platinum. Its sp. gr. is 20·25, its molecular volume 6·25, and its atomic weight 187·25.

The present year indeed promises to be an eventful one in the history of the elements. On the one hand scarcely a month passes without the reported discovery of some new substance to which this term is applied, and, on the other there is an accumulation of evidence that appears to give strength to the doubt whether more than a few, if any, known substances are entitled to that name. Some most interesting speculations have been put forward by Professor Victor Meyer in a lecture delivered at Zurich last month, based upon results obtained whilst working out the determination of the vapour densities of various bodies by the process invented by himself and Herr Carl Meyer, and described in this Journal last May (vol. ix., p. 936). At a temperature of about 1567° C., results were obtained indicating that the molecular constitution of mercury, oxygen, nitrogen and sulphur is correctly indicated by the formulæ usually adopted—Hg, O_2, N_2, and S_2. But it has been found that at this temperature the vapour density of chlorine is only two-thirds of what it is at 620° C., and that at 808° C. some kind of dissociation commences which becomes and remained constant at 1567°. Professor Meyer appears to think that the chlorine molecule as at present understood, having the molecular value of 70·4, must therefore contain at least six atoms of a hypothetic body, having the atomic weight of 11·4, and probably trivalent, and to this the name chlorogene is given ; the hypothetic atom of iodine is similarly named iogene. Mr. Watson Smith, in reporting this lecture to the *Chemical News* (Aug. 1), remarks that these results, considered in connection with the relationship between chlorine, bromine and iodine, and sulphur, selenium and tellurium, as to melting and boiling points, calculated from absolute zero, observed by Dr. Carnelly nd Mr. W. C. Williams (*Pharm. Journ.* [3], ix., 1066), suggests the probability that all these "so-called elements contain one and the same essence and will ultimately be decomposed so as to yield this essence common to all six."

But this is not all. Professor Meyer has proceeded to a practical investigation as to the constituents of chlorine, and following the hint of Berzelius, who looked upon chlorine as an oxygen compound, has tried to ascertain how far this opinion was based upon fact. After conducting his experiments with the utmost precaution, so as to eliminate causes of error as far as possible, he has arrived at the conclusion that "to all appearance" by heating chlorine oxygen is obtained. The theory put forward is that two atoms of oxygen exist combined with two atoms of a univalent body, to which the name "murium" is applied, and that at a high temperature this combination is broken up, half the oxygen being set free. Dr. Armstrong, writing upon this subject in *Nature* (Aug. 14), says that some results obtained by Mr. Norman Lockyer in the spectroscopic investigation of the non-metals are confirmatory of Professor Meyer's discovery, and that Mr. Lockyer has shown him that "with the spark at a particular tension the red line of oxygen is one of the most prominent lines in the spectrum of chlorine the freedom of which from admixed air is attested by the absence of the characteristic nitrogen and hydrogen lines."

In a letter to the *Chemical News* Mr. J. Gibbons suggests that the peculiar spectra sometimes observed in lightning may be due to metals with which the lightning comes into contact and that the instrumental observation of the spectroscopic character and direction of the lightning, with the interval of flash and report, would be sufficient to determine the character and situation of exposed metalliferous deposits in unexplored districts.

The veteran chemist, Chevreul, whose name is associated with researches on fats and fatty acids, although now in his ninety-third year, began his usual course of lectures on organic chemistry at the Museum of Natural History at Paris a short time since.

Mr. Holloway appears to be bent upon the perpetuation of his name as a benefactor of his species in more than one direction. According to *Nature* he has purchased and vested in trustees ninety-five acres of land at Egham, upon which he intends to erect a building for a college, the object and scope of which is to be to afford the best education suitable for women of the upper and upper middle classes. The contract for the building of the college within four years has been signed, the price being upwards of £250,000, exclusive of fittings. It is the founder's desire that power for the college to confer degrees should be sought at some future time, but that meanwhile students should qualify themselves to pass the women's examination of the London University. "Denominational theology" is not to be taught, and, instead of being regulated by the "traditions and methods of former ages," the system of education is to be mainly based upon studies and sciences which the experience of modern times has shown to be most valuable and best adapted for the intellectual and social requirements of the students. Mr. Holloway has also agreed to provide an endowment fund of £100,000, in addition to such proceeds as may be derived from the sale of any portion of the land not required for the purposes of the College.

It must be apparent from the continuous flow of inquiry that increased attention is being directed to these columns devoted to the difficulties which beset dispensers. The questions generally exhibit a very imperfect acquaintance even with prescriptions possessing no special characters, others refer to incompatibilities which must have escaped the observation of the writer, and some have reference to obscure preparations, the formulæ for which have never been published; but there are those also which indicate that sufficient attention is not paid to the information supplied by correspondents, and recorded continuously in the Journal. This latter is to be regretted as repetition occupies valuable space, and should, unless in quite exceptional instances be unnecessary.

The first question in the series refers to the result of a mixture of Donovan's solution with liq. hyd. perchlor. in No. 331. Immediately on the addition being made there is a decomposition with a copious separation, and ultimately a deposit of red iodide of mercury, which settles at the bottom, the supernatant liquid being pinky-white; the addition of a little iodide of potassium would render the mixture transparent, but, of course, this liberty cannot be taken with a prescription. The mixture is an inelegant one, and most probably the writer was not aware of the result of mixing liq. hyd. perch. with liq. arsen. et hydrarg. hydriod. (Donovan's solution), an already delicately balanced compound.

Gelatine is not suitable as a vehicle for tannin in pessaries or suppositories, as in No. 332. A decomposition occurs with the formation of tannate of gelatine, and the otherwise gelatinous vehicle breaks down in the preparation. In those instances where medical men require a gelatine vehicle it would be better that they left the most suitable relative proportions of the ingredients for that vehicle to the dispenser. It is usual to keep a gelatine medium ready prepared in proper proportions, and on liquefying this for the addition of the of the medicament, the pessaries are moulded in the usual manner. The usual vehicles for pessaries and suppositories are cacao butter or some such substance as a basis, on the one hand, and gelatine on the other, and it will be better for the prescriber to specify one or other of these, leaving the relative proportions to the dispenser, the writer of the prescription proportioning only the medicament. Very rarely do medical men give suitable proportions for the vehicle desired. The same may be said of pill masses. A dispenser is often at his wit's end in too literally interpreting the excipient and its quantity ordered in a prescription. The ingredients being written, those minor details, in fact, the mode of combining those ingredients so as to form a pill mass, may well be left to the practical experience of the dispenser.

The query No. 333 refers to ext. belæ liq. Made according to the formula in the B.P. the result may be termed a dark brown syrupy liquid, which on standing deposits, the supernatant liquid being clear, and the portion containing the deposited matter opaque. It will be obvious from these remarks that the appearance of the ext. belæ liq. will much depend on the time it has been allowed to stand subsequent to its preparation. The addition of spirit will also necessarily cause a separation of some of the constituents of the bael, which on standing deposits. The Pharmacopœia does not direct it to be filtered. It is presumable, therefore, that the ext. belæ liq. should be shaken each time that the prescription is dispensed, as the separated portion is not inert matter. If reference be made to the ext. ergot. liq. the distinction will be at once apparent. In that preparation the spirit is added to coagulate albumenoid matter, and then, after the addition of spirit, the liquid is directed to be filtered; but the spirit in the ext. belæ is more as a preservative than for the purposes of coagulation, though at the same time it probably promotes a subsidence of some of the proximate constituents of the bael, which forms an integral part of the finished preparation.

The recipe No. 334 is very likely one of those sometimes met with by the dispenser. In its present condition it is not complete, and it would not be judicious or safe to put calomel into such a mixture to be taken three times a day. It is scarcely possible that such a formula could emanate from a duly qualified medical practitioner. The usual method of mixing copaiba is to emulsify that substance by trituration with mucilage in a mortar, and gradually adding the other ingredients. In the presence of such a powerful agent as calomel, the dispenser, having no medical qualification, would not be justified in determining any proportion as a suitable addition to the other ingredients of the mixture.

There is no formula for emp. iodin. in the B.P.; but dispensers have facilities afforded them of referring to other works for their guidance in similar difficulties. One that is frequently found useful is Squire's 'Pharmacopœias of London Hospitals,' and again an extremely valuable little work, and one kept abreast of the time, is Beasley's 'Pocket Formulary.' When a preparation met with in a prescription is absent in the B.P., and therefore unofficial, every dispenser is not bound to go to the same source to supply the deficiency; one may take a formula from Beasley, another from a foreign pharmacopœia, and a third from a hospital pharmacopœia. This may account for the emp. iodinii as sent out by different establishments not being of the same colour. It must clearly be annoying to a dispenser to be told that he does not know his business; but if his reading be so limited that he stands aghast in the presence of such a small difficulty, he must expect some such a remark, and should profit by the hint. The formula for emp. iodinii in Beasley is given by "Gulielmus."

The formula for pomade, No. 336, corresponds with similar preparations which have been intended for promoting the growth of the hair.

There being no official preparation of dialysed iron, difficulties are very likely to occur with liquors of different makers. The strength generally accepted as suitable is a liquor containing 5 per cent. of oxide of iron. Should it ever become official, probably a strength equivalent to that of the tr. ferri perchlor., containing about 6 per cent. oxide would for the sake of uniformity be better. The prescription No. 337 is readily made, and does not separate or deposit, but forms a clear transparent mixture, which keeps well without apparent change. If the medical profession consider dialysed iron a remedial agent, having a therapeutic value, or some merit not possessed by other preparations of iron, which now occupy a place in the British Pharmacopœia, the sooner a definite strength be determined on the better, that is that it should contain a definite quantity of oxide of iron, and probably a liquor of the same strength as the tinct. ferri perchlor. would be the best that could be adopted. Advertised medicinal preparations of unknown strength should be discountenanced, and their places supplied by preparations of definite strength.

On this subject some remarks taken from a report on the progress of pharmacy, by Mr. C. L. Diehl, may be quoted here. He considers it under two heads: "The progress that is secured by research and by the furtherance of educational facilities," and, secondly, "The progress that is made by the discouragement of empiricism, and the establishment of a proper ethical and professional standard." The first need not be considered here; with regard to the second, he says:—"Pharmaceutic progress, as embraced under the second head, however, is not so satisfactory. The relations of pharmacists to the public, to each other, and to physicians, leave much to be desired, and instead of being progressive, appear rather to tend in the opposite direction. The demand of the public for cheap goods, the variety demanded, competition, the profuse supply of 'ready made' pharmaceuticals, and the disposition of physicians to prescribe medicines of a questionable composition or proprietary character, all have a tendency to reduce pharmacists to the condition of mere tradesmen, and to discourage those having higher aims."

CAVIAR.*

This substance, which is considered a great delicacy by gourmands, is the prepared roe of the sturgeon and has its origin in Russia. This roe differs materially from that of other fish, in being of a large size and very thin skinned, containing only an oily jelly which melts away in the mouth, leaving little or no residuum, and these are held together by a network of cellular tissue, fat and muscle in large masses, which generally exceed in size the head of the largest man.

A net of very small mesh, spread over a frame, does duty as a kind of coarse sieve, and the roes being lightly pressed and kneaded over this, the eggs are detached and fall into wooden tubs placed below, each grain being of a very dark brown or black colour, and utterly distinct from the others.

To make "grained caviar" the eggs are now sprinkled with salt ground very fine, of which from 3 to 5 pounds to thirty-six of eggs are used in the hotter months, while only $1\frac{3}{4}$ to $2\frac{1}{2}$ pounds are sufficient in cold weather, the least possible quantity of salt being a great desideratum. A wooden fork with from eight to ten prongs is used to stir in the salt, and the eggs become first doughy, then swell, and finally give out a noise like the stirring of small scales of glass, a sure proof that the process is completed, after which the caviar is close packed in hard-wood kegs.

In making "grain caviar" the eggs fall into tubs of brine stirred as before, and in lots of about one hundred-weight subjected to heavy pressure in coarse sacks, until the brine is expelled and the whole compressed into a cheesy mass.

Nearly one-third of the contents of the eggs are pressed out with the brine, and the caviar thus made is packed in large casks lined with napkin linen, from whence it is called *caviar à la serviette*, or "napkin caviar." *Caviar à sac*, as its name denotes, is choice pressed caviar, put up in linen sacks, and other choice preparations are shipped in hermetically sealed cans and boxes.

The fattest caviar, made in midsummer, is merely soaked in brine and packed, without pressing, in casks holding from 180 to 360 lbs. each. Much roe which is tender to the touch and half spoiled is soaked in very strong brine, packed in large casks holding from 900 to 1000 pounds, and is worth only from six to eight cents per pound, while the fat summer caviar brings from twelve to eighteen cents.

The choice kinds of fresh caviar packed in small kegs costs in Astrachan from sixty to seventy cents per pound, while the pressed brings but about forty-five to forty-eight cents; that of the "sterliad" and some especially choice makes are never exported.

Nearly 400,000 pounds are annually sent from Astrachan to Berlin, Dresden and Vienna, and England uses nearly 10,000 dollars worth yearly, but in the United States little is used except by foreigners, who have contracted a taste for it elsewhere.

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The Pharmaceutical Journal.

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THE USE AND ABUSE OF EXAMINATIONS.

THE leading journal has within the last few days directed attention to some of the evils of the examination system, and it has done good service by insisting upon the mischief likely to arise from the modern tendency to make examinations the sole test and crown of all processes of education. We quite agree with the opinion that this tendency entirely distorts every rational view of what education is and should be. But this is a result attributable more to the circumstance that too much faith has been placed in the virtue of examinations than to the absolute worthlessness of examinations as a test of merit, capacity and attainment; it is a result of the misuse of examinations that has led students to look upon the passing of them as being of more importance than the acquisition of sound khowledge, that has led teachers to devote their energies to the production of manuals by which superficial proficiency can be readily acquired, and candidates enabled to pass the ordeal of examination without its being really that test of educational training that it was designed to be.

From this point of view there is no doubt much reason to fear that however good examination may be when properly used, we are exposed to the possibility of having too much of a good thing, and as the *Times* remarks very many competent judges are already beginning to dread an educational surfeit in this respect. The exaggerated application of the examination system has not operated as a stimulus to sound and thorough education, but has rather called into existence and created a demand for facilities for passing examinations without undergoing the preparatory educational labour necessary for acquiring a proficiency in the subjects. In this way the pupil has been made a mere racer and one who contends for heavy pecuniary stakes, while the teacher is made a trainer whose whole prosperity depends, not on his power of imparting sound knowledge and drawing out the natural capacities of the mind, but on his skill in preparing his pupils for a particular examination. At the same time there is a tendency to make the examiner a judge not of mental capacity and general sound information, but of those qualities alone which are readily estimated in marks.

These results are undoubted evils, and there are others not much less serious which justify the question put by the *Times* as to whether it is not possible that, as so often happens, we have confounded ends with means and made a successful examination the paramount purpose instead of merely the indispensable test of educational training? But while admitting the existence of these we cannot share the opinion that the blame is entirely to be thrown upon examination. What in our opinion is needful as a remedy is not the abandonment of the examination system which some would recommend, but some means of reducing the exaggerated importance that has been attached to the passing of an examination.

In many cases examinations are necessary as rough tests of required attainments, and where they are to be tested for some specific purpose it is indeed scarcely possible to dispense with examinations altogether, but even then they should not be placed higher than the category of necessary evils.

Another remedy for the mischievous influence of the examination system in limiting and restricting sound education is by some believed to be attainable by the establishment of a compulsory curriculum, but we are far from sharing the opinion that such a plan would be effectual. At the best it would only furnish a guarantee that the student had enjoyed the opportunity of having the requisite education, but it would fail altogether to give assurance that he had made proper use of that opportunity. As regards this most important point we think that no real good would result from having recourse to the teacher's testimony as to the assiduity of his pupils in attending lectures, etc. It would be merely substituting for the fallacious evidence of success in examination, the equally fallacious evidence of formal compliance with the requirements of a curriculum. Neither is in itself sufficient to prove that the pupil has been properly educated.

To take the case of pharmaceutical education, involving as it does the acquisition of a sound knowledge of several branches of science and a practical training in their application to special objects, we are altogether averse to the establishment of a scholastic curriculum, because we do not believe it would ensure the education that is required. It is in the training of the apprentice in the shop that the proper curriculum of the pharmacist is to be sought for, and as the improvement in the practice of pharmacy in this country advances and becomes more general, it may be hoped that it will be found there more frequently than has been the case.

In many cases the nature of a chemist and druggist's business is not such as to afford apprentices much opportunity of studying science, but the deficiency in this respect might be largely compensated for by the local schools connected with provincial societies, and it is to be regretted that hitherto these provisions for the instruction of apprentices have not been more zealously taken advantage of.

VERIFICATION OF WEIGHTS IN NEW YORK.

It is a little curious that whilst pharmacists in Great Britain have recently been under some anxiety as to the course that would be adopted by the State in respect to the verification of their weights and measures, their brethren in New York have had a similar experience. Some time ago, it was mentioned in this Journal that a Bill had been introduced into the Legislature of the State of New York, providing for the appointment of an Inspector of Apothecaries' Weights, the amount of whose salary would have depended upon the number of penalties he succeeded in levying from persons whose weights he pronounced incorrect, although no provision was made that he himself should possess verified standard weights for use in the testing. The strong remonstrances of a committee of the New York College of Pharmacy procured the withdrawal of the Bill, upon a promise that the College would take the matter in hand and establish a bureau for the examination of apothecaries' weights, to be placed under the authority and control of the Board of Pharmacy for the city and county of New York.

The arrangements for carrying this promise into effect having now been completed, and special balances and sets of troy and decimal weights, which have been verified by the United States Standards, having been provided, the New York College has sent out an appeal to all apothecaries, whether members or not, to help in carrying out its plan as aiming at a "wise and conscientious self-government." It is proposed to deal with the weights first, leaving the measures untouched for the present. These the College offers to examine upon application of the owner, and to stamp as correct if found either absolutely identical with the standard or heavier up to a certain limit; if at all lighter or if heavier beyond the specified limit, they will be returned unstamped, and it is recommended that such weights should be at once destroyed. The limit of excess, as established for decimal weights ranges from not more than 0·200 gram in the 1000 grams or 1 kilo weight to not over 0·00025 gram in the 0·1 gram and lesser weights. In the troy weights the limit of excess ranges from not exceeding 1 grain in the 12 ounce weight to not over 0·01 grain in the $\frac{1}{4}$ grain weight.

The charge for examining weights, including the stamping of those found correct, is only five cents for each weight. The stamp of verification adopted consists of a monogram of the letters CP, and it will be noticed that it is proposed to apply it to weights so small as to be generally supposed to present almost insuperable difficulties in stamping them. Indeed the College offers to supply "correct and stamped sets of weights" of the decimal and troy systems reaching down to 1 milligram and $\frac{1}{100}$ of a grain respectively. If this offer is to be understood literally the method of carrying it out would probably not be devoid of interest to the Board of Trade officials in this country just at the present moment.

Provincial Transactions.

LEICESTER CHEMISTS AND DRUGGISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The first meeting of the twenty-second session of the Leicester Chemists' Assistants and Apprentices' Association was held at the Rooms, Halford Street, on Tuesday evening, August 12.

The proceedings of the evening were commenced by a tea, to which a good number of members sat down.

After tea the newly elected President, Mr. J. J. Edwards, delivered an inaugural address, and in commencing referred to the necessity for individual effort and advised each member to attend regularly, to put his shoulder to the wheel, and to do all in his power to make the Association a success. Referring to past members of the Association who had passed their examinations, he stated that many of them had acknowledged the valuable aid they had received from the Association. Referring to the question what to read, the President said it was much more difficult to know how to read, so as not to follow the example of some, "who, like sponges, return all they read in about the same condition, only a little dirtier;" nor of others, "who, like strain bags, merely retain the dregs of what they read." In concluding, the President reminded the members that not only was talent necessary to make a successful pharmacist, but it was imperative that there should be tact in conjunction with talent, for whilst "talent knows how to do it, tact does it;" whilst "knowledge is the treasury of the world, tact is the key to it;" and whilst "talent beats about the bush, tact catches the bird."

The President announced that during the forthcoming session several lectures on subjects connected with pharmacy would be delivered by gentlemen of repute.

Some remarks by Mr. W. B. Clark and Mr. Thirlby brought a very pleasant evening to a close.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page* 151.)

The reading of papers was then proceeded with.

The first paper was a—

Report on the Aconite Alkaloids.

BY C. R. ALDER WRIGHT, D.SC. (LOND.).

Lecturer on Chemistry in St. Mary's Hospital Medical School.

§ 1.—*Alkaloids of Japanese Aconite Roots.*

In the report presented last year there were briefly described some preliminary results obtained in the examination of Japanese aconite roots. Since that date, several batches of roots have been examined with perfectly uniform results; as the numerical and other data on which these results are founded have been already published in the *Journal of the Chemical Society* (July, 1879, p. 387), it will be unnecessary to quote them here at full length.

The first batch (about $14\frac{1}{2}$ kilos of ground roots obtained from Messrs. Wright, Layman and Umney) was worked up by the reporter and Mr. A. P. Luff, by percolating with alcohol acidulated with tartaric acid (1 part of acid per 100 of roots being used in all). The percolate was condensed to a small bulk by distillation, treated with water, filtered from precipitated resin, rendered alkaline with carbonate of soda and repeatedly shaken with ether, the ethereal solution being subsequently shaken with tartaric acid. The acid tartrate solution thus obtained free from resinous matters was then treated with soda and ether; on spontaneous evaporation a copious crop of crystals was obtained, together with a quantity of varnish-like alkaloidal matters that would neither crystallize nor yield crystalline salts.

The total yield of alkaloids from this batch was as follows:—

Soluble in ether	crystallizable	about 12 grams	= 0·08 per cent.
	non-crystalline	„ 25 „	= 0·17 „
		37	0·25
Insoluble in ether	non-crystalline	„ 20 „	= 0·14 „
Total		57	0·39

The alkaloids insoluble in ether were separated by precipitating as mercuriodide, and decomposing the precipitate by sulphuretted hydrogen; they appeared to be mainly identical with the non-crystalline alkaloid that was dissolved out by ether, being prevented from complete solution in ether by the solvent action of the soda liquors, just as is often the case with alkaline solutions of alkaloids, *e.g.*, morphine and caustic potash, cotarnine and sodium carbonate.

The non-crystalline alkaloids appeared, like the similar bodies obtained by analogous means from *A. Napellus* and *A. ferox*, to contain a higher percentage of carbon than the crystallizable base, and to possess a lower molecular weight; on saponification with caustic potash, they yielded benzoic acid to nearly the same extent as the crystallizable base, whence it is probable that the two bodies are closely related.

The second batch of roots examined was worked up by Messrs. Hopkin and Williams in precisely the same way as the first, about a hundredweight of roots being employed. From the rough alkaloids extracted by ether, etc., and sent to the reporter for examination, about 60 per cent. was isolated as crystallizable base, and 40 as non-crystalline alkaloid.

These two quantities of crystallizable base were purified by recrystallization, conversion into crystallized salts (the nitrate and hydrobromide being selected), and regeneration by soda and ether. By fractional crystallization of the different portions, attempts were made to separate the crystals into two or more portions differing from one another. No success whatever attended these efforts; in every case absolutely identical analytical numbers were yielded by the several fractions; the melting point and general properties also were invariably the same, whence it results that only one alkaloid can be supposed to be present.

The numbers obtained agreed closely with those required for the formula, $C_{66}H_{88}N_2O_{11}$, and with no other. On heating the base with strong tartaric acid solution to 100° for several hours no change whatever was brought about in its composition (aconitine and pseudaconitine become dehydrated to apo-derivatives by this treatment).

From this circumstance it appears likely that the crystallized base was already as far dehydrated as possible, either by the effect of the tartaric acid in the alcohol used for extraction or by the heat alone. Accordingly, a third batch of roots was worked up, alcohol *not acidulated at all* being employed; one hundredweight of roots was thus treated by Messrs. Hopkin and Williams, and the condensed percolate sent to the reporter, who examined it (in conjunction with Mr. A. E. Menke) as before, *i.e.*, by treating with water, filtering, adding alkali and ether, etc.

The crystallizable alkaloid obtained from this batch amounted to about 50 grams or 0·10 per cent., the non-crystalline bases dissolved by ether being about 55 grams = 0·11 per cent. No difference whatever could be detected between the crystallized base thus obtained and the former samples, showing that if dehydration took place at all during extraction, it was brought about by the heat alone conjoined with the natural acids of the roots (the alcoholic extract was distinctly acid to test-paper). It is noticeable that the spent marc obtained in this process was percolated again by alcohol acidulated with sulphuric acid (about 30 grains of concentrated acid per gallon). This percolate, after condensation, was found to contain only between 2 and 3 grams of alkaloidal matter, of which half was non-crystalline, the other half crystallizable and identical with that above described; so that *treatment with alcohol alone unacidulated by any acid at all, extracted practically all the alkaloids present in the roots examined.*

On examining the action of benzoic anhydride on the crystallized alkaloid thus obtained, it was found to be different from that occurring with aconitine and pseudaconitine, inasmuch as *three* additional benzoyl radicals were thus introduced into the alkaloid per C_{33} present instead of one only. On treating the crystallized alkaloid with alcoholic potash, saponification ensued, benzoic acid being produced, and a new base very closely resembling aconine being formed. The following equations represent the actions of the benzoic anhydride and caustic potash:—

$$C_{66}H_{88}N_2O_{21} + 3(C_7H_5O)O = 2C_7H_6O_2 + (C_{26}H_{39}NO_7)(O.C_7H_5O)_4$$

$$C_{66}H_{88}N_2O_{21} + 3H_2O = 2C_7H_6O_2 + 2C_{26}H_{40}NO_{10}$$

These results may be conveniently represented, in harmony with the formulæ arrived at in the previous researches on aconitine and pseudaconitine, by supposing that the roots originally contain an alkaloid $C_{33}H_{47}NO_{12}$ differing from aconitine by containing H_4 more; and that this hypothetical parent base loses $1\frac{1}{2}$ molecules of water, producing the crystallized base above described, thus:—

Hypothetical Parent Base.

$$\left(C_{26}H_{39}NO_7\right)\begin{cases} /\,O.C_7H_5O. \\ -\,O.H. \\ -\,O.H. \\ \backslash\,O.H. \end{cases}$$

Crystallized Base above described.

$$\begin{array}{l} \left(C_{26}H_{39}NO_7\right)\begin{matrix} -\,O.C_7H_5O. \\ =O. \end{matrix} \\ \quad | \\ \quad O \\ \quad | \\ \left(C_{26}H_{39}NO_7\right)\begin{matrix} =O. \\ -\,O.C_7H_5O. \end{matrix} \end{array}$$

Product of the Action of Caustic Potash.

$$\left(C_{26}H_{39}NO_7\right)\begin{cases} /\,O.H. \\ =O. \\ \backslash\,O.H. \end{cases}$$

Product of Action of Benzoic Anhydride.

$$\left(C_{26}H_{39}NO_7\right)\begin{cases} /\,O.C_7H_5O. \\ -\,O.C_7H_5O. \\ -\,O.C_7H_5O. \\ \backslash\,O.C_7H_5O. \end{cases}$$

Aconitine.

$$\left(C_{26}H_{35}NO_7\right)\begin{cases} /\,O.C_7H_5O. \\ -\,O.H. \\ -\,O.H. \\ \backslash\,O.H. \end{cases}$$

Apoaconitine.

$$\left(C_{26}H_{35}NO_7\right)\begin{cases} /\,O.C_7H_5O. \\ -\,O.H. \\ \backslash\backslash\,O. \end{cases}$$

Apoaconine.

$$\left(C_{26}H_{35}NO_7\right)\begin{cases} /\,OH. \\ =O. \\ \backslash\,OH. \end{cases}$$

Dibenzoylapoaconine.

$$\left(C_{26}H_{35}NO_7\right)\begin{cases} /\,O.C_7H_5O. \\ =O. \\ \backslash\,O.C_7H_5O. \end{cases}$$

As above stated, attempts to isolate this hypothetical parent base in an unaltered state did not succeed; to avoid confusion it is proposed, for the present at any rate, to designate the crystallized base, $C_{66}H_{88}N_2O_{21}$, above described, as *japaconitine*, and the product of the action of potash upon it as *japaconine*. It is noticeable that the same tetrabenzoylated derivative is obtained when benzoic anhydride acts on japaconine as is formed with japaconitine itself.

Japaconitine and japaconine respectively resemble aconitine and aconine so closely that, saving by actual combustion or studying the effects of benzoic anhydride upon them, it is practically impossible to distinguish the one from the other. Japaconitine melts at 184° to 186° when purified as far as possible, the purest aconitine tested side by side melting at 183°–184°. In physiological action the two are very closely allied, if not identical, so far as the involuntary observations made whilst working with them go. Dr. Fraser, of Edinburgh, is now investigating the two bases and their derivatives in these respects.

Inasmuch as Japanese aconite roots appear to be considerably richer in crystallizable base than *A. napellus* roots, it is evident that this class of roots is likely to be in future a valuable source of active alkaloid; further, it is evident from the above experiments that in working out the active constituents of roots of the kind, it is not necessary to acidulate the alcohol used, whereby chance of alteration during extraction is diminished.

On contrasting the results above described with those obtained two years ago ('Year-Book of Pharmacy,' 1877, 469) by Paul and Kingzett, it is open to some doubt as to whether the body obtained by those gentlemen was actually japaconitine; their analytical numbers are quite compatible with their body being either japaconitine or pseudaconitine. On the one hand, they failed to obtain any crystallized salts from their alkaloid, whilst japaconitine yields a well crystallized nitrate, hydrobromide and hydrochloride with ease, pseudaconitine only yielding a crystallized nitrate by employing a particular mode of manipulation unknown at the time Paul and Kingzett's experiments were made; this would seem to indicate, as suggested at the time by the reporter, that the base examined by them was simply pseudaconitine. On the other hand, Paul and Kingzett found that their base showed much greater tendency to crystallize than pseudaconitine, and on boiling with dilute sulphuric acid it furnished a liquid capable of reducing Fehling's solution. Whilst japaconine, like aconine, reduces Fehling's solution pseudaconine does not do so; whence these circumstances would tend to indicate that the base isolated by Paul and Kingzett was actually japaconitine; a conclusion also in harmony with the fact that only japaconitine and *no other crystallizable alkaloid of any kind* was obtained from each of three different batches of roots examined by the reporter.

§ 2.—*Alkaloids of Atis Roots* (*A. heterophyllum*).

Through the kindness of Mr. E. M. Holmes, the reporter was enabled to examine the alkaloidal constituents of some 2 pounds of these roots. By percolating the coarsely powdered dry roots with alcohol containing a little tartaric acid, and evaporating the percolate, a condensed liquid was obtained containing scarcely any resin; by adding water, filtering, and shaking with ether after rendering alkaline, a small quantity of an alkaloid was extracted. This agreed very well with the description given by Broughton of *Atisine*; it was uncrystallizable but yielded a crystalline readily soluble hydrodichloride; its taste was intensely bitter without the slightest tendency to produce the tingling characteristic of the active aconite alkaloids. The quantity obtained was not quite so much as a gram (less than 0·1 per cent.), wherefore its purification was impossible, and still more was it impracticable to find out if it was a mixture of alkaloids. The following numbers were obtained on analysis of the gold salt, which formed a yellow flocculent precipitate almost insoluble in cold water. The substance examined was dried by standing several days over sulphuric acid; at 100° it fused, losing in weight and becoming apparently partially decomposed.

0·3710 gram gave 0·5175 CO_2 and 0·170 H_2O.

0·4565 gram burnt with soda lime gave 0·00882 nitrogen by titration, 0·070 Pt. by platinum salt.

0·3970 gram gave 0·1140 Au.

These numbers are close to those required for the formula, $C_{22}H_{31}NO_2$, HCl, $AuCl_3$.

	Calculated.	Found.
Carbon	38·82	38·04
Hydrogen	4·71	5·09
Nitrogen	2·06	1·93, 2·17
Gold	28·82	28·72

Broughton deduced from his analysis of his platinum salt the formula, $C_{46}H_{74}N_2O_5$, which requires, carbon = 39·09, hydrogen = 5·38, nitrogen = 1·98, gold = 27·76, assuming the gold salt to be $C_{46}H_{74}N_2O_5$, 2HCl, $2AuCl_3$. It cannot, however, be concluded with certainty from the above experiments that his formula requires modification owing to the minute quantity examined. *A priori* the formula, $C_{22}H_{31}NO_2$, seems somewhat more probable than his di-nitrogenous one. The alkaline fluid from which ether had extracted this base still contained a small quantity of alkaloid permanently dissolved; on slightly acidulating with acetic acid and addition of potassium mercuriodide, a dirty yellow precipitate was thrown down.

After washing and drying over sulphuric acid—

0·432 gram gave 0·321, Ag I, iodine = 40·16.

The formula, $C_{22}H_{31}NO_2$, HI, HgI_2, would require 41·19, whence it is very probable that the base dissolved by the soda was mainly the same as that dissolved out by the ether.

§ 3.—*Alkaloids of the Flowers, Leaves and Stalk of Aconite.*

In order to examine the nature of the alkaloids present in the aconite herbs (distinct from the roots), it was found to be necessary to wait until the present spring for fresh material. Messrs. Wright, Layman and Umney obligingly undertook to prepare the raw material, and ultimately succeeded in obtaining 300 pounds of fresh aconite herb grown at Foxton, Cambridgeshire. This was crushed under granite millstones, and the pulpy mass digested with 30 gallons altogether of methylated spirit of about 90 per cent. alcohol at the ordinary temperature for seven days, no acid of any kind being added; as much of the tincture as could be removed by draining was so recovered, and the marc pressed in cocoa fibre bags ultimately with a pressure of 1 ton to the square inch. The total tincture was then filtered and distilled in four portions, so as to expose to heat for as short a time as possible; the residues were not completely freed from alcohol by heat for the same reason; they were united and exposed to the air in shallow pans for a night to facilitate removal of some of the remaining alcohol, and then sent to the reporter as a brown aqueous fluid smelling somewhat agreeably, not unlike treacle, the total quantity being about 59 pounds.

This material was thus worked up by adding soda and repeatedly shaking with ether, the ethereal solution being shaken with tartaric acid, and then used over again. From the acid tartrates thus formed, there was obtained by shaking with soda and ether an ethereal solution which did not crystallize on quick evaporation in a watch glass. These operations having only been performed within the last few days, and the reporter being on the point of leaving town, it is impossible to report to the Conference, at this meeting, what is the nature of the alkaloids present. Judging from the comparative absence of inconvenience experienced in working out the crude alkaloid, the amount of active bases present is not large; the ethereal solution finally obtained is being abandoned to spontaneous evaporation in the hope that crystallizable bases will separate.

The author of the paper was not present, and it was read by Professor Attfield.

The PRESIDENT observed that Dr. Wright had given this subject very great attention, and had, in this last paper, arrived at much more definite conclusions.

Mr. J. WILLIAMS (London) said the most important point in Dr. Wright's investigation appeared to be the fact that he had now proved that it was no longer necessary to use acid in the preparation of aconitine, and it was proved pretty clearly that the use of acid was to be avoided. This was not known a year ago and therefore he thought the investigation was of great practical value. He had taken practical advantage already in a working sense of this discovery, and finding that it was really true that acid was not required, he might say that they as pharmacists had been benefited by an amount of knowledge they had not previously possessed. With regard to the recent aconite plant he thought it was a very interesting portion of the research, and he was surprised that no more distinct result had been obtained. He thought it went to prove that the process of separating the alkaloid to be adopted would have to be rather different to get a satisfactory result. The process of merely shaking up with ether and carbonate of soda would fail in extracting the alkaloid out of such a large bulk. The quantity of recent plant used he should have thought must have contained a large amount of alkaloid, although not so much as in the root. The plant was of a highly poisonous character, for their knowledge of the poisonous nature of aconite was not derived from the root, but the plant itself. It would have been satisfactory if Dr. Wright had been able to isolate and show them the alkaloid of the plant, and he trusted further investigation would enable him to do so.

Mr. UMNEY (London) said the great thing that had militated against Dr. Wright in his observations on the aconite plant was time. Dr. Wright had only had the extract three weeks, and he hoped they might hear something further from him on the matter. He was glad to find the deductions he had obtained from his chemical experiments confirmed what they knew, that Japanese aconite was of excellent quality. In London large quantities had been put in the market and used almost exclusively in pharmacy, and there could be no question that it was a more powerful drug than that grown in Germany and England.

Mr. GREENISH (London) was anxious to know what kind of aconite Dr. Wright had used, for the broad term "Japanese aconite" was not very definite. It was well known that in Japan there were at least three species of aconite. He had examined many samples of Japanese aconite, and had found at least two kinds continually mixed together, one root had a round, turnip shape, as described by Hanbury in 'Science Papers,' and the other root was more tapering. They were evidently to his mind distinct roots. It must leave Dr. Wright's experiments in an uncertain condition until he made them from one species of aconite. These two roots mixed together in the Japanese aconite differed in character when sections were made from them. He had submitted one to Professor Flückiger, who was of opinion that Japanese aconite was not from the same species as that which was imported from Germany, the produce of *Aconitum Napellus*. In course of time it might be ascertained from what aconites these roots were produced, and it was desirable that experiments should be made on the different roots, of which there were certainly two kinds, separately. Schroff had made experiments on aconite leaves, and had arrived at the conclusion that they contained but a very small portion of the alkaloid, even if they contained any.

Prof ssor ATTFIELD said the remarks made by Mr. Greenish were valuable, and members would like to know if he could suggest any method by which the experiments could be made on one species, and not on two or three different kinds. Unless some remedy were found he feared they must take Dr. Wright's work as it was.

Mr. UMNEY (London) said he could not state what was the particular aconite plant from which the Japanese aconite roots that had been used, had been derived, whether *Aconitum Napellus*, *Aconitum ferox* or *Aconitum paniculatum*, but he believed that Mr. Holmes was at the present time engaged in investigating the botanical source.

Mr. LUFF said that he had worked at the roots with Dr. Wright, and was able to state positively they only got one alkaloid from the Japanese roots, and the same alkaloid from the two batches.

Mr. GREENISH was of opinion that there would be little trouble in separating the aconites, and did not think they could arrive at a satisfactory conclusion, until they knew what species were used. If the species were separated, and the alkaloid were extracted from each species, he thought the investigators would arrive at something more definite.

The PRESIDENT, in moving a vote of thanks to Dr. Wright for his paper and able report, said he was glad to hear that the grant was not entirely expended, and consequently they might expect further communications from him on the subject.

The next paper read was the following:—

PROXIMATE ANALYSIS OF THE RHIZOME (DRIED AND DECORTICATED) OF ZINGIBER OFFICINALIS, AND COMPARATIVE EXAMINATION OF TYPICAL SPECIMENS OF COMMERCIAL GINGERS.

BY J. C. THRESH, F.C.S.,

Pharmaceutical Chemist.

Part I.—Proximate Analysis of Rhizome of Z. Officinalis.

The sample of ginger selected for analysis was a variety of what is known in commerce as Jamaica ginger. The decorticated irregular lobes were from 1 to 2 inches long, pale yellow brown externally, and yielded a decidedly brown powder; fracture slightly resinous. Preliminary experiments lead me to the conclusion that it would be best to treat the powder with the following solvents, in the order given;—ether, water, rectified spirit, 1 per cent. soda solution, 1 per cent. hydrochloric acid.

As the constituents soluble in ether were known to be those most worthy of investigation, I got Mr. Umney to exhaust 28 pounds of the ginger with ether, to distil off the solvent, and forward me the extract and the marc. This extract was of a deep red-brown colour, semi-fluid consistency, and had the strong characteristic odour and pungent taste of ginger. It dissolved readily and completely in ether, alcohol, chloroform and benzol, required a rather large proportion of 84 per cent. alcohol for complete solution, was imperfectly soluble in glacial acetic acid, and but slightly soluble in petroleum ether.

A part of the ethereal extract was agitated first with water, then with successive portions of petroleum ether, until the solvent came off nearly colourless. After being treated a great number of times with this ether, the residue continues to impart to it both a slight colour and pungency, hence it was not deemed advisable to continue the treatment more than three or four times. The solution was of a deep red colour and very pungent. Upon allowing the petroleum ether to evaporate spontaneously, a quantity of deep red, apparently crystalline, fatty matter was deposited. This was removed by filtration, washed with a little petroleum ether, and pressed between folds of bibulous paper. Let this be called "crystalline fatty matter."

The fluid which had passed through the filter was exposed to a current of warm air until the last trace of the petroleum ether* was removed, then placed in a flask and

* The petroleum ether employed boiled at 50° C.

a current of steam passed through it, and condensed so long as any volatile oil came over. The residue in retort consisted of a transparent red fat, about the consistence of lard. Call this "red fatty matter."

The residue of ethereal extract, insoluble in petroleum ether was of semi-fluid consistency, of a red-brown colour, with a scarcely perceptible odour, but intensely pungent taste. It dissolved readily in absolute and 84 per cent. alcohol, but when treated with 50 per cent. alcohol a residue was left which after washing with several successive quantities of alcohol of this strength, finally yielded nothing further to the solvent. This substance was of resinous consistency, nearly black in colour, and quite tasteless. "Neutral resin."

The dilute spiritous solution when evaporated left a soft transparent red-brown residue, which although I soon found evidence of its compound nature, has proved most troublesome to resolve into its proximate constituents. It dissolved readily in benzol, bisulphide of carbon, glacial acetic acid, dilute alcohol and alkaline solutions. Its alcoholic solution precipitated most copiously with neutral and basic lead acetates, milk of lime and baryta water. In each case the precipitate first thrown down by the reagent differed in colour from the portions precipitated afterwards. In the former case the precipitate was a pale orange brown, in the latter orange yellow, and the supernatant fluid after addition of excess of the precipitate was exceedingly pungent, and much paler in colour than the original solution. A quantity of the tincture was shaken with successive portions of slacked lime so long as anything was carried down, and the lime precipitate removed by filtration. After repeated washings with spirit it still retained some pungency, and when treated with hot spirit, what was previously a soft sticky flocculent precipitate fused into a semi-transparent mass which adhered tenaciously to the sides of the flask. This was digested in alcohol and sufficient sulphuric acid added to completely decompose it, excess of acid removed with baryta, the solution filtered and evaporated to dryness. The residue was a dark brown-black, brittle solid, possessed of a slightly pungent taste, but no odour. "Acid resins."

The 50 per cent. alcohol solution from which the resins had been removed by lime when acidified with sulphuric acid gave an abundant precipitate of sulphate of lime, indicating the presence of a lime salt in the solution. This fluid was carefully freed from excess of sulphuric acid, filtered and evaporated to dryness. The residue was semi-fluid, transparent, pale red, and intensely pungent. "Active principle."

There remains now to examine further—

1. Crystalline fatty matter.
2. Red fatty matter.
3. Volatile oil.
4. Neutral resin.
5. Resinous acids.
6. Active principle.

1. *Crystalline Fatty Matter.*—This had a slightly pungent taste, which, however, was easily removed by treatment with 84 per cent. alcohol, which when cold did not appear otherwise to affect the residue. Boiled with spirit, and filtered hot, the filtrate deposited voluminous flakes of brownish colour. The portion insoluble in 84 per cent. alcohol was a soft red fat, which has resisted all efforts to resolve it into simple constituents, and hence may be regarded as a proximate constituent of the ginger rhizome.

a. Soft Red Fat.—Properties, transparent, dark red, tasteless and odourless. Soluble in alcohol, petroleum ether, ether, benzol, carbon disulphide, and turpentine. Very slightly soluble in 84 per cent. alcohol, and forming with solution of potash an imperfect soapy solution. Not further examined.

The brownish flocculent matter deposited by the spirit upon cooling, when collected and placed on a water-bath, shrivelled up to an exceedingly small residue, of a pale brown colour and waxy consistency. I at first regarded this as a kind of wax, but when purified by being a great number of times dissolved in hot alcohol, and re-deposited on cooling, a very small quantity of a snow white amorphous substance remained.

b. White Amorphous Substance.—White, amorphous, pulverulent, odourless and tasteless. Heated on the mercurial bath to 250° C., it did not fuse, but began to exhibit a slight brown coloration. At a higher temperature it becomes darker in colour, melts and evolves inflammable vapours which burn with a luminous smokeless flame, emitting no characteristic odour. It is insoluble in water, acid or alkaline solutions. Its behaviour with other solvents is somewhat peculiar. Cold ether dissolves it very sparingly, but in boiling ether it is more soluble, depositing the excess as the fluid cools in a granular form. Benzol and carbon disulphide dissolve it rather more freely and the solutions when left to evaporate spontaneously, become covered with a transparent gelatinous film, which increases in thickness as the evaporation continues, until at length the residue is wholly of this consistence and the vessel may be upturned without losing any of the contents. If the evaporation be now continued on the water-bath, the bulky mass dwindles away, leaving a very slight residue. From boiling absolute alcohol it is deposited in granular waxy looking masses upon the side of the containing vessel. From boiling rectified spirit, if saturated, it is deposited in the gelatinous or bulky form, the whole becoming semi-solid, and resembling in appearance a strong solution of an aluminium salt to which ammonia has been added. Boiling glacial acetic acid takes up a small portion, and deposits it upon cooling or dilution in the gelatinous condition.

c. Resin δ. The wax-like appearance of the crude substance "*b*" is due to the presence of a hard brittle fusible resin, which I have not isolated in the pure state. It appears to be but slightly soluble in alcohol, but soluble in petroleum ether, benzol, carbon disulphide and turpentine. It is tasteless and odourless.

2. Red fatty matter. This portion of the ethereal extract was very pungent, but when treated with successive portions of 50 per cent. alcohol, the pungent principle passed into the alcohol, together with other substances which upon further examination proved to be identical with those contained in the alcoholic solution of the ethereal extract, which had been treated with petroleum ether. Besides these (gingerol, resins α and β) there was the red fat already described, and traces of resin, and of the white amorphous substance.

3. *Volatile Oil.*—This is the only constituent of the ginger root hitherto examined, and the statements concerning it are somewhat conflicting. Gmelin says that its colour is yellowish, Neumann that it is red, and Morin affirms that it is greenish-blue. Paponsek (*Wien. akad. Ber.* 9, 315), who submitted the oil to chemical examination, obtaining the formula $C_{10}H_{16}.H_2O$, states that it has a strong odour of ginger, and a burning aromatic taste, Bucholz on the contrary asserting that its taste is "rather mild at first but somewhat bitter and biting after." Time has only allowed me to note the following physical and other properties of the oil obtained in the manner previously described.

It is a limpid, straw coloured fluid, with a peculiar aromatic odour by no means recalling that of the rhizome from which it was prepared, and of an aromatic and somewhat camphoraceous taste. Sp. gr. ·853 at 15° C. (Hanbury and Flückiger in 'Pharmacographia,' ·878, Paponsek ·893) It is neutral in reaction, forms no compound with sodium bisulphite, and is very soluble in absolute alcohol, benzol, petroleum ether, ether and bisulphide of carbon.

One part of the oil dissolves in 25 of alcohol (sp. gr. ·815), in 50 parts of alcohol (sp. gr. ·834) but requires about 600 to 700 parts of alcohol of sp. gr. ·920. These approximations were obtained by adding with agitation alcohol of the above strengths, to 1 c.c. of the volatile oil contained in a flask, until a clear solution resulted. Dropped upon dry powdered iodine, instantaneous reaction takes place, accompanied by evolution of heat and effervescence. A few drops digested with a fragment of sodium produced a slight effervescence which continued for several days, the ultimate product being much darker in colour, and very viscid. The strange difference between the odour of the oil as it exists in the ginger and as obtained by distillation accounts for the statement made by Mr. Draper at the last Conference, that "an essence prepared from oil of ginger did not give the same results as that obtained from ginger itself." A sample of this oil, obtained from a London firm who import it from Germany, is identical in colour, odour and taste with that prepared by myself, but its specific gravity is ·907. A sample of oil obtained from an ethereal extract which had lost a great portion of its volatile oil from too long exposure to steam heat in the retort had a slightly darker colour and a specific gravity of ·874. Hence it appears most probable that the oil of ginger really contains two or more volatile oils differing in specific gravity, boiling point, etc.

4. *Neutral resin.*—This is the most abundant constituent of the ethereal extract, and, after treatment with 50 per cent. alcohol, remains as an odourless and tasteless brittle but somewhat soft resin, slowly taking the form of the vessel in which it is kept. Its colour by reflected light is nearly black, but by transmitted light, if viewed in thin layers, it appears transparent and of a dark red-brown colour. It dissolves readily in absolute alcohol, ether, benzol, carbon disulphide and turpentine. In rectified spirit it dissolves slowly but somewhat freely, but is almost totally unaffected by proof spirit and petroleum ether. Glacial acetic acid dissolves it, but it is only slightly acted upon by solutions of potash, soda or ammonia. The alcoholic solution is neutral to test paper.

5. *Acid resins.*—This portion of the original extract evidently contained, as before stated, at least two resins, besides traces of the active principle, and possibly also of an oxidation product of the essential oil. When treated with benzol or carbon disulphide it separated into two portions, the one taken up by the solvent, the other unaffected by it. This residue after being treated repeatedly with benzol and carbon disulphide until nothing further was dissolved I have called resin α.

Resin α.—As above obtained is a dark brown rather soft solid, breaking with a short resinous fracture, readily soluble in dilute alcohol, ether and chloroform, but almost entirely insoluble in benzol, carbon disulphide and turpentine. Glacial acetic acid dissolves it freely, as also does solution of potash, the fluid becoming of a dark brown colour. The alcoholic tincture gives a pale brown precipitate with both acetate and subacetate of lead. Does not dissolve in liquor ammoniæ, and is precipitated from its solution in potass by addition of ammonium chloride. The alcoholic solution is neutral to test paper.

Boiled with absolute alcohol and sodic carbonate the solution becomes of a dark brown colour, and sodium is readily detected in it. Hydrochloric acid does not affect the resin; sulphuric acid forms with it a brown solution which is decolorized by addition of potassium bichromate; nitric acid gives a brown solution which evolves nitrous fumes and becomes orange red.

The benzol solution of No. 5 was very pungent in taste, and when the benzol had been removed by evaporation and the semi-fluid residue dissolved in rectified spirit, addition of basic lead acetate gave a copious precipitate; but when the precipitant was added very gradually it was noted that the colour of the precipitate varied from an orange-brown to an orange-yellow. By fractional precipitation, decomposition of the orange-yellow lead salt, resolution of the resulting resin in alcohol, and re-precipitation (partial) by subacetate of lead, a compound of lead and resin was obtained, from which the resin was finally extracted.

Resin β.—In external appearance, consistency, etc., it closely resembles resin α; like it also it is readily soluble in dilute alcohol, ether, chloroform, glacial acetic acid and solution of potash; but it differs from resin α in being soluble in benzol, bisulphide of carbon and turpentine, and in giving an orange precipitate with subacetate of lead and a deep orange solution with liquor potassæ. It does not dissolve in ammonia, is tasteless and odourless, and in alcoholic solution has a barely perceptible acid reaction.

Dissolved in absolute alcohol and boiled with sodium carbonate, the solution assumes an orange-red colour and contains sodium. By action of hydrochloric, nitric and sulphuric acids it can scarcely be distinguished from resin α.

The alcoholic solution from which the resins α and β had been removed by lime yielded upon evaporation, etc., as before stated, a reddish, thick, oily-looking substance, which was intensely pungent in taste. This was dissolved in as small a quantity as possible of 50 per cent. alcohol, and shaken with a little lime, whereby more of the resins α and β were removed. When neutralized with sulphuric acid, filtered and evaporated, the residue was found to be much paler than before, but when dissolved in liquor potassæ it still gave a rich orange coloured solution. It undoubtedly contained traces of resin β, to remove which is an exceedingly difficult matter. It can, however, be accomplished by boiling the impure substance (which I have called gingerol) in petroleum ether and rapidly decanting. The ether as it cools deposits the gingerol in oily drops. By treating the crude substance several times with the same ether, collecting the still slightly impure principle, and subjecting it to a repetition of the above treatment, the pure or very approximately pure gingerol is obtained. Only the portions first taken up by the petroleum ether are employed (as by repetitions of the treatment the whole of the impure substance can be dissolved); hence the product of pure gingerol is small.

Gingerol.—This, which is the pungent or active principle of ginger, is a viscid fluid of about the consistency of treacle, of a pale straw colour, entirely devoid of odour and of an extremely pungent and slightly bitter taste. It is very soluble in alcohol (even when diluted to 50 per cent.), benzol, volatile oils, carbon bisulphide, solutions of potash and ammonia and glacial acetic acid. It is very slightly soluble in petroleum ether. The alcoholic solution is neutral in reaction and gives no precipitate with the acetates of lead nor with lime. It does not yield glucose when treated with dilute sulphuric acid; strong sulphuric acid dissolves it with production of a brown colour; hydrochloric acid does not affect it; nitric acid converts it into a blood red resinous substance. The specific gravity of a slightly impure specimen was 1·09 at 15° C.

Aqueous Solution of Ethereal Extract.—Upon evaporation this deposited a considerable amount of soft resinous matter; was acid in reaction and pungent in taste. It contained considerable traces of an alkaloid, malic acid and other substances, found in aqueous extract of the rhizome.

A second lot of ethereal extract was treated in a somewhat different manner. The whole was placed in a flask and the essential oil carried off by a current of steam. The residue was then treated first with petroleum ether and afterwards with proof spirit. What remained was completely soluble in benzol, but upon addition of a little petroleum ether the fluid separated into two distinct layers. The lower and darker coloured was removed and more benzol and petroleum ether added to it and the lower layer again removed. This residue was now found to consist almost entirely of resin α, and after treatment with successive portions of benzol to remove traces of gingerol and resin β, pure resin α remained. The benzol and petroleum ether solution when shaken with slightly diluted alcohol (about 75 per cent.) yielded up nearly all the gingerol, together with a part of the resins. Upon repeating this treatment the active principle contained still less of the resins and was further purified by treatment with petroleum ether as before described. The gingerol and resin α thus obtained are identical with those obtained by treatment with lime, decomposition of lime salt by acid, etc. Resin β can only be obtained by evaporating off the benzol and petroleum ether from solution which has been treated with spirit, dissolving residue in dilute alcohol, fractional precipitation with lime, etc.

Aqueous Extract of Ginger.—The ginger, or rather a portion of the ginger, which had been exhausted with ether, was macerated for a couple of days in sufficient cold water to cover it, then transferred to a percolator, and water passed through until the marc was exhausted. The first portion of the percolate had an acid reaction, was limpid, and of a pale brown colour. It was carefully evaporated upon the water-bath to a small bulk, a pellicle constantly forming upon the surface, which readily dissolved when the fluid was stirred. This solution gave with ammonia a copious crystalline precipitate, which when removed by filtration proved to be almost pure ammonio-magnesium phosphate. Both mineral and organic acids gave a flocculent, very voluminous flesh-coloured precipitate which only re-dissolved in large excess of mineral acid. Both acetates of lead gave bulky precipitates, as also did admixture with alcohol. The concentrated solution was mixed with 3 volumes of 85 per cent. alcohol, and after standing some time the precipitate was removed by filtration, and washed with a little alcohol. When now diffused in warm water, only part dissolved, a beautifully white crystalline powder remaining behind. This was separated and washed, and proved to be almost pure phosphate of magnesia, but contained traces of manganese, potassium, iron, calcium and oxalic acid. The aqueous solution derived from the alcoholic precipitate, when mixed with a little acetic acid, gave a voluminous precipitate, and the filtrate when mixed with alcohol gave a further precipitate (mucilage or gum). From the filtrate the alcohol was removed at a gentle heat, and to the solution acetate of lead was added. This gave a brownish coloured precipitate, a part of which dissolved in boiling water, and was redeposited in an indefinitely crystalline form upon cooling. The fawn-coloured crystalline mass was diffused through water and decomposed by sulphuretted hydrogen. The resulting acid when neutralized gave no precipitate with calcium chloride until alcohol was added, and was apparently malic acid associated with a little impurity. The lead salt when ignited left a residue of lead oxide somewhat under the normal amount. The portion of lead precipitate not dissolved by boiling water yielded but little to acetic acid, and the residue was phosphate of lead together with a little oxalate and brown humus-like matter. The aqueous infusion which had been treated with neutral lead acetate was rendered slightly alkaline by ammonia and excess of basic lead acetate added; the precipitate which fell was not further examined. The excess of lead was removed from the liquid by H_2S, and the excess of H_2S got rid of by warming the solution whilst exposed to a current of air. When rendered alkaline tannin produced a most abundant precipitate, and phosphomolybdate of ammonia, Nessler's reagent, and iodine gave indications of the presence of an alkaloid, but not in sufficient amount to warrant an attempt at its isolation. The tannin precipitate was collected, washed, dried, rubbed with lead oxide and rectified spirit, and digested at a gentle heat for several hours. The resulting solution when evaporated left a residue, which I will call "Indifferent substance precipitated by tannin."

The original infusion did not reduce Fehling's solution.

Acidified with acetic acid and filtered $CaCl_2$ gave a precipitate which readily dissolved in hydrochloric acid. Evaporated to a small bulk, traces of Ca and Mg removed, then acidified with hydrochloric acid and perchloride of platinum added, abundant evidence of the presence of potassium was obtained. These reactions together with the acid character of the infusion lead me to infer that the binoxalate of potash is a normal constituent of ginger rhizome. The substance precipitated by acids, mucilage, and indifferent principle precipitated by tannin were submitted to such further examination as my limited time allowed.

Substance Precipitated by Acids.—This substance, when obtained, together with mucilage, by precipitating an infusion of ginger with alcohol, easily dissolves in pure water; when obtained by addition of an acid it is not so readily soluble. Solutions of potash, soda, and ammonia dissolve it, and when an acid is added it is reprecipitated. When washed with a little water, and dried, the residue is transparent, reddish, very brittle, and readily reduced to a red-brown powder. It dissolves in strong hydrochloric, nitric, and sulphuric acids, the hydrochloric solution after some time acquiring a purplish yellow tint; the nitric solution is bright yellow; the sulphuric solution is similar in colour to that in hydrochloric acid. In each case dilution with water causes precipitation of the original substance. When burnt upon a platinum dish it swells up considerably, leaving a voluminous char, which burns away with difficulty, leaving a little slightly coloured ash, which appeared to be chiefly Mg_32PO_4.

·4200 gram yielded ·0105 ash or 2·5 per cent.

A little of the dried substance when fused with sodium in a test-tube and the resulting mass treated successively with solution of oxidized ferrous sulphate and hydrochloric acid, gave a copious precipitate of Prussian blue. ·651 gram when burnt with soda lime yielded ·135 gram of double chloride of platinum and ammonium, corresponding to 1·3 per cent. of nitrogen. (This substance is probably a mixture of albuminoid and arabinoid bodies.)

Mucilage.—This is precipitated by alcohol, after the nitrogenous substance has been removed by addition of acetic acid and filtration. When dried it is an amorphous gum-like mass. As precipitated from a strong aqueous infusion of the ginger it contained 25 per cent. of mineral salts (chiefly $Mg_3P_2O_8$ and KHC_2O_4); as obtained from a more dilute solution it yielded 13 per cent. of ash. It is soluble in water, forming a slightly mucilaginous solution, which is not affected by solution of borax, precipitates slightly with neutral lead acetates, ferric chloride, and mercuric chloride (probably only oxalate and phosphates), and solidifies (in concentrated solution) upon addition of basic lead acetate. After boiling some time with dilute sulphuric acid the product reduces Fehling's solution. No blue colour is exhibited when moistened with iodine and sulphuric acid.

Indifferent Substance precipitated by Tannin. — The matter precipitated by tannin was left as a pale brown amorphous residue upon evaporation of the tincture obtained by digesting the tannic precipitate with carbonate of lead. It did not reduce Fehling's solution after treatment with dilute acid. Its aqueous solution gave indications of the presence of an alkaloid with the phosphomolybic, metatungstic, iodine, and Nessler's reagents, but it was evident that this existed in it only in minute proportion. From its aqueous solution tannin only precipitated it after addition of an alkali.

Alcoholic Extract.—A portion of the powdered ginger which had been treated with ether and water was next percolated with 84 per cent. alcohol. The percolate was of a very pale red colour and when evaporated left an exceedingly small residue of a resinous character. It was insoluble in water or dilute acids, soluble in alkaline solutions, absolute and diluted alcohol. Did not affect Fehling's solution after treatment with acid. Not further examined.

The marc insoluble in ether, water and alcohol was digested in 1 per cent. soda solution for several days. The infusion was mucilaginous; it filtered with very great difficulty, the filtrate being opalescent. Neutralized with acid, only a very slight turbidity was produced, but upon addition of 3 volumes of 95 per cent. alcohol, a very voluminous, white, flocculent precipitate fell, which rapidly cohered into lumps, leaving the supernatant fluid perfectly clear.

Metarabin.—The substance, as above isolated, appeared to be an insoluble variety of gum, it was free from colour, and when dried left a brittle, slightly coloured residue. It contained a barely detectable trace of nitrogenous matter, and left upon ignition 5 per cent. of ash. It dissolved readily in alkalies, but very slightly, if at all, in strong hydrochloric acid.

The alkaline solution (together with the marc) was diluted, boiled (to dissolve and remove the starch), and the insoluble residue washed by subsidence and decantation, boiled and digested with a 1 per cent. hydrochloric acid. The infusion when filtered and neutralized became slightly turbid, and upon admixture of alcohol a flocculent precipitate was formed. This, which appeared to be pararabin or a closely allied body, yielded upon incineration nearly 20 per cent of ash, chiefly calcium oxide (but possibly also a little phosphate), derived from the calcium oxalate contained in the rhizome.

The quantitative analysis of the rhizome, the result of which will be found tabulated with those obtained upon examination of typical samples of commercial ginger, and given at end of part 2 of this paper, was made in a similar manner to that detailed in part 2, but not upon same quantities of ginger. The percentage of ethereal extract and of its constituents is calculated from amounts yielded by 28 pounds of powder, and the other constituents from 10 grams only. The total oxalates derived from analysis of a hydrochloric infusion, by precipitation with calcium chloride after addition of excess of an alkaline acetate correspond to 1·52 per cent. of oxalic acid. The phosphoric acid, as determined in solution from which the oxalate had been removed, equalled ·7 per cent.

Appended is a tabulated statement of the action of the various solvents, etc., upon the constituents of the ethereal extract:—

Name.	Alcohol.	Petroleum Ether.	CS_2.	Benzol.	Essential Oil.	KHO solution.	Glacial Acetic Acid.	Physical Properties.
Volatile Oil. . .	Soluble	Soluble	Soluble	Soluble	Soluble	Insoluble	Soluble	Straw coloured, limpid, not pungent in taste.
Amorph. Substance	Soluble*	Soluble*	Soluble*	Soluble*	Soluble*	Insoluble	Soluble*	White, amorphous.
Red fat	Soluble*	Soluble	Soluble	Soluble	Soluble	Forming a soapy solution	Insoluble	Deep red transparent fat.
Resin δ	Soluble	Soluble	—	—	—	—	—	—
Neutral Resin . .	Soluble†	Insoluble	Insoluble	Soluble	Soluble	Insoluble	Soluble	Black, pitch like resin.
α Resin	Soluble	Insoluble	Insoluble	Insoluble	Insoluble	Soluble (deep brown)	Soluble	Odourless and tasteless, soft but brittle resin.
β Resin	Soluble	Soluble*	Soluble	Soluble	Soluble	Soluble (orange red)	Soluble	Odourless and tasteless, soft but brittle resin.
Gingerol. . . .	Soluble	Soluble*	Soluble	Soluble	Soluble	Soluble	Soluble	Straw coloured, viscid, odourless fluid; taste extremely pungent.

* Slightly soluble. † Insoluble in proof spirit.

(*To be continued.*)

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The President's Address.

(*Concluded from page* 160.)

We have seen how little mere form has to do with the essential properties of protoplasm. This may shape itself into cells, and the cells may combine into organs in ever-increasing complexity, and protoplasm force may be thus intensified, and, by the mechanism of organization, turned to the best possible account; but we must still go back to protoplasm as a naked formless plasma if we would find—freed from all non-essential complications—the agent to which has been assigned the duty of building up structure and of transforming the energy of lifeless matter into that of living.

To suppose, however, that all protoplasm is identical where no difference cognizable by any means at our disposal can be detected would be an error. Of two particles of protoplasm, between which we may defy all the power of the microscope, all the resources of the laboratory, to detect a difference, one can develop only to a jelly-fish, the other only to a man, and one conclusion alone is here possible—that deep within them there must be a fundamental difference which thus determines their inevitable destiny, but of which we know nothing, and can assert nothing beyond the statement that it must depend on their hidden molecular constitution.

In the molecular condition of protoplasm there is probably as much complexity as in the disposition of organs in the most highly differentiated organisms; and between two masses of protoplasm indistinguishable from one another there may be as much molecular difference as there is between the form and arrangement of organs in the most widely separated animals or plants.

Herein lies the many-sidedness of protoplasm; herein lies its significance as the basis of all morphological expression, as the agent of all physiological work, while in all this there must be an adaptiveness to purpose as great as any claimed for the most complicated organism.

From the facts which have been now brought to your notice there is but one legitimate conclusion—that life is a property of protoplasm. In this assertion there is nothing that need startle us. The essential phenomena of living beings are not so widely separated from the phenomena of lifeless matter as to render it impossible to recognize an analogy between them: for even irritability, the one grand character of all living beings, is not more difficult to be conceived of as a property of matter than the physical phenomena of radial energy.

It is quite true that between lifeless and living matter there is a vast difference, a difference greater far than any which can be found between the most diverse manifestations of lifeless matter. Though the refined synthesis of modern chemistry may have succeeded in forming a few principles which until lately had been deemed the proper product of vitality, the fact still remains that no one has ever yet built up one particle of living matter out of lifeless elements—that every living creature, from the simplest dweller on the confines of organization up to the highest and most complex organism, has its origin in pre-existent living matter—that the protoplasm of to-day is but the continuation of the protoplasm of other ages, handed down to us through periods of indefinable and indeterminable time.

Yet with all this, vast as the differences may be, there is nothing which precludes a comparison of the properties of living matter with those of lifeless.

When, however, we say that life is a property of protoplasm, we assert as much as we are justified in doing. Here, we stand upon the boundary between life in its proper conception, as a group of phenomena having irritability as their common bond, and that other and higher group of phenomena which we designate as consciousness or thought, and which, however intimately connected with those of life, are yet essentially distinct from them.

When the heart of a recently killed frog is separated from its body and touched with the point of a needle, it begins to beat under the excitation of the stimulus, and we believe ourselves justified in referring the contraction of the cardiac fibres to the irritability of their protoplasm as its proper cause. We see in it a remarkable phenomenon, but one nevertheless in which we can see unmistakable analogies with phenomena purely physical. There is no greater difficulty in conceiving of contractility as a property of protoplasm than there is in conceiving of attraction as a property of the magnet.

When a thought passes through the mind, it is associated, as we have now abundant reason for believing, with some change in the protoplasm of the cerebral cells. Are we, therefore, justified in regarding thought as a property of the protoplasm of these cells in the sense in which we regard muscular contraction as a property of the protoplasm of muscle? or is it really a property residing in something far different, but which may yet need for its manifestation the activity of cerebral protoplasm?

If we could see any analogy between thought and any one of the admitted phenomena of matter, we should be bound to accept the first of these conclusions as the simplest, and as affording a hypothesis most in accordance with the comprehensiveness of natural laws; but between thought and the physical phenomena of matter there is not only no analogy, but there is no conceivable analogy; and the obvious and continuous path which we have hitherto followed up in our reasonings from the phenomena of lifeless matter through those of living matter here comes suddenly to an end. The chasm between unconscious life and thought is deep and impassable, and no transitional phenomena can be found by which as by a bridge we may span it over; for even from irritability, to which on a superficial view, consciousness may seem related, it is as absolutely distinct as it is from any of the ordinary phenomena of matter.

It has been argued that because physiological activity must be a property of every living cell, psychical activity must be equally so, and the language of the metaphysician has been carried into biology, and the "cell soul" spoken of as a conception inseparable from that of life.

That psychical phenomena, however, characterized as they essentially are by consciousness, are not necessarily coextensive with those of life there cannot be a doubt. How far back in the scale of life consciousness may exist we have as yet no means of determining, nor is it necessary for our argument that we should. Certain it is that many things, to all appearance the result of volition, are capable of being explained as absolutely unconscious acts; and when the swimming swarm-spore of an alga avoids collision, and by a reversal of the stroke of its cilia backs from an obstacle lying in its course, there is almost certainly in all this nothing but a purely unconscious act. It is but a case in which we find expressed the great law of the adaptation of living beings to the conditions which surround them. The irritability of the protoplasm of the ciliated spore responding to an external stimulus sets in motion a mechanism derived by inheritance from its ancestors, and whose parts are correlated to a common end—the preservation of the individual.

But even admitting that every living cell were a conscious and thinking being, are we therefore justified in asserting that its consciousness, like its irritability, is a property of the matter of which it is composed? The sole argument on which this view is made to rest is that from analogy. It is argued that because the life phenomena, which are invariably found in the cell, must be regarded as a property of the cell, the phenomena of consciousness by which they are accompanied must be also so regarded. The weak point in the argument is the absence of all analogy between the things compared, and as the conclusion rests solely on the argument from analogy, the two must fall to the ground together.

In a lecture to which I once had the pleasure of listening—a lecture characterized no less by lucid exposition than by the fascinating form in which its facts were presented to the hearers, Professor Huxley argues that no difference, however great, between the phenomena of living matter and those of the lifeless elements of which this matter is composed should militate against our attributing to protoplasm the phenomena of life as properties essentially inherent in it; since we know that the result of a chemical combination of physical elements may exhibit physical properties totally different from those of the elements combined; the physical phenomena presented by water, for example, having no resemblance to those of its combining elements, oxygen and hydrogen.

I believe that Professor Huxley intended to apply this argument only to the phenomena of life in the stricter sense of the word. As such it is conclusive. But if it be pushed further and extended to the phenomena of consciousness it loses all its force. The analogy, perfectly valid in the former case, here fails. The properties of the chemical compound are, like those of its components, still physical properties. They come within the wide category of the universally accepted properties of matter, while those of consciousness belong to a category absolutely distinct—one which presents not a trace of a connection with any of those which physicists have agreed in assigning to matter as its proper characteristics. The argument thus breaks down, for its force depends on analogy alone, and here all analogy vanishes.

That consciousness is never manifested except in the presence of cerebral matter or of something like it, there cannot be a question; but this is a very different thing from its being a property of such matter in the sense in which polarity is a property of the magnet, or irritability of protoplasm. The generation of the rays which lie invisible beyond the violet in the spectrum of the sun cannot be regarded as a property of the medium which by changing their refrangibility can alone render them apparent.

I know that there is a special charm in those broad generalizations which would refer many very different phenomena to a common source. But in this very charm there is undoubtedly a danger, and we must be all the more careful lest it should exert an influence in arresting the progress of truth, just as at an earlier period traditional beliefs exerted an authority from which the mind but slowly and with difficulty succeeded in emancipating itself.

But have we, it may be asked, made in all this one step forward towards an explanation of the phenomena of consciousness or the discovery of its source? Assuredly not. The power of conceiving of a substance different from that of matter is still beyond the limits of human intelligence, and the physical or objective conditions which are the concomitants of thought are the only ones of which it is possible to know anything, and the only ones whose study is of value.

We are not, however, on that account forced to the conclusion that there is nothing in the universe but matter and force. The simplest physical law absolutely inconceivable by the highest of the brutes, and no one would be justified in assuming that man had already attained the limit of his power. Whatever may be that mysterious bond which connects organization with psychical endowments, the one grand fact—a fact of inestimable importance—stands out clear and freed from all obscurity and doubt, that from the first dawn of intelligence there is with every advance in organization a corresponding advance in mind. Mind as well as body is thus travelling onwards through higher and still higher phases; the great law of Evolution is shaping the destiny of our race; and though now we may at most but indicate some weak point in the generalization which would refer consciousness as well as life to a common material source, who can say that in the far off future there may not yet be evolved other and higher faculties from which light may stream in upon the darkness, and reveal to man the great mystery of Thought?

Meetings of the Sections.

The various Sections commenced their meetings on Thursday morning, the 22nd inst., when the proceedings were opened by addresses from their respective presidents as follows:—

Section A.—*Mathematical and Physical Science.*—President: G. Johnstone Stoney, M.A., F.R.S.

Section B.—*Chemical Science.*—President: James Dewar, M.A., F.R.S.L. & E.

Section C.—*Geology.*—President: P. Martin Duncan, M.B., F.R.S., F.G.S.

Section D.—*Biology.*—President (Department of Zoology and Botany): St. George Mivart, F.R.S., F.L.S., F.Z.S. Vice-President (Department of Anthropology): E. B. Tylor, D.C.L., F.R.S. Vice-President (Department of Anatomy and Physiology): Dr. Pye Smith. This Department did not meet until Friday.

Section E.—*Geography.*—President: Clements R. Markham, C.B., F.R.S., F.L.S.

Section F.—*Economic Science and Statistics.*—President (in the absence of Mr. G. Shaw Lefevre, owing to the death of his father): Mr. Mundella, M.P.

Section G.—*Mechanical Science.*—President: J. Robinson, Pres. Inst. Mech. Eng.

Soirées, Lectures, etc.

On Thursday Evening a *Soirée* was given by the Master Cutler in the Cutlers' Hall, and on Tuesday the 26th a *Soirée* was given by the Local Committee in this same building.

On Friday Evening, the 22nd, Mr. William Crookes delivered a lecture on "Radiant Matter," to a large audience assembled in the Albert Hall. This lecture it is intended to print in an early number of this Journal. Another lecture was delivered in the Albert Hall on Monday evening, the 25th, the lecturer being Professor E. Ray Lankester and his subject "Degeneration." On Saturday, the 23rd, the lecture to the operative classes was delivered by Professor Ayrton, on "Electricity as a Motive Power."

Next Place of Meeting.

At a meeting of the General Committee on Monday, for the election of Officers, Professor A. C. Ramsay, LL.D., F.R.S., was chosen President of the Association for the meeting next year in Swansea. It was also finally decided to accept the invitation of the municipality of York to meet in that city in 1881.

At the concluding meeting on Wednesday it was announced that the total attendance had been 1404, against 2578 last year at Dublin, 1217 in 1878 at Plymouth, and 2652 in 1877 at Glasgow.

The following is a list of the papers read in the Chemical Section:—

Report of Committee on the Chemistry of some of the lesser known Alkaloids. Read by W. Chandler Roberts, F.R.S.

On some relations between the numbers expressing the Atomic Weights of the Elements. By Walter Weldon, F.R.S.E.

On the Synthesis of Diphenyl Propyl. By M. R. D. Silva.

Recent Researches in Explosive Agents. By F. A. Abel, F.R.S.

On Vapour Densities. By Professor Dewar, F.R.S.

To Describe a large Crystal of Mercury Sulphate. By P. Braham.

On the Manufacture of Crucible Steel. By Henry S. Bell, F.C.S.

On the Separation of Iron and Phosphorus especially with reference to the Manufacture of Steel. By Thomas Blair.

A new Process in Metallurgy. By John Hollway.

A Lecture Experiment in Illustration of the Hollway Process of Smelting Sulphide Ores. By A. H. Allen, F.C.S

On Lead Fume with a description of a New Process of Fume Condensing. By Andrew French.

On the constitution of Aluminic Compounds. By Professor Odling, F.R.S.

On the presence of Nitrogen in Steel. By A. H. Allen.

Colour tests for Phosphorus and Sulphur in Iron and Steel. By A. Vernon Harcourt, F.R.S.

To exhibit some experiments with Hughes' Voltaic Induction Balance. By W. Chandler Roberts, F.R.S.

Historical Sketch of the various Vapour Density Methods. By J. T. Brown.

Note on certain Vapour Densities. By Professor Wanklyn.

Note on Isocyan-propionic Acid. By Professor Wanklyn.

Physical Constants of Liquid Acetylene and Hydrochloric Acid. By G. Andsell.

The Action of Ammoniacal Salts on Metallic Sulphides By M. De Clermont.

On the Chemical Composition of a nodule of Ozokerite found at Kinghorn-ness. By W. Ivison Macadam.

On some curious Concretion Balls derived from a Colliery Mineral Water. By Thomas Andrews.

On some points in connection with Agricultural Chemistry. By Dr. Gilbert, F.R.S.

On the rare Metals of the Yttrium Group. By T. S. Humpidge, B.Sc.

On the Synthesis of Hydrocyanic Acid. By Professor Dewar, F.R.S.

On the amount of Nitrous Acid produced in Electric Illumination. By Professor Dewar, F.R.S.

On the Kinoline Bases. By Professor Dewar, F.R.S.

An account of some recent Experiments on Supersaturated Solutions. By John M. Thomson.

Notes of some recent Spectral Observation. By J. Norman Lockyer, F.R.S.

Notes on Petroleum Spirit or Benzoline. By A. H. Allen.

On the illuminative value of a mixture of Hydrogen. By A. Vernon Harcourt, F.R.S.

On a new form of Condenser. By G. T. Hazelhurst.

Notes on a sample of Fullers Earth found in an old Fullonica recently excavated at Pompeii. By W. Thomson, F.R.S.E.

On the detection of Milk Adulteration. By W. H. Watson.

Chemical researches on the Palmella cruenta. By Dr. Phipson.

Description of a glass burette for collecting, measuring, and discharging gas over mercury. By Philip Braham.

Parliamentary and Law Proceedings.

Prosecutions under the Pharmacy Act, Ireland.

In the Northern Division of the Dublin Police Courts, before Mr. J. W. O'Donnell, the chief magistrate, two summonses have been heard, brought under the Pharmacy Act, Ireland, by the Pharmaceutical Society of Ireland. The first case gone into was one against Messrs. George P. Beater and James North Hardy, trading under the name of Beater and Co., as druggists, of 17, Lower Sackville Street, the allegation being that they, "not being persons registered as a pharmaceutical chemist or chemist and druggist under the Pharmacy Act of 1875, did compound a certain prescription and sell same at Lower Sackville Street, in the Police District of Dublin Metropolis, on the 10th of July, 1879, between the hours of 10 and 11 o'clock, a.m., contrary to the form of the satute in such case made and provided."

Mr. Purcell, Q.C., instructed by Messrs. Ennis and Son, appeared on behalf of the Pharmaceutical Society of Ireland for the prosecution. Mr. Gerald Byrne appeared for the defendants.

Mr. Purcell said the Society were proceeding under the 30th section of the 57th chapter of the Pharmacy Act of 1875. That statute enacted that the Society should be a body corporate, and the 30th section was: "So much of the Act of 1791 as prohibits the keeping of open shops within the meaning of the said Act by any person other than a licentiate of Apothecaries' Hall shall be repealed; provided always, that it shall be unlawful for any person to sell or keep open shop for retailing, dispensing, or compounding poisons within the meaning of the Act of the session of the thirty-third and thirty-fourth years of the reign of Her present Majesty, chapter twenty-six, or medical prescriptions, unless such person is registered as a pharmaceutical chemist or a chemist and druggist under this Act, or to assume or use the title of pharmaceutical chemist, or pharmaceutist, or pharmacist, or dispensing chemist, or the title of chemist and druggist in any part of Ireland, unless such person shall be registered as a pharmaceutical chemist or as a chemist and druggist respectively under this Act; and any person acting in contravention of this enactment, or compounding any medicines of the British Pharmacopœia, except according to the formularies of the said pharmacopœia, shall for every such offence be liable to pay a penalty of five pounds; but no such penalty shall exempt any person from being liable to any other penalty, damage, or punishment to which he would have been subject if this Act had not passed." On the 10th of July last, Messrs. Beater and Hardy, who carry on business as (chemists and) druggists in Lower Sackville Street, compounded a medical prescription and sold it to the party who presented it, and he (counsel) held a receipt given by the defendants for compounding. He did not think that the facts were disputed, but if they were the Society had their witnesses ready who would prove the offence alleged.

Mr. O'Donnell: What is the particular offence with which the defendants are here charged?

Mr. Ennis, solicitor: Selling and compounding medicines.

Mr. O'Donnell: Then it is for the sale and compounding of medicines, and not of poisons?

Mr. Purcell: Yes. On the 10th of July a medical prescription, which we have here, was presented at the establishment of Messrs. Beater and Hardy, who are not registered pharmaceutical chemists under the Act of Parliament, and in the presence of our witnesses it was made up. But I believe they do not dispute the facts.

Mr. Byrne, solicitor: I appear for Messrs. Beater and Hardy, and they admit that a breach of the law was committed in their establishment, but it was committed by one of the *employés* and not by themselves. Under the circumstances I hope the Society will not press the case.

Mr. Purcell: If they express regret that it occurred and promise that there shall be no repetition of it in future we will not press for the full penalty. It is not the object of the Society to do so under such circumstances——

Mr. O'Donnell: I am sure of that.

Mr. Purcell: But we are bound to vindicate the law.

Mr. O'Donnell: It is a very salutary Act. Mistakes occur every day in London in consequence of prescriptions being compounded by persons who are not properly qualified to do so, but, I am happy to say, there have been very few here.

Mr. Byrne: My clients will take every measure to prevent a similar occurrence in future, and as far as Messrs. Beater and Hardy are personally concerned they knew nothing of it.

Mr. Purcell: That is no justification.

Mr. O'Donnell: They would be both personally and pecuniarily responsible for any neglect that might occur in their establishment.

Mr. Purcell: On the undertaking of Messrs. Beater and Hardy that there will not be any repetition——

Mr. O'Donnell: I will impose a nominal penalty of ten shillings.

Mr. Purcell: I think that will do. And five guineas costs, your worship.

Mr. O'Donnell: This is the first case of the kind that has been heard, and it settles the law on the subject. Should a similar case be again brought the penalty inflicted will be very serious.

Mr. Purcell: That is the object of the Society.

Mr. O'Donnell: Of course, as a public body they act on public grounds and they will not prosecute in a mere squabble between different establishments. When they find anyone violating the law they should *chasser* him at once. The defendants are now fined 10*s.*, but if any person, with that conviction in his face, commits a similar offence he will be severely dealt with.

An order was made for the payment of 10*s.* and five guineas costs.

The second summons, which was brought against Mr. Joseph Brownrigg, of Talbot Street, trading as Brownrigg and Co., and was in respect of a similar offence alleged to have been committed by him on the 10th of July, was then heard.

Mr. Brownrigg, when the case was called, denied that the prescription had been compounded in his establishment, and asserted that he had sent it out to Messrs. Hamilton, Long and Co., where it was compounded.

Mr. Purcell: We will prove the facts.

Mr. Robert Cowan, 23, Geraldine Street, was examined by Mr. Purcell, and deposed: On the 10th of July I took this prescription (produced) into the establishment of the defendant. I was standing by all the time while it was being made up by Mr. Brownrigg himself.

By himself?—I saw him.

Did you see the stamp put on it?—I did.

Was it done by him in your presence?—It was.

Who wrote the directions?—He himself.

Is that the box of pills that you got with the bottle?—It is.

And who wrote the directions? — Mr. Brownrigg himself.

I ask a conviction in this case for the full amount.

Mr. Cowan, cross-examined by the defendant, who conducted his own case, stated: When I first went in you said it would require an hour to make up the prescription, and I went away for that time. On my return I stayed in the shop half an hour.

Did you see me send out?—No. I was looking at you all the time, and I saw you making it up.

To Mr. O'Donnell.—When I came back to the shop the defendant said he had not made up the prescription, and then he went and did it. He had nothing done when I came back, and he made it up before my face.

Mr. Brownrigg: I have a witness to prove that I sent to Hamilton, Long and Co.'s, and it was compounded there. I put on the labels myself.

Mr. Cowan: I saw Mr. Brownrigg filling the bottle from the bottles on the shelves in the shop.

Mr. Purcell: Not only is the label, as the witness swears, written in the handwriting of the defendant, but he actually has the audacity to have on it that he is a member of the Pharmaceutical Society—"Joseph Brownrigg, M.P.S."

Mr. Cowan: I saw him put his name to it.

Mr. Purcell (to witness): Did you go a second time to his shop?—I did, on the 16th of July.

Mr. O'Donnell: I will not take that as evidence. (To the witness.) Take the bottle in your hands. Did you see him write that on it?—I did.

Could any other person have written on the bottle?—No. There was a young man sitting on a chair, but Mr. Brownrigg wrote the label himself and put the wrapper on the bottle, and made up the prescription himself.

Mr. Purcell: Look at the stamp on the prescription. Do you see Brownrigg and Company on it? I do. The defendant wrote on it in my presence. The letters "M.P.S." are after his name.

That is "Member of the Pharmaceutical Society" of chemists and druggists and so forth, Talbot Street, Dublin, and he admits that he is not a member.

Witness, in reply to Mr. Purcell: The receipt produced is the one that Mr. Brownrigg wrote.

Cross-examined by Mr. Brownrigg: When I returned at the end of the hour you said the medicine was not ready, and that its preparation would take half an hour, but from the time you began to make it you were not twenty-five minutes. I saw you fill the bottle from bottles on your shelves.

Mr. Brownrigg (to Mr. O'Donnell): I admit he got it from me, but it was made up elsewhere.

Mr. Hugh James Fennell, Registrar of the Pharmaceutical Society of Ireland, was sworn, but before he was examined,

Mr. Brownrigg said: I admit I am not a member of the Pharmaceutical Society of Ireland.

Mr. Purcell (to witness): Do you see the letters "M.P.S."?—I do.

That is member of the Pharmaceutical Society?—That is the usual meaning of the letters.

Is it true or false?—It is not true that Mr. Brownrigg is a member of the Pharmaceutical Society of Ireland.

This closed the case for the prosecution.

Mr. William Coulson, defendant's assistant, was examined for the defence. He stated, in reply to Mr. Brownrigg: I remember the prescription perfectly well. I took it to Hamilton and Long's. Having some other things to get at the same time, I did not return at once with it. Mr. Cowan was kept near to an hour altogether.

Was the bottle corked and labelled when you brought it in?—It was. You then wrote a label yourself and put it on, taking off the other one. I saw the man (Mr. Cowan) when he came back. From where he was in the shop he could not possibly have seen you label the bottle. He was sitting down.

Cross-examined by Mr. Purcell: I am a chemist's assistant. I do not know the name of the assistant at Hamilton and Long's who made up the prescription. He would not put his number on it when it was for another chemist. I went out through the hall door of Mr. Brownrigg's.

What was your object?—Not to let the person in the shop know what we were doing. If we let every one see us go out for what we might be short of, people would say, "It is no good going there for they have nothing."

Did you hear the evidence sworn here to-day?—I did.

And was it false or true?—It is quite untrue that Mr. Brownrigg compounded the prescription himself.

Mr. O'Donnell: Suppose you brought the prescription to Hamilton and Long's would they not make an entry of it?—Not when it was for another druggist.

Mr. Purcell: Is it your evidence that they assist the druggists of Dublin in violating an Act of Parliament by making up prescriptions for them and letting them sell them?—It is no violation.

Mr. Purcell: Well, I think it is.

Mr. Coulson: That is the difference of opinion between us.—It is made up by a qualified apothecary.

Mr. O'Donnell: Are you in the habit of going to Hamilton and Long's?—When we have prescriptions, but we have very few.

Mr. Cowan: From the time I went in till when I came out, he (the witness) was not in the shop at all.

Witness: The shop is a divided shop.

Mr. O'Donnell (to Mr. Cowan): You said there was a young man on a chair in the shop?—But this is not the one, nor did I sit down. He has told a falsehood. I stood and looked at Mr. Brownrigg mixing the things.

Did any one bring in a bottle and hand it to him?—No one.

Mr. Purcell (to Mr. Coulson): Have you a receipt from Messrs. Hamilton and Long?—No. Receipts are only given when they are asked for. If you came to my shop I would not give you a receipt unless you asked for one. Mr. Cowan asked for the one he was given.

Mr. Purcell: Even if there were a shadow of foundation for this statement the Act covers it, for it is not only an offence against the 30th section to compound, but it is an offence to sell a medical prescription by a person who is not registered as a pharmaceutical chemist. The summons is not only for compounding, but selling.

(To Mr. Coulson): You brought the prescription to Messrs. Hamilton and Long's?—Yes.

Mr. O'Donnell: How long did that delay?—From ten or fifteen minutes.

Mr. Purcell: What did you pay at Messrs. Hamilton and Long's?—One shilling.

And got no receipt?—And got no receipt. There is not a day I am not in the habit of going there. They know who I am and give me things at trade prices.

Mr. Cowan, examined by Mr. Brownrigg, said: I did not see a glass counter dividing the shop.

To Mr. O'Donnell: I was quite close to the defendant all the time he was making up the prescription.

Mr. Brownrigg: Was not a little girl in the shop when I was called down first?—Yes, when I entered first.

And you said very well you are at your breakfast?—I said no such thing.

Mr. Purcell: Then it appears there was only a little girl in the shop.

Mr. Brownrigg: This was at nine o'clock in the morning.

Cross-examination of Mr. Coulson resumed by Mr. Purcell: This pill box (produced) is not the one we got from Messrs. Hamilton and Long's, as we could not wash the label off.

Is that the bottle you got from Messrs. Hamilton and Long?—I don't suppose they changed it. You don't imagine we pay twopence for a bottle when we can get them so much cheaper by the dozen.

Mr. O'Donnell (to Mr. Purcell): You say the section embraces selling and compounding?

Mr. Purcell (reading): "Provided always that it shall be unlawful for any person to sell or keep open shop for retailing, dispensing, or compounding poisons . . . . or medical prescriptions." To sell or compound medical prescriptions, for that it is so intended is shown by the use of the disjunctive "or."—(To the witness): Were the pills made up at Messrs. Hamilton and Long's?—Yes.

How much did you pay?—I paid a shilling in all. We charged Mr. Cowan one shilling and sixpence.

Mr. O'Donnell (to the defendant): At all events by the sale that day you made a profit of sixpence. I fine you £5 and £3 10*s.* costs.

Mr. Brownrigg contended that the 31st section should be considered conjointly with the 30th, and in support of his argument quoted the following passage from the former, "Nothing in this Act contained shall extend to or interfere with the making or dealing in patent medicines, or with the business of wholesale dealers in supplying poisons in the course of wholesale dealing or of chemists and druggists who are practising as such in Ireland upon their own account at the time of the passing of this Act, save and except the provisions against the compounding of poisons or medical prescriptions, and against the preparing of any medicines of the British Pharmacopœia, except according to the formularies of the said Pharmacopœia."

Mr. O'Donnell held that the provisions of the 31st section did not alter the meaning of those of the 30th, and refused to change his ruling.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[338].

Argent. Nitratis . . . . . . ʒij.
Aquæ Destill. . . . . ℥iij.
Liq. Ammon. Fort. . . . . . q s.
Ut ft. solutio secund. artem.

How should the above be prepared?

HERBERT CHAMBERS.

[339]. How should the following be dispensed?—

℞ Ferri Ammon. Cit. . . . . . . ʒj.
Quiniæ Disulph. . . . . gr. xv.
Aquæ Fort. . . . . ℥ss.
M. ft. Guttæ. Five drops three times a day in sugar and water.

MINOR.

Notes and Queries.

[624]. COLOUR OF CLOTH.—Will some correspondent kindly state what acid is generally used for testing the colour of cloth?

MINOR.

THE PRESERVATION OF LEECHES.—Complaints are frequently heard of the inability of chemists to keep their leeches in health for any length of time. I have avoided the advertised leech aquariums and the like, and have for years kept leeches in perfect health by the following simple plan:—

I got a 7 lb. ointment jar, made of glazed white earthenware, and put my leeches into it. Then instead of replacing the top I covered the jar with white muslin, and tied it round tightly.

The water was never allowed to go unchanged more than a week, and by these simple means I have been able to keep all the leeches alive for months, even during the hottest weather, when the mortality amongst them is usually very great.

EDMUND F. CHERRY.

COURT PLASTER.—Soak isinglass in a little warm water for seventy-four hours, then evaporate nearly all the water by gentle heat, dissolve the residue in a little proof spirits of wine, and strain the whole through a piece of open linen. The strained mass should be a stiff jelly when cool. Now stretch a piece of silk or sarsenet on a wooden frame, and fix it tight with tacks or pack-thread. Melt the jelly and apply it to the silk thinly and evenly, with a badger hair brush. A second coating must be applied when the first has dried. When both are dry, apply over the whole surface two or three coatings of balsam of Peru. Plaster thus made is very pliable and never breaks.

INDELIBLE ANILINE INK.—Triturate $1\frac{3}{4}$ grams of aniline-black with 60 drops of strong hydrochloric acid and 42 or 43 grams strongest alcohol; then add to it a hot solution of $2\frac{1}{2}$ grams gum-arabic in 170 grams of water.

This ink attacks steel-pens but little. It is not destroyed either by strong mineral acids or by strong lye.

If the first alcoholic solution of aniline black be diluted with a solution of $2\frac{1}{2}$ grams of shellac (instead of gum-arabic) in 170 grams of water, an ink is produced which may be employed for writing on wood, brass or leather, and which is remarkable for its deep black colour.

Correspondence.

⁂ No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

J. C. Talbot.—See the *Pharm. Journ.* for February 22 last, p. 695, and May 21, p. 988.

"*Tonic.*"—We think the label would necessitate the use of a stamp, but recommend you to submit it to the revenue authorities who alone can decide the point.

T. H. C. (Southsea).—*Nostoc commune.* By some it is considered an alga, by others a stage in the life-history of a lichen, *Collena pulposum.*

J. H. Dingle.—*Festuca gigantea* is correct. The other plant is *Pyrus torminalis.*

E. Parrett.—*Veratrum nigrum.*

D. Dickinson.—1 and 3. Send better specimens. (2) *Veronica serpyllifolia.* (4) *Prunella vulgaris.*

Diogenes.—*Staphylea pinnata* (bladder nut?).

T. D.—*Euphorbia Helioscopia.*

R. Roberts.—1, 2 and 3 are correctly named. (4) *Athyrium Filix Mas.* (5) *Betonica officinalis.* (6) *Mentha arvensis.*

F. H. Fairweather.—(1) *Beta maritima.* (2) *Sinapis nigra.* (3) *Sinapis arvensis.* (4) *Crepis virens.* (5) *Leycesteria formosa*: not British.

J. B. (who should have sent his name) is recommended to address his question to the editor of a veterinary journal.

"*Student.*"—Potassium ferrocyanide is not a poison and is not included in Schedule A of the Pharmacy Act.

"*Pendennis.*"—The latest edition of the 'Elements of Materia Medica' was published in 1872 by Messrs. Longman and Co., and was edited by Professors Bentley and Redwood. This is an abridgment of the original work published by Dr. Pereira.

R. Radclyffe.—See an article on Bisulphite of Lime and its use in Brewing, in the *Pharm. Journal* for March 3, 1877, p. 720.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Howie, Prollius, Atkin, Moss. Attfield, Claypole, Fox. Pedler, Cocks, A. B., Sanders, Martindale, Benger.

NOTES ON CINCHONA BARK.

BY DAVID HOWARD.

Recent importations of East Indian cinchona bark have thrown light on several points worthy of the notice of those interested in the subject.

The officinalis bark from the Government Plantation at Dodabetta gives us some valuable information as to the effect of age on the value of the bark. The date of the plantation from which each parcel was obtained was given, and we thus have a series of barks, classed as natural, mossed and renewed from trees planted each year from 1863 to 1867.

As "natural" bark from the lower stems is only obtained from trees not yet treated for "renewing," it is evident that in the older plantations the natural bark will be chiefly from the upper stem or from saplings and inferior trees, and thus, as Dr. De Vrij has shown, will be of inferior quality.

The result shows this to be the case, the best parcel of natural bark being from the plantation of 1867, that from the other plantations being of uneven quality showing no regular variation. The mossed bark on the other hand may fairly be taken to represent the oldest bark from the main stems in each plantation, and therefore is the best guide as to the influence of age on the quality of the bark.

The result is highly satisfactory, showing that as yet the bark from the oldest plantations, so far from deteriorating, continues to improve. Both the quinine and the total crystallizable alkaloid steadily increase from the bark of the 1867 plantation to that of 1864, that of the 1863 plantation yielding the same quinine as that of 1864, and slightly more cinchonidine and quinidine.

It is certainly more likely that so regular a progression is the result of greater maturity than that the difference should be caused by any variety in the *C. officinalis* cultivated.

This is a most important point, for recent importations of the bark of *C. succirubra* confirm the opinion so often expressed by my uncle, J. E. Howard, F.R.S., and by Mr. Broughton, the late Quinologist to the Indian Government ('Quinology of the East Indian Plantations,' p. 71), that in this species the bark deteriorates beyond a certain age. It is difficult to say exactly what that age may be, and it probably varies according to the growth of the tree, but some of the very finest of the red bark now coming from India, as far as appearance goes, certainly seems to have passed its maximum of richness in quinine.

As to the "renewed" officinalis bark, the time during which the different parcels have been forming is not given, nor is it stated whether it is from the first, second, or later crops, and therefore the comparison may not be accurate; but it is interesting to see that here also the older plantations show no deterioration, the best being from the 1863 plantation.

From a private plantation I have received a sample of root bark of *C. officinalis* from trees which were coppiced three years ago. It gives quinine 2·2 per cent., cinchonidine, ·2 per cent., quinidine, 1·5 per cent., and cinchonine, 3·3 per cent.

The stem bark from this plantation, at the time when the trees were cut down, gave: quinine, 2·6 per cent., cinchonidine, ·6 per cent., cinchonine, 1· per cent., and but a trace of quinidine.

We find, therefore, that in this sample the ordinary tendency of root bark to produce the dextrogyrate alkaloids is developed to a most unusual degree, the percentage of quinidine is a most extraordinary one for bark from *C. officinalis*.

I have also received from Darjeeling a very interesting sample of the bark of *C. succirubra* accidentally renewed. It is entirely the produce of accidental injuries to the trees (not deep enough to injure the cambium, and prevent the bark forming over the whole surface), no protection whatever having been given where the bark was removed.

The result is as successful as could have been expected from renewing under the most favourable conditions, the contained alkaloids being, quinine, 2·3 per cent., cinchonidine, 1·5 per cent , cinchonine, 1·2 per cent., quinidine, ·1 per cent.

Two parcels of the stem bark sent over at the same time from this plantation gave, first, quinine, ·8 per cent., cinchonidine, 1·2 per cent., cinchonine, 1·2 per cent., and secondly, quinine, ·9 per cent., cinchonidine, 1·1 per cent., cinchonine, 2·0 per cent.

The improvement in value in renewed bark is therefore not owing to the covering, but is found equally in this accidentally renewed bark, and it would seem that the mossing is valuable chiefly as enabling the tree to produce the renewed bark with as little injury to its health as possible. It will probably be found that a less perfect shelter than moss may in some circumstances be sufficient to preserve the health of the tree under this process.

It has been proposed by M. Moens to shave off the outer layers of bark without cutting quite through the bark. No doubt the cellular portion of the bark is richer in alkaloids than the inner fibrous layer (*vide* 'Quinology of the East Indian Plantations,' by J. E. Howard, F.R.S., pp. 23, 24 and 38), although the corky excrescences thrown out by the variety of *C. officinalis*, the "knotty bark of Jussieu," contain but little alkaloid (*Pharmaceutical Journal*, third series, No. 454, p. 769; 'Quinology of the East Indian Plantations,' p. 70). The inner and outer portions of a sample of the bark of *C. succirubra* gave the following results:—

	Quinine.	Cinchonidine.	Cinchonine.
Inner .	·6 per cent.	1·2 per cent.	1·4 per cent.
Outer .	1·2 "	1·4 "	1·7 "

It will be noted that not only is the total alkaloid more in the outer bark, but the quinine is in greater proportion, and therefore the outer bark would be of much greater value per pound to a manufacturer than the whole bark.

The practical value of the process chiefly depends on the effect on the tree. If when thus treated the tree throws out fresh bark of a similar quality to that produced in the old method of renewing without greater injury to its health, the process may be successful, but of course it is essential not to cut so deeply as to injure the cambium, and thus destroy the recuperative power of the bark.

AN IMPROVED METHOD OF MAKING PHOSPHORUS PILLS.

BY E. F. CHERRY.

Many have been the methods proposed for making phosphorus pills; most of them however, have something in the process to which objection may be made.

I believe the following process will be found free from all objections, and it has been in use now for years without a single instance of failure.

For the sake of example let it be supposed that 150 pil. phosphori are to be made, each to contain one-fiftieth of a grain of phosphorus. For this quantity we shall, of course, require 3 grains of phosphorus. This is to be put into a 1 ounce wide-mouth bottle: on it pour ½ ounce of chloroform, close the bottle, and allow it to stand until the phosphorus is completely dissolved. Carbonic disulphide has been recommended as a good menstruum in which to dissolve the phosphorus, but it is open to two objections: 1st. It is unpleasant to use on account of its disgusting odour; and 2ndly. It is not so volatile as chloroform, which is a disadvantage in the after part of the process.

When the process of solution is completed, pour the phosphorized chloroform into a mortar containing 150 grains of pulv. glycyrrhizæ. By stirring continuously for a few minutes, a dry powder is obtained consisting of liquorice combined with the phosphorus in a minute state of subdivision. This forms a good pill-mass by the addition of equal parts of syrup and mucilage of acacia.

These pills have been submitted to various eminent medical men, and have been found superior to those made by the B. P. process. In the latter it is often found that the presence of the wax prevents their solution in the stomach, and consequently their virtue is to a great extent lost.

Another recommendation is that the pills made as above are much less trouble to make than the B. P. ones; the latter process taking a long time to perform, while this new method only occupies a few minutes.

A NEW METHOD OF MAKING TINCTURE OF IODINE.

BY EDMUND F. CHERRY.

The ordinary method of making tinct. iodi often entails the dirtying of several measures, and not unfrequently stains on the skin. By the following method this is avoided; the tincture is made in a cleanly manner and can be allowed to proceed automatically, as it does not require any attention.

Suppose 2 pints are going to be made. Into a measure pour about 30 ounces of spirit, then take a funnel and loosely but completely plug the narrow part with cotton wool. On this bed place the pot. iodid. and the iodine. Then introduce this into the measure, taking care that the level of the spirit outside is *above* that of the solid ingredients in the funnel. It will be found that by a simple process of displacement the spirit will rise in the funnel and gradually dissolve the iodine and iodide of potash. This solution, by reason of its superior specific gravity, will sink to the bottom and fresh spirit will rise to continue the operation.

When the solids are completely dissolved, the remainder of the spirit may be added and the tincture is complete without any mess whatever.

MORPHIOMETRIC PROCESSES FOR OPIUM.*

BY ALBERT B. PRESCOTT, M.D.

(*Concluded from page* 130.)

B. *Process A, Modified by the Initiatory Treatment of the Opium with Hot Benzole.*—Each portion of the opium was digested, with heat, for one hour, with 35 c.c. of benzole, then washed on a filter with a little benzole, dried, and worked thereafter as directed in the process first given in this paper. The following results were obtained:—

Process B.

	Percentages. No. 1.	No. 2.	No. 3.	No. 4.	Mean.
a. Crystallized precipitate of crude morphia*	10·82	11·80	11·66	10·32	11·15
b. Ether-washed morphia	10·26	11·18	11·08	9·84	10·59
c. By estimating *b* with Mayer's solution	7·20	7·60	7·40	6·92	7·28
d. From filtrate, by amyl alcohol and Mayer's solution	3·08	2·72	3·60	3·72	3·28
e. Total morphia by Mayer's solution	10·28	10·32	11·00	10·64	10·56
f. Subtracting from *b* $\frac{1}{30}$ (Jacobsen)	9·92	10·81	10·71	9·51	10·28
g. Subtracting from *a* $\frac{1}{10}$ (Hager)	9·74	10·62	10·49	9·29	10·04

Comparison between Results of A and B.

	Percentages. Mean of A.	Mean of B.
a. Crude morphia	12·42	11·15
b. Ether-washed morphia	11·55	10·59
c. By estimating *b* with Mayer's solution	8·37	7·28
d. From filtrate, by amyl alcohol and Mayer's solution	2·50	3·28
e. Total morphia by Mayer's solution	10·87	10·56

It appears, then, that the use of hot benzole, instead of cold benzole, upon the opium, causes lower gravimetric results and lower results of the sum of the volumetric estimation. Result *b* is lower with each sample, as well as in the mean, from the use of hot benzole. The ether-washed morphia is purer in process A than in process B; the former giving of the mean 72·47 per cent. and the later only 68·84 per cent. of absolute morphia, by Mayer's volumetric estimation. Finally, the morphia precipitation is more nearly complete with process A than with process B; the former giving in the precipitate a mean of 77·00 per cent. and the latter a mean of 68·94 per cent. of the total morphia obtained by volumetric estimation. According to Cleaver (*Pharm. Jour. Trans.*, 1876, vii., 240), morphia is soluble in 2000 parts of benzole, at ordinary temperatures. The results of process B here seem to show that, when hot, benzole dissolves more morphia. The morphia volumetric yield is 0·0155 gram less after treatment with 35 c.c. hot benzole than after treatment with 50 to 100 c.c. cold benzole.

I will not venture to surmise why hot treatment, with benzole should make the precipitate less pure and less complete, but it was found, not only in the mean, as above stated, but in each of the four samples, the hot benzole treatment gave precipitates less pure and less nearly complete. Therefore, it appears inadvisable to use the benzole hot. And, because morphia is not without waste by cold benzole, the quantity to be used is limited, in the process recommended.

C. *Hager-Jacobsen's Process, as given by Hager, without Initiatory Treatment of the Opium with Benzole.*—(Hager's 'Untersuchungen,' ii., 176.) The materials and directions are essentially the same given in the proposed U. S. Pharmacopœia process, at the beginning of this paper, except that only eight drops of benzole are taken, and the initiatory treatment with benzole is omitted. The time of formation of the morphia precipitate was limited to three to three and a-half hours. As with processes A and B, the crude morphia was weighed, then ether-washed

* From the 'Proceedings of the American Pharmaceutical Association,' 1878.

* The weights of these precipitates were, in grams, for No. 1, 0·541; No. 2, 0·590; No. 3, 0·583; No. 4, 0·516.

and again weighed, and comparisons are given with crude morphia, minus $\frac{1}{10}$, and then ether-washed morphia, minus $\frac{1}{30}$. The precipitates were estimated volumetrically, and additional precipitates were obtained by twenty-four hours' standing, and volumetrically estimated, but, I regret to say, the final filtrates were not exhausted with amyl alcohol.

Process C.

	Percentages. No. 1.	No 2.	No. 3.	No. 4.	Mean.
a. Crystallized precipitate of crude morphia	9·96	14·14	12·80	10·28	11·79
b. Ether-washed morphia.	8·82	12·34	11·82	9·30	10·57
c. By estimating *b* with Mayer's solution	7·80	8·60	8·20	6·60	7·80
d. From additional precipitate by Mayer's solution	0·80	0·24	0·80	0·40	0·56
e. Total precipitates, by Mayer's solution	8·60	8·84	9·00	7·00	8·36
f. Subtracting from *b* $\frac{1}{30}$ (Jacobsen)	8·53	11·93	11·54	8·99	10·21
g. Subtracting from *a* $\frac{1}{10}$ (Hager)	8·96	12·72	11·52	9·25	10·61

Here the gravimetric mean result of ether-washed morphia is lower than in process A, and nearly the same as in process B. The additional precipitates contain, in the mean, 0·56 per cent. against 0·41 per cent. in process A. Of the morphia in the last mother liquor (filtrate) no estimation was made. By the volumetric estimation of the ether-washed precipitate it was, in the mean, 73·79 per cent. of morphia, a little purer than by process A (72·47 per cent.), and purer than B (68·84 per cent.). Judged by processes A and B (and D), the precipitation in C was deficient in No. 1, and notably impure in No. 2. Process C makes No. 2 to be 3·52 higher in per cent. than No. 1, A giving the difference 1·20, and B only 0·92 (for ether-washed morphia). The omission of the initiatory treatment with benzole leaves the opium-lime mixture loaded with the opium-wax and renders the filtrations more difficult and the entire operation less satisfactory. Indeed, one might say that the trouble of using the benzole was compensated for simply by the greater neatness of all the work afterwards.

D. *Procter's Staples's Process* ('Pro. Am. Pharm. Asso.,' 1870, p. 130; *Am. Jour. Pharm.*, 1871, p. 65; the first of the three methods tried by Procter).—The plan of the U. S. Pharmacopœia preparation of morphia modified by the washing of the opium with benzole.

The proportion of benzole used was 50 c.c. for the 100 grains of opium, the quantity taken by Procter. The benzole was applied by maceration in a filter and percolation, as directed for the proposed U. S. Pharmacopœia process. Following the proportions and directions used by Procter, the following results were obtained:—

Process D.

	Percentages. No. 1.	No. 2.	No. 3.	No. 4.	Mean.
a. Crystallized precipitate of crude morphia*	15·52	15·89	15·28	14·00	15·17
b. Ether-washed precipitate	14·91	14·87	14·54	13·28	14.40
c. By estimating *b* with Mayer's solution	11·20	11·11	11·60	10·40	11·08
d. From filtrates, by amyl alcohol and Mayer's solution	Results not satisfactory.				

The results with Staples's process were so evidently incorrect that I give them only as a confession of failure, the cause of which Mr. Stecher and myself had not time to investigate. In my own hands, and in the hands of those working under my instruction, Staples's process has usually given results rather lower than Hager-Jacobsen's. In this case the quantities of the samples were small, as given in the foot-note, but the balance was delicate and the work seemed satisfactory. The crude morphia was beautifully crystallized and of light colour, as is usual from Staples's process. I can only surmise that the "ether-washed morphia" contained something besides morphia, which can react with Mayer's solution. The results of working the filtrates were still less satisfactory. The filtrate from No. 1 was exhausted with amyl alcohol, this solution evaporated to dryness, the residue dissolved in sulphuric acidulated water, when it took 7·5 c.c. of Mayer's solution, indicating 6·00 per cent. of morphia. Then, with Nos. 3 and 4, the amyl alcohol residue was dissolved, as before, in acidulated water, this solution made barely alkaline with ammonia, and a bulky, light-coloured precipitate obtained. Filtered out and dried, the precipitate turned dark, coherent and waxy. Dissolved in acidulated water, the No. 3 solution took 3·5 c.c. of Mayer's solution (giving 2·80 per cent. morphia), and the No. 4 solution took 4·5 c.c. of Mayer's solution (indicating 3·60 per cent. morphia). The ammoniacal filtrates from these precipitates, last above named, were washed with benzole, then acidulated and titrated, when that of No. 3 took 3 c.c. of Mayer's solution (2·4 per cent. morphia), and that of No. 4 took 2·3 c.c. Mayer's solution (1·84 per cent. morphia). These benzole washings evaporated, and their residue dissolved in acidulated water and titrated, used for No. 3, 1·8 c.c. Mayer's solution (indicating of narcotina, 1·53 per cent.), and for No. 4, also 1·8 c.c. (same per cent. narcotina given by No. 3).

I would advise, in extracting filtrates from Staples's process with amyl alcohol, first to exhaust them with benzole, as was done for the estimations tabulated below. Narcotina, when free, is sufficiently insoluble in water, but narcotina, partially combined, may dissolve in the water solution of opium to a notable extent. If the crude morphia of process D, *a*, was loaded with narcotina, the ether washings have been insufficient to remove all narcotina, and the weights, *b*, may have represented this impurity.

May there be something beside alkaloids which precipitates Mayer's solution, obtained in the amyl alcohol extract from Staples's filtrates (though not so obtained from filtrates of Hager's process)? Dragendorff calls attention to the fact, that an aqueous extract of opium contains substances, aside from known alkaloids, which precipitate Mayer's solution, whatever those substances may be. Some results of the titration of water solutions of opium, acidulated with sulphuric acid, were found to correspond to 50 and 60 per cent. of morphia ('Werthbestimmung.,' p. 88). Again, titrating ammoniacal filtrates from opium, Dragendorff reports that when additions showing 19 per cent. and 21 per cent. of morphia had been made, the precipitates were still incomplete. Certainly no results so widely out of the way are obtained by titrating the amyl alcohol extract (a method used by Dragendorff himself), but it is desirable to know more positively whether amyl alcohol (always aqueous) takes up anything at all to precipitate Mayer's solution beside alkaloids. The work recorded in the next paragraph was entered upon before this question had defined itself in our investigation; but, although undertaken as a measure of the morphia left in Hager's filtrates and Staples's filtrates, and not as a test of the accuracy of amyl alcohol extraction, nevertheless it may be said that the results have such reasonable proportions as to do credit to the amyl alcohol extraction by which they were obtained.

Comparative Estimation of the Morphia remaining in a Set of the Final Filtrates of Hager's Process and of Staples's Process.—The estimation being done by Mayer's

* No. 1, from 2·5 grams opium, 0·388 crude morphia; No. 2, 3·24 of opium, 0·517 crude morphia; No. 3, 2·5 of opium, 0·382 crude morphia; No. 4, 2·5 of opium, 0·350 of crude morphia.

solution applied to amyl alcohol extracts, and the extraction with amyl alcohol, being preceded with benzole washing in case of the Staples's filtrates. These filtrates were obtained in a set of assays of tincture of opium, done by Mr. Henry Heim, in parallel operations by Hager's and Staples's process.* The work upon the filtrates, done by Mr. Stecher, was as follows:—The filtrates of Staples's process were first exhausted with two successive portions of benzole; those of Hager's process were treated directly with the amyl alcohol, the total alkaloid so obtained being estimated as morphia. In every case the amyl alcohol was used in three portions, successively, of 15 c.c., 10 c.c., and 5 c.c.—30 c.c. in all—each portion being shaken with the opium filtrate in a tube, the mixture left to separate, and the clear amyl alcohol layer drawn off. The united amyl solutions were evaporated to dryness on a steam-bath, the residue dissolved in sulphuric acidulated water, and this solution titrated with Mayer's solution. The results were as follows:—

From Filtrates Left in Valuation of Opium Tinctures.

No.	With Hager's Process.		
	Filtrate.	Morphia.	Morphia, per c.c.
1	45 c.c.	0·046 gram.	1·02 milligram.
2	50 ,,	0·100 ,,	2·00 ,,
3	33 ,,	0·060 ,,	1·82 ,,
4	40 ,,	0·070 ,,	1·75 ,,
5	38 ,,	0 080 ,,	2·10 ,,
6	40 ,,	0·060 ,,	1·50 ,,
7	40 ,,	0·096 ,,	2·40 ,,
8	35 ,,	0·094 ,,	2·70 ,,
9	35 ,,	0·052 ,,	1·51 ,,
10	40 ,,	0·094 ,,	2·35 ,,
11	—	—	— ,,
12	40 ,,	0·090 ,,	2·25 ,,

No.	With Staples's Process.		
	Filtrate.	Morphia.	Morphia, per c.c.
1	40 c.c	0·100 gram.	2·50 milligram.
2	40 ,,	—	—
3	40 ,,	0·110 ,,	2·75 ,,
4	35 ,,	0·062 ,,	1·77 ,,
5	30 ,,	0·090 ,,	3·00 ,,
6	35 ,,	0·096 ,,	2·74 ,,
7	40 ,,	0·108 ,,	2·70 ,,
8	36 ,,	0·072 ,,	2·00 ,,
9	37 ,,	0·080 ,,	2·16 ,,
10	—	—	—
11	—	—	—
12	—	—	—

* Valuation of tincture of opium, twelve samples, in parallel assays by Hager's process and Staples's process, reported by the writer from works by Henry Heim See.

The earlier process of Hager was used, differing from "Hager-Jacobsen's" in taking only 5 grams of opium (or the residue by evaporating an equivalent quantity of tincture), washing the residue into the lime opium solution, and concentrating the latter to about 25 grams before adding the ammonium chloride (and benzole and ether), then leaving twenty-four hours for precipitating the crude morphia. (Dragendorff's 'Werthbestimmung.,' 91.) For Staples's process, that given by Procter, 'Pro. Am. Phar. Asso.,' 1870, 131, was followed, evaporating tincture to one-half, and proceeding as directed, but leaving four days for the crude morphia to precipitate.

Mean morphia per c.c. for 8 Nos., omitting 2, 10, 11, 12; Hager's, 1·85 milligrams; Staples's 2·45 milligrams.

For the total 436 c.c. of 11 Nos. with Hager's process, the mean was 1·93 milligram morphia per c.c. of filtrate. The solubility of morphia in water, and to a greater extent in the mother liquor of morphiometric assays, even when no excess of ammonia is present, has been alluded to in a foot-note under process A. As the filtrate of Staples's is alcoholic, it ought to dissolve more morphia than the filtrate of Hager's process. Taking the solubility of morphia in pure water as 0·001 gram per c.c., it is indicated by this work that Hager's filtrates dissolve, in the average, 1·9 times more than water does (the extreme being 1·02 times, and 2·4 times); while Staples's filtrates dissolve, in the average, 2·45 times (in extremes, 1·77 times and 3·0 times) more than water dissolves.

As having a bearing on the comparison of Hager's process with Staples's it may be quoted here that Mr. Heim's gravimetric results, in valuation of tincture of opium give, as the average with the twelve samples, by Hager's process, 3·103 grains ether-washed morphia per fluid ounce of tincture; by Staples's process, 2·84 grains morphia per fluid ounce of tincture.

E. *Schachtrupp's Process for Estimation of Morphia and Narcotina.*—(*Zeitschrift für Analyt. Chemie*, 1868, vii., 509.) A weighed amount of opium (5 grams), is covered in an evaporating dish (porcelain), with a solution of sodium carbonate, heated on the water-bath, and when semi-fluid, evaporated to dryness. The dry mass is transferred to a perfectly dry beaker or flask, covered with benzole, agitated and heated moderately, then decanted on a filter, and the residue treated two or three times with portions of benzole and filtered. [The quantities of benzole were not stated by Schachtrupp. The solubility of morphia in benzole has been discussed under "Process B." It is advised to use, in all, about 40 c.c. for 5 grams opium, but a good deal more was used in our operations.] (The benzole solution is reserved for estimation of the narcotina). The dried filter with its contents is now added to the residue in the flask or beaker, and the whole warmed to expel the last trace of benzole. Amyl alcohol is now added to the dry residue, in the flask, the mixture stirred and heated to near boiling, and while hot decanted upon a filter, adding successively two more portions of amyl alcohol. [Schachtrupp does not specify how much amyl alcohol to use.] Set the mixed filtrates aside for a few hours. Decant from crystals of crude morphia; distil the solution to its one-third; add dilute hydrochloric acid, in the retort, and shake. Remove the amyl alcohol, the upper layer (from the water solution of morphia hydrochlorate, below); wash the decanted amyl alcohol with two or three additional portions of the dilute acid, and pour the united acid water solutions upon the crystals of crude morphia, previously separated, to dissolve them. [Schachtrupp does not give strength or qualities of the dilute hydrochloric acid. Mr. Stecher used four portions, and found the last to take up a notable proportion of morphia. Dragendorff states that all the morphia can hardly be obtained in this way. It would be better to evaporate the amyl solution to dryness, and then dissolve in acidulated water, as done by Mr. Stecher in extracting mother liquors with amyl alcohol described under process A.] The acidulated water solution of morphia is now evaporated on the water-bath, to a weight double to that of the opium taken, filtered, the filtrate treated with ammonia in slight excess, covered loosely, and set aside for twenty-four hours. The precipitate (at first bulky and afterwards growing crystalline) is collected on a filter, washed several times with distilled water, and dried and weighed. [The gravimetric morphia of this process retains considerable colour.] The reserved benzole solution is evaporated to dryness, the residue dissolved in sulphuric acidulated water, and the solution titrated for narcotina, with Mayer's solution. Each c.c. of the latter precipitates 0·0213 gram narcotina.

The following results were obtained by Schachtrupp's process:—

Process E.

	Percentages. No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	Mean.
a. Coloured morphia, precipitate . .	7·53	8·82	11·16	10·27		9·44
b. By estimating *a* with Mayer's solution . . .	4·80	5·60	10·20	10·00	7·00	7·52
c. Benzole alkaloids, by Mayer's solution, estimated as narcotina . . .	14·91	10·44	9·58	9·80	9·04	10·15

Flückiger and Hanbury mention percentages of narcotina, from 1·30 to 10·30. Dragendorff gives results for narcotina, from 8·8 to 14·7 per cent. ('Werthbestimmung.,' 83). As previously mentioned, Mr. Stecher used more benzole than should be used, and considerations of the benzole solubility of morphia make it certain that a notable proportion of morphia was obtained with the narcotina.* No work was done to separate morphia from the other alkaloids dissolved by the benzole, and it can only be declared that the results are untrustworthy, and the process of Schachtrupp an inexpedient one.

The trial of process E gives additional evidence that *the initiatory treatment of the opium with benzole* cannot be used to remove all the narcotina, while leaving all the morphia behind. To dissolve all the narcotina, which is partly held in feeble combination, alkali must be added,† as in Schachtrupp's process, and then the use of another benzole to take out the wax, etc., seriously diminishes the morphia. The office of the benzole is to free the opium of caoutchouc-like matter, colour, etc., and the additional service of making it unnecessary to purify the crude morphia crystals seems to be more than benzole can accomplish. The advantages of preliminary benzole treatment appear from the results of process C, wherewith they have been named. As to the results by the use of the benzole hot, see process B. It can hardly be said that the benzole treatment is very important; but as it is otherwise required in the Hager-Jacobsen process, the preliminary use of the agent does increase the number of materials to be taken.‡

The purification of the crude morphia crystals is best done, I believe, by the ether, non-alcoholic or water-washed. I suggest to put *water-washed ether* in the list of reagents, unless otherwise included, with direction to wash shortly before use, because any pharmacist can, from any grade in stock, in a few minutes, make a uniform quality of ether, free from those common impurities most objectionable for use as a solvent, alcohol and acetic acid, the latter derived in keeping.

With the Hager-Jacobsen process as proposed for the Pharmacopœia, I regret the unavoidable length of the directions, giving an appearance of complexity, perhaps forbidding to the pharmacist. In the execution of the process there is nothing difficult; all the operations define themselves sharply and satisfactorily, and there is little more weighing and much less waiting than in other processes. Some features of leading processes may be compared as follows:—

Process.	Quantity of Filtrate to 1 of Opium.	Time Required.
Hager-Jacobsen's .	1 to 10	5 to 6 hours.
" with benzole preliminary treatment	1 to 10	6 to 8 hours.
Staples-Procter's .	1 to 6 or 7 (alcoholic)	48 "
British Pharmacopœia	1 to $2\frac{1}{2}$	50 "

As to the purity of the morphia weighed, considered with the incompleteness of its extraction, and as to deducting a fraction for impurities, I would only add to what is given under "Process A," a remark of Dragendorff ('Werthbestimmung.,' 92), to the effect that, for ordinary purposes, the foreign substances left in the (chloroform-washed) crystals by Hager's process may be left to balance the loss in mother liquor and washings.

The reports made by careful analysts in different parts of the world render it evident that exact morphiometric methods for opium have not been attained, and the obstacles in the way towards exactness appear only the more apparent in the work I have undertaken. Indeed, absolute exactness is rarely if ever reached in human science. We must be patient with imperfection, always measuring our results by the truth beyond them, as nearly as we can, and we must work heartily for the uses of mankind with such approximate measures as we have.

University of Michigan.

* Benzole dissolves narcotina, codeina, papaverina and narceina (slightly).

† Obtaining, by Mayer's solution, from the benzole extract of a sample of dried opium (not made alkaline), 2·3 per cent. of narcotina, I found from the similar extract of another portion which was made alkaline, 3·3 per cent. of narcotina.

‡ I hardly need mention that Mr. William Procter recommended the adoption of the benzole treatment, referring to its use by Flückiger, and that the modification (of the Staples' process) very properly bears the cognomen due to Mr. Procter's important report on morphiometric methods.

CULTIVATION OF PERFUME PLANTS IN SOUTH AUSTRALIA.*

A recent report on the progress and condition of the botanic garden and Government plantations at Adelaide, South Australia, by the Director, Dr. Schomburgk, contains some interesting remarks on the cultivation of perfume plants in that colony.

A branch of cultivation that promises to become of very great importance in South Australia is the systematic growth of perfume plants. Of the magnitude of the commercial aspect of the perfumery trade, we are reminded that British India and Europe consume about 150,000 gallons of handkerchief perfume yearly, and the English revenue from eau-de-cologne alone is about £8000 a year; that the total revenue from imported perfumes is estimated at about £40,000, and that one great perfume distillery at Cannes uses yearly about 100,000 lbs. of acacia flowers (*Acacia farnesiana*), 140,000 lbs. of rose petals, 32,000 lbs. of jasmine blossoms, 20,000 lbs. of tuberose, besides a great many other fragrant plants. Dr. Schomburgk says:—"Most of the flowers which provide the material for perfumes grow most luxuriantly with us, viz.: mignonette, sweet verbena, jasmine, rose, lavender, *Acacia farnesiana*, heliotrope, rosemary, peppermint, violets, wallflower, laurel, orange, and the sweet scented geranium. I may say that these plants thrive probably in greater perfection here than in any other part of the world. No doubt South Australia should be a perfume-producing country. We see flourishing here some of the most valuable scent plants, and even some of our native plants will yield a valuable scent; but two things are needed to encourage the enterprise. First if the scent is manufactured in South Australia, freedom of the still, so as to license distilling in vessels of less than twenty-five gallons capacity, and, secondly, the *bonâ fide* advertisement of a capitalist manufacturer that he will buy any quantity of specified flowers, leaves, roots, or plants, at a marketable price, then some farmers might be tempted to plant a few acres of lavender or mint; another, geraniums or rosemary; another, jasmine; whilst plantations in hedgerows, or otherwise of roses, cassia, together with contributions of gardens, would lay the

* From the *Journal of the Society of Arts*, August 22, 1879.

foundation of an export trade. Then it must also be noted that whatever the value which plants yield in flowers, fruit, leaves, and stems, it is increased threefold under manufacture, and this manufacture again consumes other local produce called into existence by it, such as olive and other oils, fats, alkalies, wheaten flour, colouring matter, pottery, and glass ware, which combine to make the farmer and the manufacturer contribute largely to the maintenance of the population and the wealth of perfume-producing countries." Dr. Schomburgk further points out the profits likely to accrue from an extended cultivation of scent-bearing plants, as against the cost of land in England, acres of which in certain localities are under cultivation of peppermint, lavender, and other well-known plants of the same class. The failure of these crops, or more particularly those on the farms of Grasse, Cannes, and Nice, would be a serious disaster to this branch of commerce, the importance of which may be proved from the fact, that a member of a well-known perfumery house in Bond Street has thought it worth his while to visit Australia for the purpose of encouraging this branch of culture. Regarding the manufacture of the perfumes, an opinion is expressed which will no doubt be fully endorsed by practical men at home, that it is unadvisable to prepare them in the colony; this work would of course be much more effectually done in this country; at the same time, the plants might go through some manipulation or partial preparation, so as to reduce their bulk and consequent cost of freight. The outcome of this endeavour to open a new branch of commerce with Australia will be looked to with much interest.

The introduction and extended cultivation of the olive (*Olea europea*) in Australia is now *un fait accompli*; it is nevertheless satisfactory to find that a choice variety—that which produces the famous Lucca oil—has been successfully raised. This new introduction seems due to the energy and liberality of a private gentleman, by whom it is hoped the plants will be freely distributed.

VERATRUM VIRIDE—NOTES OF AN EXAMINATION.*

BY CHARLES BULLOCK.

When the root of *Veratrum viride* is digested in water acidulated with sulphuric acid at a temperature of 150° F., the mass becomes gelatinous and swells up to an increased bulk. When expressed and alcohol is added to the expressed liquor, a copious deposit of pectic acid is occasioned.

The presence of pectose and the large amount of resin and fatty matter contained in the root makes the use of alcohol necessary for its exhaustion.

Fifty-three pounds of *Veratrum viride*—rhizome with rootlets—from North Carolina, in powder, was exhausted with alcohol, the alcohol distilled off and the resulting extract exposed to a continued moderate heat until all of the alcohol was expelled. During this process the resin separated from the soft extract. It was removed and allowed to drain for several weeks during the warm weather of summer.

Weight of the soft extract .	6 lbs. $10\frac{1}{4}$ ozs.
Weight of the hard resin .	3 lbs. 4 ozs.
Total weight of extract from 53 lbs. of root	9 lbs. $14\frac{1}{4}$ ozs.

This extract furnished the material for examination.

In separating the alkaloids, advantage was taken of the previously-ascertained fact that *all* of the alkaloids were imperfectly precipitated from acid solutions by caustic alkalies or alkaline carbonates at ordinary temperatures, but if the solution is heated to 150° F., the precipitation is almost complete.

The Soft Extract.—86 per cent. of this extract is soluble in water. Petroleum benzin removes 4·3 per cent. of fatty matter. After removal of the alkaloids, the watery solution was treated in the usual manner with subacetate of lead, and after separating the excess of lead and neutralizing the free acid with carbonate of baryta, the filtered solution was evaporated to a syrup and thrown into alcohol. The filtered alcohol solution, evaporated and exposed to a temperature of 212° F. until it ceased to lose weight, gave a product representing 85·5 per cent. of the extract.

This product has a transparent red colour, a saccharine taste, with some bitterness, and acts energetically as a reducing agent with salts of copper and silver. In chemical character it appears to be almost entirely glucose.

The amount of alkaloids contained in this extract was determined for the portion soluble in water and for the resin separately.

880 grains of the extract, representing the yield from one pound of root, was exhausted with water, the washings were evaporated to reduce the volume and carbonate of soda added to alkaline reaction. After separating the precipitate, the solution was heated to 150° F. and a little caustic soda added. The precipitate occasioned was removed while the solution was warm.

The weight of the first precipitate by carbonate of soda was . .	16·7 grains.
The second, by caustic soda, was .	2·6 „
Total	19·3 „

These alkaloids contained a large amount of colouring matter, from which they were purified by re-solution in acetic acid, filtering and precipitation from a warm solution. The precipitate, when dry, weighed 10·7 grains.

All of the mother-waters were made acid and evaporated, then made alkaline and treated with ether. The ether product was dissolved in acetic acid, filtered and precipitated as before. Weight of product, 1·7 grain; total weight of mixed alkaloids, 12·4 grains.

The jervia was separated by precipitation, as a nitrate, from an acetic solution representing 3 grains in each fluidounce, by addition of an equal volume of a saturated solution of nitrate of potassium. After standing six hours, the nitrate of jervia was collected on a filter and washed with a solution of nitrate of potassium, pressed between folds of bibulous paper and dried. Weight of nitrate of jervia, 7·9 grains. After the separation of the jervia the solution was evaporated, heated to 150° F. and precipitated by soda. Weight of other alkaloids, 3·2 grains.

Resin from the Soft Extract.—To prevent any change which might be caused in saponifying the resin with lime, the following process was adopted with this as also, subsequently, with the hard resin:—

The fatty matter was removed by petroleum benzin. The resin, rubbed to a fine powder, was made into a smooth paste with water introduced into a bottle and a solution of carbonate of soda containing a little caustic soda added until the resin was dissolved. It was then agitated with ether and the ether removed. The washing with ether was then repeated. The product left on distillation of the ether was dissolved in acetic acid, filtered and precipitated by carbonate of soda, containing a little caustic soda. Weight of product, 9·3 grains.

The mother-water was made acid, evaporated, and after being made alkaline, treated with ether. The product, dissolved in acetic acid, filtered and precipitated, gave 0·7 grain more of alkaloids. Total weight of mixed alkaloids from the resin, 10 grains.

The alkaloids separated by nitrate of potassium gave—

Nitrate of Jervia	8·4 grains.
Other Alkaloids	1·6 „

Hard Resin.—429 grains, representing the yield from one pound of root, was powdered and digested in petro-

* From the *American Journal of Pharmacy*, July, 1879.

leum benzin. The loss of weight representing fatty matter, was 84·7 grains. After removal of the benzin by evaporation, the resin was reduced to a fine powder and treated as in the previous experiment, by dissolving it in an alkaline solution and treating the solution with ether. The weight of mixed alkaloids obtained was 22·5 grains. The mother-water was made acid, evaporated, and, after addition of caustic soda, treated with ether. The product obtained weighed 0·8 grain. The alkaloids, separated in the manner preceding, gave—

Nitrate of Jervia	14·1 grains.
Other Alkaloids	6·1 „

The resin from the soft extract and the hard resin were then precipitated from their alkaline solution by hydrochloric acid, and dried. The solution was made neutral with soda and evaporated to dryness. This product was added to the precipitated resin and the whole mixed with an equal weight of lime previously slaked, and the mixture boiled for a few minutes, then evaporated to dryness by steam heat. The dry mass was powdered and exhausted by hot alcohol. The product left on distillation of the alcohol was dissolved in diluted acetic acid, filtered and precipitated. Weight of mixed alkaloids obtained, 0·9 grain. The alkaloids, separated as before, gave—

Nitrate of Jervia	0·1 grain.
Other Alkaloids	0·8 „

The *total* amount of alkaloids obtained from the extract representing one pound of root, was—

From Soft Extract	12·4 grains.
Resin from Soft Extract . .	10 „
Hard Resin	24·2 „
Total yield of mixed Alkaloids,	46·6 „

When separated, the alkaloids represented—

	From soft extract.	Resin from soft extract.	Hard resin.
Nitrate of Jervia.	7·9 grs.	8·4 grs.	14·9 grs.
Other Alkaloids .	3·2 „	1·6 „	6·2 „
Total amount of Nitrate of Jervia . .			31·2 grains.
„ „ „ other Alkaloids . .			11·0 „
			42·2
Loss			4·4 „
			46·6

The loss of over 10 per cent. which occurred in separating the alkaloids is due both to separation of foreign matter and loss in manipulation.

An examination under the microscope of the alkaloids, after separation of the jervia, was made by allowing a drop of their alcoholic solution to evaporate on a glass slide. Crystalline forms were found, differing in form from jervia, indicating the probable presence of another alkaloid which crystallizes from its alcoholic solution. When further purified by solution in ether, dissolving the ether product in acetic acid and precipitating by nitrate of potassium until a solution containing 1 part in 200 of acetic solution was no longer disturbed by addition of the nitrate, then precipitating the solution at 150° F., by caustic soda, a product representing 5 per cent. of the mixed alkaloids was obtained.

Saponification of the Resin by Lime.—One pound avoirdupois of the hard resin was powdered and rubbed into a smooth paste with one pound of lime previously slaked. Sufficient water was added and the mixture boiled for a few minutes. After evaporation and drying on a steam-bath, the mass was powdered and exhausted with three gallons of hot alcohol. The product left on distillation of the alcohol was treated with warm diluted acetic acid,* filtered and precipitated while warm by caustic soda. The precipitate was purified by drying, re-solution and precipitation. The weight of mixed alkaloids obtained was 485 grains.

A better result was obtained from a second pound of the resin, by first removing the fatty matter with benzin and using two pounds of lime. The yield of alkaloids by the process of saponifying with lime was 20 per cent. greater than by the ether process.

Volatile Principles.—300 grains of the hard resin, deprived of fatty matter, was dissolved in water by addition of carbonate of soda mixed with a little caustic soda. The alkaline solution was submitted to distillation, collecting the product in a receiver containing water acidulated with acetic acid. The distillate was evaporated to reduce its volume, made alkaline and treated with ether. The result was negative.

Note.—After concluding the examination recited in this paper, I have seen the abstract of a paper read by Dr. Wright before the Chemical Society, London, May 15th, "On the Alkaloids of *Veratrum Viride*," in which the able and exhaustive examinations made by him contribute greatly to our knowledge of the constituents of this interesting drug. The name "rubijervine" has been given by him to the alkaloid which has claimed my attention, a name which is very appropriate to the reactions of the alkaloid. The alkaloid which I found to crystallize from solution in alcohol along with "rubijervine" is probably his "pseudojervine."

The large amount of alkaloids which are associated with the resin, and removed from it only by saponifying with lime, render it probable that by his process of obtaining the alkaloids a considerable amount escaped his notice.

The approximate yield of the bases which I obtained from 1 pound avoirdupois of the root by the ether process was 46·6 grains = 6·612 grams per kilo. The amount obtained by Dr. Wright was 0·80 gram per kilo.

The amount obtained from *the hard resin alone* by saponifying with lime represented 29·7 grains for one pound of root = 4·21 grams per kilo.

Philadelphia, June 6, 1879.

SOAP BARK IN THE TREATMENT OF SKIN DISEASES.†

The *Quillaia saponaria* is indigenous to Chili. Its bark is imported in flat pieces, which are usually several inches wide, and from 2 to 3 feet in length. These are hard and tough and of light grey colour. In the shops it is generally found in raspings and small woody fibres mixed with an acrid dust which readily provokes sneezing. It contains, among other ingredients, saponin, sulphate of calcium and a small quantity of starch.

A saturated alcoholic solution of saponin possesses the power of dissolving gums, resins and oils, and will form with them after being mixed with water, permanent emulsions. This same solution, when shaken with mercury, will keep it suspended. It will be seen that saponin in solution possesses all the chemical action of soap, and is often preferred to the latter. As a therapeutic agent this natural soap can be used in the form of infusion, tincture, or fluid extract.

An infusion of the bark can be easily made by tying some of it in a piece of white flannel, and allowing it to remain in a bowl of water for one or two hours, until the saponin is dissolved. I resort to this method of extracting the active principle in order to avoid the irritating effect of the minute fibres of the bark. If this solution is applied to any part of the body it will be found to

* Repeated treatment with hot water containing acetic acid until two gallons were used was necessary to exhaust the product.

† From the *Druggists' Circular and Chemical Gazette*, August, 1879.

fulfil all the requirements of a mild soap, and act in addition as a moderate stimulant and astringent on the skin. I have used it with marked benefit in dandruff of the scalp. It causes the enlarged glands of the part to contract, and often removes all infiltration of the skin. It has often been of great service in removing the scales in simple pityriasis, and in producing at the same time its moderately stimulant and astringent action. Similarly, I have had some excellent results from its use in chronic ulcers and eczema of the extremeties. I usually saturate a roller bandage with the infusion and bandage up the part. The cases in which I tried this means had previously used both the simple dry and wet roller bandage, but no success was attained until the above method was adopted.

The infusion is also a valuable remedy for aiding in arresting excessive secretion and fetid perspiration. The parts that are usually affected by these troubles are the face, armpits, hands and feet. In cases involving the face and armpits, I instruct the patient to dip a small piece of sponge in the infusion, and carefully mop over the surface once or twice daily. When the hands and feet are affected they should be bathed in the solution nightly, or on alternate nights, according to the condition.

When a more active stimulant and astringent effect is required, the tincture of saponin can be employed with much advantage. The tincture is prepared by extracting the bark, as already mentioned, by means of strong boiling alcohol. The solution thus formed is clear and of a deep wine colour, and a pungent taste. It is chiefly employed as an external remedy, and when applied to a part has a refrigerant effect. It is miscible with both water and oil, and has the power of dissolving, emulsifying, and removing fats and dirt from the skin. In many diseases, especially in *Seborrhœa sicca*, I have found it far preferable to the tincture of green soap. It has all the advantages that are claimed for the tincture of green soap, and at the same time is free from the high diffusive, penetrating, and destructive action on the tissues that the latter possesses.

I have used this tincture with great benefit, not only in the diseases to which the infusion is applicable, but also in general thinning and loss of hair in different parts of the body. It can be employed with great advantage as an addition to the internal treatment in that variety of the loss of hair in which the scalp is to all appearances healthy, but the surface is covered with short, fine, and downy hairs. In cases of this description it should be applied in full strength with a sponge, and should always be thoroughly rubbed into the scalp, and afterwards rinsed off with water.

NOTE ON HYRACEUM.*

BY WM. H. GREENE, M.D., AND A. J. PARKER, M.D.

Among the native remedies from the Cape of Good Hope, exhibited at the Centennial Exhibition, was a peculiar substance called hyraceum, which was supposed to be the inspissated urine of the Cape Hyrax (*Hyrax capensis*).

The material was obtained from Dr. Leidy, who, in the 'Proceedings of the Academy,' December, 1876, p. 325, gave a short account of it. According to this account "the hyrax is reputed to inhabit gregariously rocky places at the Cape of Good Hope, and the accumulated urine in the hollows of rocks, gradually evaporating, is supposed to give rise to the product in question. It is reported as having been employed in medicine with the same effect as castoreum."

Professor Cope remarked that "a material resembling the concretion made by the urine of the hyrax was found in the fissures of the rocks of New Mexico. It is probably the fecal and renal deposit of the wild rat, *Neotoma*."

About two years ago we made an exhaustive examination of this substance. It is a dark-brown, brittle and resinous material, having an aromatic odour and a bitter taste. About 56 per cent. of it is soluble in water, and nearly one-third of the residue from the aqueous extraction is soluble in alcohol, ether and chloroform.

The soluble material amounts in all to about 70 per cent., and the remainder is composed of 14 per cent. of woody fibre and insoluble organic material, and 16 per cent. of sand and other inorganic substances.

On ignition, hyraceum yields about 34 per cent. of ash, which is composed of chlorides, sulphates, phosphates and carbonates of the alkaline metals, and of lime and magnesia. It also contains nitrates in small proportion.

On precipitating the organic material contained in the aqueous extract with lead acetate, and afterwards decomposing the suspended precipitate by means of sulphuric acid, a substance was obtained which constitutes the greater portion of the organic material soluble in water. It was hard, horny and of a resinous character, transparent, and of a bright-brown tint. It probably consists of several substances, but we were unable to obtain a sufficient quantity for separation, and an ultimate organic analysis. It gives out a fecal odour, and seems to be derived from fecal matter.

The analysis, the details of which are subjoined, shows that the substance is a mixture of various salts and organic matter, the latter constituting about one-half, and containing traces of urea, together with uric, hippuric and benzoic acids. We also obtained from the material a small quantity of a substance having a sweet taste, and which is probably glycocol (?) derived from the breaking up of hippuric into benzoic acid and this substance.

Hyraceum is undoubtedly derived from the urine of some animal, but the large amount of lime (6 per cent.) in proportion to the other salts, and the character of the organic matter contained, indicates that it also contains fecal matter.

Analysis of Hyraceum.—Water, by desiccation, 7 per cent.

A microscopical examination revealed nothing of importance. Woody fibres, particles of sand and a general granular appearance were found.

Dried Material.

Ash	34·15
Organic substances soluble in water	37·44
Organic substances soluble in water, alcohol, ether and chloroform	14·54
Woody fibre and insoluble organic substances; residue	13·87
	100·00

Ash.

Soluble in water	19·20
Insoluble in water	14·95

Potassa	2·95
Soda	8·95
Lime	6·00
Magnesia	2·10
Iron	·12
Sand	2·00
Sulphuric acid	·60
Carbonic acid	3·64
Phosphoric acid	·97
Chlorine	6·45
Traces of nitric acid, and loss	·37
	34·15

* From the *Proceedings of the Academy of Natural Sciences of Philadelphia*, January 28, p. 12. Reprinted from the *American Journal of Pharmacy*, July, 1879.

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 6, 1879.

PROTECTION OF THE PRACTICE OF PHARMACY IN IRELAND.

The two cases of prosecution under the Pharmacy Act, Ireland, of which we published reports last week, serve to show that the Council of the Irish Pharmaceutical Society is resolved to maintain the character of the degree of pharmaceutical chemist, and we rejoice to be able to congratulate that body upon the manifestation of so laudable an intent.

At the time the Irish Act was passed there were some misgivings in this country that the adoption of only one grade of pharmaceutical practitioners and the application of the title of pharmaceutical chemist to that grade might have a prejudicial influence on the value—acquired and anticipated—of the same designation in this country.

The Irish Society was able to do what could not be done here in legislating for the pharmaceutical practitioners that were to succeed the old apothecaries. Here the practice of pharmacy was cast adrift to all comers, and in assuming new functions the English apothecaries abandoned the trust that was confided to them in the interest of the public. In Ireland, on the contrary, the right to compound physicians' prescriptions has always been zealously guarded by the apothecaries as their exclusive privilege in virtue of special preparation for the duty, and though they, like the apothecaries of England, are gradually developing into medical practitioners simply, the protection of the public and of the qualified pharmacist has been secured by the provisions of the Irish Pharmacy Act in a manner that could not be done here when our Pharmacy Act was passed in 1868, though the eventual realization of this object is thereby provided for.

As an incident of the first of these cases we find that the magistrate gave utterance to one of those expressions of opinion which are sometimes exceedingly damaging in their influence upon particular classes, but at the same time are totally destitute of any just foundation, and should therefore be studiously avoided by magistrates or other judicial functionaries. We refer to the comments of the magistrate upon the propriety of the action taken by the Pharmaceutical Society of Ireland. It was naturally urged by the counsel for the plaintiffs that the prosecution was not intended to be oppressive, but that it was merely the action incumbent on the representatives of the Irish pharmaceutical body for the purpose of vindicating the law and protecting the public. This view was at once accepted by the magistrate, who also proceeded to observe—in illustration, we presume, of the salutary nature of the Act—that "mistakes occur every day in London in "consequence of prescriptions being compounded by "persons who are not properly qualified to do so," and he then went on to say that happily there had been very few such cases in Ireland.

It is not our desire to open old wounds by following out the comparison thus instituted by the magistrate, though we think that if some members of the Council of the Irish Society had pointed out the total absence of any justification for the magistrate's remarks to the disadvantage of London he would not have done more than justice to his English colleagues nor would he have overdone that generous chivalry for which Irishmen are justly famous. But as this was not done it becomes our duty to give the most emphatic contradiction to the statement of the Dublin magistrate. Comparisons are always dangerous, no less than odious, and in this instance it would scarcely have been possible within so small a number of words to express a greater amount of inaccuracy. It is not the case that in London mistakes occur every day in the compounding of prescriptions; it is not the case that in London, or any other part of Great Britain, prescriptions are compounded by persons not properly qualified to do so. There is no contrast in these respects between Great Britain and Ireland which is to the disadvantage of the former. In the expression of a sense of what is necessary in the public interest as regards dispensing of medicines, Great Britain lies under the advantage of having led the way through the medium of the Pharmaceutical Society to establishing a regulation of the practice of pharmacy by which the competence and skill of pharmaceutists is ensured, and it is upon the model of the example thus afforded that pharmacists in Ireland have carried out the application of similar measures. In their labours to this end they have always had the cordial sympathy of their *confrères* in this country; we trust their efforts may always be united in the same direction, and that these amicable relations may never be interfered with by unwise comments in the spirit of the Pharisee, whether they be accidental or intentional.

THE FLOODS IN HUNGARY.

We have received a communication from Mr. Gustav Jarmay, the President of the Hungarian Pharmaceutical Society, acknowledging the receipt of £39 1s. in aid of the fund for the relief of the distressed pharmacists of Szegedin, and requesting us to express to those pharmacists of Great Britain whose contributions that sum represents the grateful thanks of himself and the other members of the Committee. We also will take this opportunity to express our hearty thanks to those who have supported our endeavour to obtain on the part of British pharmacists a fitting expression of sympathy with the misfortunes of their brethren in Hungary.

POISONOUS HONEY.

In a report by Mr. Vice-Consul Biliotti on the trade of the port and district of Trebizond, he refers to the poisonous effects produced by some of the honey obtained near the coast of that province. Those who partake of it suffer from giddiness, vomiting and intoxication, exactly as did Xenophon's soldiers in the same locality more than two thousand years ago. This poisonous quality has been on a former occasion attributed to the bees having collected the honey from the flowers of henbane and hemlock, which occur plentifully in the neighbourhood, but Mr. Biliotti appears to be inclined to refer the mischief rather to the *Datura Stramonium*, which grows in abundance on the coast. Although therefore bees are reared on a somewhat extensive scale in the province of Trebizond, in the neighbourhood of the coast, the hives are only remunerative in wax, but the honey produced in the high lands is innocuous, and is said to be of superior quality.

In the list of candidates who have passed the recent honours examinations of the London University the first name in the first B. Sc. and Preliminary Scientific Examinations is that of Mr. A. P. Luff, formerly a Bell Scholar, whilst bracketed with another gentleman in the second place is Mr. W. A. Gostling, a son, we believe, of Mr. Gostling, of Diss, a member of the Council of the Pharmaceutical Society.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, September 3, 1879.

Present—Mr. George Webb Sandford, President; Messrs. Atkins, Bottle, Churchill, Hills, Richardson, Robbins and Savage.

The minutes of the previous meeting were read and confirmed.

The Pharmaceutical Conference.

The President said he might state that he and several other members of the Council represented the Society at the Pharmaceutical Conference, and they were very warmly received. It was as good a meeting, he believed, as they had ever had, and the Sheffield chemists did everything to render their visit a pleasant one.

Weights and Measures.

The President read the following correspondence on the above matter:—

"Board of Trade,
"(Harbour Department),
"Whitehall Gardens, S.W.,
"August 21, 1879.

"Sir,—With reference to previous correspondence on the subject of providing proper standards of the weights and measures used in trade by apothecaries, I am directed by the Board of Trade to transmit to you, herewith, copy of the Order of Her Majesty in Council legalizing certain denominations of standards of apothecaries' weight and measure.

"I am, sir,
"Your obedient servant,
"Henry G. Calcraft.

"The President of
"The Pharmaceutical Society of Great Britain,
"17, Bloomsbury Square, W.C."

[The Order in Council here referred to was published in the *Pharmaceutical Journal* of August 23, p. 145.]

"Pharmaceutical Society of Great Britain,
"17, Bloomsbury Square, W.C.,
"August 27, 1879.

"Henry G. Calcraft, Esq.,
"Harbour Department,
"Board of Trade,
"Whitehall Gardens, S.W.

"Sir,—In reference to your letter of the 21th inst., enclosing a copy of the Order in Council 'legalizing certain denominations of Standards of Apothecaries' Weight and Measure,' may I venture to refer you to a memorandum sent to F. H. Farrer, Esq., by the then President of this Society, on the 30th January last, especially on the subject of verifying small weights and certain sub-divisions on glass measures, which are in daily use by chemists, and stamping them?

"If you will kindly favour me with the decision of the Board of Trade on these points or refer me for further information to the officer who has authority in the stamping department, I shall be greatly obliged.

"I am, sir,
"Your obedient servant,
(Signed) "G. W. Sandford,
"*President.*"

The President said he had not received any answer to the last communication, and on inquiry at a scale-maker's was informed that he had not at present received any instructions for stamping weights. It would be remembered that the question submitted was, whether the sub-divisions of glass measures would be verified.

Mr. Richardson asked if it was intended that glass measures should be stamped.

The President said no doubt they would be marked in some way—probably engraved.

Elections.

MEMBERS.

Pharmaceutical Chemist.

Hugh Odard Dutton, Rock Ferry, having passed the Major examination and having tendered his subscription for the current year, was elected a Member of the Society.

Chemists and Druggists.

The following, who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected Members of the Society:—

Carr, Walter Paterson............Berwick-on-Tweed.
James, Joseph ....Cheltenham.

ASSOCIATES IN BUSINESS.

The following, having passed the Minor examination, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Jones, John ....Liverpool.
Scott, John ....Newcastle-on-Tyne.
Steele, John Cockburn ....Glasgow.

ASSOCIATE.

John Carter, London, having passed the Modified examination and tendered his subscription for the current year, was elected an Associate of the Society.

Mr. Richardson asked when the Modified examination would cease.

Mr. Bottle said when they got a new Act of Parliament.

The President said all who were on a certain register were entitled to come up for the Modified examination.

Mr. Robbins asked how many came up in the course of the year.

The Secretary said about 20 or 25 per annum. There were, he believed, about 1200 men still eligible to pass the Modified examination.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Allen, Ernest Edward	Winchester.
Bradley, Frederick William	Wisbeach.
Clarke, William Seth	Coventry.
Hall, Ernest Edward	Wednesbury.
Hepple, Thomas	North Shields.
Hill, Major	Sleaford.
Ingham, William Linnell	London.
Middleton, Burton	Ilkley.
Mitchell, Charles Edward	Bolton-le-Moor.
Newman, Alfred Pointon	Crewe.
Staley, Henry	Burton-on-Trent.
Skoulding, William George	Oakham.
Talbot, William Widdowson	Bulwell.
Thomas, William Morgan	Glamorgan.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The names of the following persons who have severally made the required declarations and paid a fine of one guinea were restored to the Register of Chemists and Druggists:—

John Brierley, Barrow-in-Furness.

Archibald James Millar, 2, Railway Terrace, York Road, Wandsworth, Surrey.

MINUTES OF COMMITTEES.

FINANCE.

The report of this Committee was received and adopted, and sundry accounts were ordered to be paid.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£15 to a pharmaceutical chemist, formerly in business, but now out of employment. Applicant has had five previous grants.

£10 to the widow of a chemist and druggist, having three daughters dependent upon her.

£10 to the widow of a late annuitant on the Benevolent Fund.

£10 to a registered chemist and druggist, aged 67, suffering from partial paralysis.

The report and recommendations were received and adopted.

Mr. Savage said he was recently in the town where one of Isherwood's children was placed, and he thought it right to make some inquiry about her. He had not an opportunity of seeing the child, but he heard from an independent source a very nice character, both of the child and the gentleman with whom she was placed.

The Secretary said this information quite agreed with the letter received last month.

INFRINGEMENTS OF THE PHARMACY ACT.

A letter was read from the Solicitor enclosing correspondence with regard to certain cases of alleged infringement. The Council, according to the usual practice, went into Committee to consider the various matters referred to.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page* 175).

Proximate Analysis of the Rhizome (Dried and Decorticated) of Zingiber Officinalis, and Comparative Examination of Typical Specimens of Commercial Gingers.

BY J. C. THRESH, F.C.S.,

Pharmaceutical Chemist.

Part II.—Comparative Examination of the Gingers of Commerce.

For the above purpose Mr. Umney kindly selected for me a typical specimen of each of the varieties found in commerce, viz., Jamaica, Cochin and African.

No. 1. Jamaica ginger. A fine B.P. specimen. Irregular lobed decorticated pieces, three or four inches long, sub-compressed, yellowish-white, but not chalky on surface. Fracture short, mealy. Powder yellowish-white.

No 2. Cochin ginger. Irregularly lobed pieces, decorticated, two or three inches long, a little smaller than the Jamaica, and pale brown externally. Fracture, fibrous, short. Powder yellowish-white.

No. 3. African ginger. Short irregular coated lobes, of a brown colour. Fracture short, rather resinous. Powder brown.

Moisture and Volatile Oil.—A quantity of each of the above was reduced to powder, and small weighed portions placed in tared dishes on the water-bath, until they ceased to lose weight and no longer retained an odour of ginger.

No. 1. 1·652 grams lost ·234 or 14·17 per cent.
„ 2. 1·311 „ „ ·195 or 14·88 „
„ 3. 1·476 „ „ ·235 or 16·13 „

Ash.—The above quantities were burnt at a dull red heat, cooled in dry air, and rapidly weighed.

No. 1 yielded ash weighing ·059 or 3·57 per cent.
„ 2 „ „ ·063 or 4·80 „
„ 3 „ „ ·063 or 4·27 „

Ethereal Extract.—Twenty grams of each were packed in small percolators, and ether passed through to exhaustion. For this purpose the African required twice as much of the solvent as the Jamaica and Cochin. The ether was driven off at a low temperature, and the residue kept on water-bath until the loss of weight between consecutive weighings at short intervals was trifling.

No. 1 extract weighed ·658 grams.
„ 2 „ ·993 „
„ 3 „ 1·613 „

Volatile Oil.—The above residues were kept for eight to ten hours upon a chloride of calcium bath, until they no longer lost weight.

No. 1 extract lost ·150 = ·75 per cent. volatile oil.
„ 2 „ ·270 = 1·35 „ „
„ 3 „ ·323 = 1·61 „ „

A second determination of above was made by treating fresh portions of the powdered ginger with petroleum ether (boiling at 50° C.), removing ether by, first, a current of air, and, second, exposure for a few minutes to a temperature of 100° C. The extracts were then kept at about 115° C. until the weights were constant.

No. 1 gave results corresponding to ·830 per cent. volatile oil.

No 2 gave results corresponding to 1·14 per cent. volatile oil.

No. 3 gave results corresponding to 1·97 per cent. volatile oil.

No. 4 gave results corresponding to 1·38 per cent. volatile oil

No. 4 was the sample used in investigation of proximate constituents of ginger. The amount of volatile oil actually obtained from 28 lb. of this ginger was as before stated $5\frac{1}{2}$ ozs. or 1·23 per cent., and as this was undoubtedly not the whole of the oil contained in the ethereal extract, the above determinations may be taken as close approximations.

Deducting the volatile oil, from the moisture + volatile oil, we have—

Moisture in No. 1, 13·42 per cent.
„ „ 2, 13·53 „
„ „ 3, 14·515 „

Soft Fat, Resin δ and Wax (?). The ethereal extracts were next treated with small portions of petroleum ether to extract the fat, etc., the ether driven off, the residues washed with a little proof spirit, dried and weighed.

No. 1 yielded ·140 grams or ·7 per cent.
„ 2 „ ·241 „ 1·2 „
„ 3 „ ·245 „ 1·22 „

Neutral Resin.—The residues insoluble in petroleum ether were exhausted with proof spirit, and the washings of petroleum ether extracts added thereto. The portions insoluble in proof spirit consisted of the neutral resin, which was dried and weighed.

No. 1 weighed ·173 = ·865 per cent.
„ 2 „ ·190 = ·950 „
„ 3 „ ·461 = 2·305 „

Gingerol.—The above proof spirit solutions were precipitated with basic lead acetate, filtered, evaporated, and residue washed with dilute acetic acid, dried and weighed. This residue consisted of the active principle with traces of resins α and β. The lead precipitate retained traces of active principle, so that these determinations, gingerol and resins α and β are mere approximations.

No. 1 yielded ·132 or ·66 per cent.
„ 2 „ ·120 or ·60 „
„ 3 „ ·290 or 1·45 „

Resins α and β.—Calculated by difference we have from—

No. 1. ·063 gram or ·315 per cent.
„ 2. ·172 „ or ·860 „
„ 3. ·294 „ or 1·470 „

Aqueous Extract—The portions of the original gingers insoluble in ether were dried and mixed with water until each measured 400 c.c.'s. The mixtures were stirred at frequent intervals for several days, the insoluble portions then allowed to subside, 20 c.c. (= 1 gram ginger) of the clear supernatant fluid removed from each, evaporated to dryness and weighed, and the ash afterwards ascertained by ignition and re-weighing.

No. 1 gave ·143 extract less ·023 ash = 12·0 per cent.
„ 2 „ ·146 „ ·025 „ = 12·1 „
„ 3 „ ·105 „ ·030 „ = 7·5 „

Substance Precipitated by Acids.—Other portions of 100 c.c. each (= 5 grams ginger) were acidified with acetic acid, allowed to stand for a few hours, then warmed, and filtered through tared filters, the precipitates washed with a little dilute acid, dried and weighed.

No. 1 yielded ·266 less ash ·0035 = 5·25 per cent.
„ 2 „ ·262 „ ·0045 = 5·35 „
„ 3 „ ·235 „ ·005 = 4·60 „

Mucilage.—The acid filtrate and washings from above were evaporated to 20 c.c., and mixed with 60 c.c. of 95 per cent. alcohol. (In each case during the evaporation a little flocculent matter was deposited, but the amount was too small to materially affect the estimations.) The mixtures were set aside for a day, the precipitates then thrown upon tared filters, washed with a little alcohol, dried and weighed, and the ash afterwards determined and deducted.

No. 1 yielded ·1725, ash ·053 = 2·39 per cent.
„ 2 „ ·1155 „ ·043 = 1.45 „
„ 3 „ ·097 „ ·038 = 1·19 „

Organic Acids, etc.—The combustible portion of aqueous extract unaccounted for consisted of malic (?) and oxalic acids, an indifferent substance precipitated by tannin and possibly other bodies. These amount in

No. 1 to 4·36 per cent.
„ 2 to 6·80 „
„ 3 to 1·70 „

Alcoholic Extract.—The marcs insoluble in ether and water were drained upon filters, re-packed in the percolators, and 84 per cent. alcohol passed through so long as anything was dissolved. (200 c.c. in each case) The Jamaica and Cochin tinctures had a pale amber tint, the African a pale brown. 40 c.c. of each were evaporated to dryness and the residue weighed.

No. 1 gave ·016 or ·4 per cent.
„ 2 „ ·011 or ·28 „
„ 3 „ ·025 or ·625 „

The residues from treatment with ether, water and alcohol were next digested in sufficient 1 per cent. soda solution to measure 400 c.c. The Jamaica ginger yielded a mucilaginous solution, in which the insoluble matter settled very slowly; the Cochin ginger gave but a slightly mucilaginous solution, whereas the African variety yielded a perfectly limpid infusion. 50 c.c. (= $2\frac{1}{2}$ grams ginger) were neutralized with acetic acid mixed with 100 c.c. of 95 per cent. alcohol, and allowed to stand for a day. The precipitates were then collected on tared filters, washed, dried, weighed, then ignited and the ash estimated.

No. 1 yielded ·731, ash ·029 = 28·08 per cent.
„ 2 „ ·210, „ ·007 = 8·12 „
„ 3 „ ·049, „ ·0015 = 1·86 „

Starch.—The remainder of the alkaline infusions were in each case diluted to 1200 c.c., boiled for a few minutes, allowed to cool to 50° and digested at the latter temperature for forty-eight hours with a little diastase. 50 c.c. were then taken and boiled with 8 c.c. of dilute sulphuric acid (1 in 8) until the fluid ceased to react with iodine, or the volume was reduced to 50 c.c. After cooling the solutions were each run into 10 c.c. of Fehling's solution (= ·044 gram starch), until the blue tint disappeared.

No. 1. 14·9 c.c. = ·044 starch or 18·12 per cent.
„ 2. 17·1 „ = ·044 „ 15·79 „
„ 3. 20· „ = ·044 „ 13·50 „

Pararabin and Calcium Oxalate.—The residues insoluble in caustic soda and boiling water were slightly washed by subsidence and decantation, and mixed with sufficient 1 per cent. hydrochloric acid to measure each 400 c.c. After macerating twenty-four hours, they were boiled for a few minutes, and 50 c.c. (= $2\frac{1}{2}$ grams ginger) of each, filtered, neutralized with ammonia, and diluted with three volumes of 95 per cent. alcohol. The addition of ammonia to the Jamaica infusion caused a slight turbidity; the Cochin infusion was not affected, but a rather bulky brown gelatinous precipitate was produced in the African solution. The ammonia and alcohol precipitates were collected on tared filters, dried and weighed, then incinerated and the ashes weighed. The ashes from the Cochin and Jamaica gingers consisted of CaO derived from the calcium oxalate in acid solution; the African ash was of a brown colour, and contained manganese.

No. 1. Pararabin and calcium oxalate ·025 = 1·00 per cent.

No. 2. Pararabin and calcium oxalate ·374 = 14·96 per cent.

No. 3. Pararabin and calcium oxalate, etc., ·273 = 10·92 per cent.

The ash of No. 1 weighed ·010 = ·914 per cent. of calcium oxalate.

The ash of No. 2 weighed ·006 = ·580 per cent. of calcium oxalate.

The ash of No. 3 weighed ·085, but of this only ·022 was CaO, equivalent to 2·04 per cent. CaC_2O_4. Deducting the proportions of this salt from the result of last experiment, we have the yield of pararabin in

No. 1. ·086 per cent.
„ 2. 14·40 „
„ 3. 6·36 „

(the ash not CaO also being deducted).

Cellulose.—The marcs from treatment with dilute acid were digested for several days with constant agitation in nitric acid of sp. gr. 1·16, to which a little powdered potassium chlorate had been added. The insoluble portions, which were nearly colourless, were washed successively with water, dilute ammonia and alcohol, then dried and weighed.

No. 1 yielded ·7 cellulose = 3·5 per cent.
„ 2 „ ·75 „ = 3·7 „
„ 3 „ 1·25 „ = 6·25 „

Albuminoids.—Portions of the original gingers in powder were burnt with soda lime as in Will and Varentrap's method, and the ammonia estimated as double chloride of platinum and ammonium. As the precipitates were rather dark in colour, one of them was ignited, and the platinum weighed. The results were closely concordant.

1·069 gram No. 1 yielded ·245 pt. salt = 1·38 per cent. N.
1·360 „ „ 2 „ ·193 „ = ·891 „
1·130 „ „ 3 „ ·094 „ = ·522 „

In a second determination of the No. 1,

·833 grams yielded ·211 pt. salt = 1·44 per cent. N.

Taking one part of nitrogen as representing 6·25 parts of albuminoids, and neglecting to take into consideration the small percentage of nitrogen in the substance precipitated by acids, we obtain the following proportions:—

No. 1. 8·8 per cent. albuminoids.
„ 2. 5·57 „ „
„ 3. 3·27 „ „

Vasculose, Pectose, Loss, etc.—These have simply been calculated by difference. Thus, in No. 1, 91·908; in No. 2, 85·237; and in No. 3, 67·695 per cent. has been accounted for, leaving in

No. 1. 8·092 per cent.
„ 2. 14·763 „
„ 3. 32·305 „

to represent the fibrous and pectic matters, loss, etc.

Tabulated Results of Analyses.

	Original Sample.	No. 1.	No. 2.	No. 3.
Volatile Oil . . .	1·380	·750	1·350	1·615
Fat, Wax(?) and Resin (P. ether solution) .	·835	·700	1·205	1·225
Neutral Resin . . .	·915	·865	·950	2·305
α and β Resins . .	1·300	·315	·865	1·470
Gingerol	1·210	·660	·600	1·450
Substance precip. by acids	4·600	5·250	5·350	4·650
Mucilage	1·600	2·390	1·450	1·190
Indifferent Substance precipitated by Tannin	1·500	} 4·360	6·800	1·700
Organic Acids, etc. .	1·750			
Extractive (soluble in S. V. R., not in Ether or Water .	·800	·400	·280	·625
Alkaloid	a trace.	a trace.	a trace.	a trace.
Metarabin	23·880	28·080	8·120	1·860
Starch	18·750	18·120	15·790	13·500
Pararabin	2·490	·086	14·400	6·360
Oxalic Acid (as CaC_2O_4) . . .	1·240	·642	·427	1·440
Cellulose	5·710	3·500	3·750	6·250
Albuminoids . . .	6·880	8·800	5·570	3·270
Vasculose, etc.. . .	9·080	8·092	14·763	32·305
Moisture	11·020	13·420	13·530	14·515
Ash	5·060	3·570	4·800	4·270
	100·	100·	100·	100·

	Original Sample.	No. 1.	No. 2.	No. 3.
Ethereal Extract . .	5·64	3·28	4·97	8·06
Aqueous „ . .	9·45	12·00	12·10	7·50
Alcoholic „ . .	·80	·40	·28	·63
Alkaline „ . .	23·88	28·08	8·12	1·86
Starch	18·75	18·12	15·79	13·50
Acid Extract . . .	4·32	1·00	14·96	10·92
Cellulose, etc. . . .	21·08	20·13	25·45	38·74
Moisture	11·02	13·42	13·53	14·52
Ash	5·06	3·57	4·80	4·27
	100·	100·	100·	100·

Comparison of these results reveals the singular fact that the variety of ginger most esteemed contains only about half the quantity of essential oil found in the other varieties, and less of the active principle than either the African or common Jamaica, and about as much as good Cochin. It would be interesting to have prepared samples of the essential oils from these various sources, in order to ascertain their physical and chemical properties. But as possibly in all cases the aroma would be affected by distillation, it would be necessary to devise some other method of obtaining them. Undoubtedly the volatile oil in the finest Jamaica gingers possesses a finer bouquet than the others.

The very dark colour of tincture of ginger when made from the African rhizome is evidently due to the large percentage of the neutral, α and β, resins contained therein, and as these are tasteless and apparently inert, their presence only deteriorates the value of the ginger.

The most striking difference in the constitution of the varieties examined is the relative proportions of metarabin and pararabin which they contain. It is easy to distinguish between a sample of Jamaica and one of Cochin ginger, when in powder, by maceration for forty-eight hours in a 1 per cent. soda or potash solution. If, however, the fibrous portion of the rhizome has been removed by sifting, as is generally the case with the finer qualities of powder, the test does not give such decided indications, from which it may be inferred that the fibrous portion is the seat of this metarabinoid substance.

The same author also read a paper on—

Soluble Essence of Ginger.

BY J. C. THRESH, F.C.S.

Since the publication of my short paper on the above subject, which was read at the Conference last year, I have received a number of letters from chemists, and others interested, some containing suggestions, others queries. These chiefly referred to the essence becoming turbid after being kept some time, and to the evident loss of active principle, in the magnesia precipitate, this being exceedingly pungent.

To remedy these defects the following modification of the process was devised, by which almost all the active principle is removed from the precipitate, and the product does not become turbid by keeping, as is evidenced by the sample upon the table, which was made before last Christmas.

Take of strong tincture (1 to 1) of finest Jamaica ginger one pint, add in small portions at a time finely powdered slacked lime, shaking vigorously after each addition, until the tincture ceases to lose colour, throw the whole upon a filter, and pass through the residue proof spirit until the product measures two pints. Now add drop by drop dilute sulphuric acid until the rich yellow colour of the tincture suddenly disappears, let stand for twenty-four hours, filter, dilute with water to four pints, shake with a little powdered pumice or silica (by no means lime or magnesia), and filter at 0° C. if possible.

Rationale of the Process.—As may be gathered from a consideration of the constituents of ginger root, the alcoholic tincture will contain besides the extractive soluble in water, which need not further be considered, essential oil, neutral resin, α and β resins, gingerol, and small quantities of the red fat, wax (?) and peculiar extractive insoluble in ether. Upon agitating the tincture with lime the greater part of the α and β resins is removed, and by addition of the acid the lime which has entered into solution is precipitated. The addition of water precipitates the neutral resin, wax, fat, and peculiar extractive, and unless the ginger from which the original tincture was prepared was poor in oil, the excess of volatile oil also.

As in probably all cases the soluble essence is saturated with essential oil, the final filtration must be effected at a lower temperature than any to which the essence is likely to be exposed.

The product as thus obtained is very pale in colour, but if a darker essence is preferred it is only necessary to add one or two drops of solution of potash to give an alkaline reaction, when the rich orange tint due to the action of the alkali upon the β resin will be immediately produced.

The PRESIDENT congratulated Mr. Thresh upon his able report, and congratulated the Conference on being the means of inducing him to pursue his inquiries on this truly pharmaceutical subject.

Mr. UMNEY (London) said scientific chemists and pharmacists were greatly indebted to Mr. Thresh for having brought this subject forward. It had been a standing disgrace that a drug they daily handled in a variety of forms, such as African, Cochin and Jamaica ginger, was not thoroughly understood by them. Mr. Thresh had placed the subject before them very exhaustively, and from his paper they would be able to follow with certainty the pharmaceutical aspect of ginger. The soluble essence of ginger was a most elegant preparation, and useful for the manufacture of aërated water. The difference noticed in specific gravity of portions of the volatile oil was probably due in the main to the different processes by which the oils had been obtained. Those who had distilled essential oils knew that according to the heat used in their production they differed slightly in specific gravity. No doubt, according to whether this oil were made with petroleum spirit, or by distillation, the specific gravity would vary somewhat.

Mr. GREENISH remarked that he had examined microscopically sections of Jamaica and African ginger root, and found that a very large amount of starchy matter was developed in the Jamaica root as compared with the African ginger; but African ginger, if subjected for a series of years to the same amount of cultivation as Jamaica ginger, might possibly lose some of its pungent character, and develop starchy matter to an equivalent extent.

Mr. W. L. HOWIE (London) adverting to Mr. Thresh's statement that the oil of ginger odour did not recall that of ginger, said he was inclined to think that possibly the smell was masked by that of the petroleum spirit used in its extraction. The difference in the specific gravity of the oils was due to some extent to the method followed, but it might also be due to a change which he believed took place in the oil when it had been kept some time. A small quantity of oil of ginger, which he had had in his possession some years, and which had, he believed, been made by distillation, he found to be but sparingly soluble in rectified spirit—not more perhaps than one in ten, and even with one in fifty there were still left some small whitish globules, which, when separated and exposed to heat, dried into a clear glassy resin, with scarcely any odour or taste. After exposing a little of the oil, for some days, in a watch-glass to a temperature of 100° F., there remained a resinous residue like the other in appearance. He made these remarks in order that Mr. Thresh's attention might be directed to the further examination of the oil so as to discover whether or not it was a compound, and what was the character and extent of the change which occurred in it when kept for a long period.

Mr. MARTINDALE (London) observed that from a medical point of view and having before them the prospect of a new Pharmacopœia, it was doubtful whether it would be advisable to introduce soluble essence of ginger into it or not; although as a commercial article it might be very useful. The syrup of ginger was, in the present Pharmacopœia, prepared from the essence and did not make a very elegant preparation. It might be improved if it were not opaque, but prepared from a soluble essence. The old London syrup was made from an infusion, which contained the metarabin Mr. Thresh had mentioned and made it a mucilaginous, and not very satisfactory preparation.

Mr. F. B. BENGER (Manchester) remarked that the paper, which was by a pharmaceutical chemist actively engaged in their business, was of great practical value and might be taken as the type of the sort of papers it was desirable to bring before the Conference.

Mr. THRESH, in replying, said that he thought the essential oil exhibited did not smell of petroleum spirit. He had distilled a sample of the oil directly from an ethereal extract, and found that it had exactly the same odour as that distilled from petroleum extract; it was therefore quite impossible for it to have the odour of petroleum. He had observed (as also had Mr. Umney) that in distilling an ethereal or alcoholic essence of ginger a considerable quantity of oil came over at that low temperature, and he felt confident that this more volatile portion, which was lost, had the finest aroma. Again, he did not think it desirable to put the soluble essence of ginger into the Pharmacopœia for its own sake; but, as suggested by Mr. Martindale, it might be advisable to employ it for making the syrup of ginger, as the syrup thus prepared was really a much more elegant one than that made by the officinal process. The active principle was certainly very soluble in dilute spirit, but as the soluble essence must contain some essential oil also, it was impossible to make it of equal strength with the B.P. strong tincture; nevertheless by removing the inert resins they were enabled to make a stronger solution than would otherwise be possible.

The PRESIDENT asked if Mr. Thresh had made any special examination into the nature of the oil itself, as to its boiling point.

Mr. THRESH said he had not. His time was limited and the isolation of the active principle took so much time that he had not been able to pursue the subject further.

Professor ATTFIELD hoped Mr. Thresh would continue the investigation further, and examine the oil as well as the other principles, applying to the committee for a grant to cover any outlay.

The PRESIDENT was exceedingly glad so many able men had spoken of the value of the paper, and he hoped they would join him in passing a very hearty vote of thanks to Mr. Thresh for his able report.

The motion was carried unanimously.

The Conference then adjourned for luncheon.

After returning from luncheon the first paper read was on—

THE GROWTH AND DEVELOPMENT OF CLAVICEPS PURPUREA (Tulasne).

BY W. W. STODDART, F.C.S., F.G.S., ETC.,

Lecturer on Forensic Medicine at Univ. Coll., Bristol.

At the end of the year 1877, a farmer residing in the neighbourhood of Bristol requested me to investigate the death of some sheep which had taken place every autumn without any assignable cause, so much so that a heavy loss was annually incurred. Many visits were consequently paid to the farm for the purpose of finding out the cause of disease. I noticed that the sheep were fed only on the natural herbage grown on the spot. It consisted of two kinds of clover, the ordinary Dutch (*Trifolium repens*, L.), and the common purple (*T. pratense*, L.). With these were the ray grass (*Lolium perenne*, L.), or as it is commonly but erroneously spelled "rye" grass. A strict inquiry being made as to the symptoms, the farmer informed me that they were always the same and generally supervened in the month of August, when this very peculiar illness on the farm became prevalent. It took the form of dysentery, inflammation of the bowels, diarrhœa, the evacuations resembling coffee grounds, afterwards succeeded by exhaustion, collapse and death.

Analyses of water and the soil were made for the purpose of detecting any deleterious metal or other irritant poison. No satisfactory result followed and the cause of the illness seemed to be mysterious and inexplicable. At length I heard that the ewes sometimes slipped their young, which gave a remote suspicion that the cause of all might be due to ergotism. An inquiry was then made as to the presence of gangrene, when the unexpected but significant remark was made, that although the farm was on a dry, porous, sandy slope, yet the sheep always had the "foot rot," even in the summer, which defied all the remedies that usually proved effectual. With this idea in my mind and while watching the lambs feeding I noticed that they avoided the old mature plants, while they greedily devoured the young green ones.

On examining more minutely the former, I noticed several well formed, purplish, dark coloured ergots were projecting from the paleæ, but could not discover a single specimen on the younger fresh plants. Several of these ergots were then taken home for chemical and microscopic examination. I made a considerable number of sections which exactly coincided with the beautiful and truthful engravings in the paper by Tulasne, in the 'Annales Sc. Nat.' for 1853, Sur l'Ergot des Glumacées. While here, I must stop to express my admiration both at the accuracy of these microscopic delineations and the description of the metamorphoses of this curious fungus. I thought that this would be a good opportunity of studying the growth of this vegetable, and that the result of my observations during the following year may prove to be of some service in the cause of pharmacy.

During the next few months I had only the old and nearly dead stems of the *Lolium* on which I could work, but on the 12th of April I obtained some specimens of the *Lolium perenne* in which the commencement of the inflorescence was just to be observed. Soon afterwards I made several sections of caryopsides, on which were many thousands of conidia, which seemed rapidly to multiply and to completely fill some of the grains till they protruded far beyond the glumes. In two or three days the sclerotium stage of the mycelium began to change colour and assumed a purplish brown tinge. The sclerotium seemed now to have arrived at what was formerly termed the "sphacelia" condition, and was soft, while the upper portion was wrinkled. The exterior was white from the growth of the hyphæ, which seemed to grow with marvellous rapidity till at length only a small portion of the pistil remained free. Although the conidia were so numerous, I never noticed any on the andrœcium, even when examined with a one-sixth of-an-inch object glass, while close to them four or five of the caryopsides were completely filled with the little conidia, which are blunt and ellipsoid bodies about $\frac{5}{1000}$ mm. to $\frac{7}{1000}$ mm. in length, and from $\frac{3}{1000}$ mm. to $\frac{45}{10000}$ mm. in breadth. They are curved and divided into two parts, each part containing a nucleus. On touching them with a drop of diluted sulphuric acid, a cilium or minute flagellum was extruded, and when placed in water had a vibratile motion. On examining suspected flour, bread or pastry, the microscope would always show these conidia, especially with the addition of a little chromic acid.

In the third week of May several small drops of a syrupy substance made their appearance on the stem near the spikelet. If dissolved in a little distilled water and placed under the microscope, the solution would be seen to contain the conidia, and hence I suppose gave rise to the supposition that the honey-dew was intimately connected with the formation of ergot by aiding the growth of the mycelium. But it most probably only attracts and adheres to insects, who by this means convey the conidia to other spikelets and thus spread the infection to other grains. This saccharine mixture instantly reduces the copper solution of Trommer's test, thus showing the presence of sugar. When boiled, a slight milkiness is produced and not removed by nitric acid in excess, pointing out the presence of albumen. At this period the ergot attains its full development and gives no blue with iodine, because by the well-known metastatic power of fungi all starch is removed and an oil substituted. Of this oil, ergot sometimes contains about a third part of its weight.

At this period of its growth each sclerotium gives off the odour of trimethylamine when treated with potass, and produces a red colour. With spontaneous evaporation, after mixing the honey-dew with alcohol and a little ether, minute octahedra of mycose are formed and may be seen with the lens.

On July 18th I first gathered fully formed and mature ergots, which I now produce. They have a dark exterior with a white interior and give the ordinary red infusion.

On August 1st one of the lambs was taken ill with the usual inflammatory symptoms. The feet also in a few days had a gangrenous appearance, which did not seem to be alleviated by any of the usual applications of silver nitrate, carbolic or cresylic acids. The affection of the feet strongly reminded me of "clavellization," so destructive among the flocks of Italy, France and Moravia, and has frequently been supposed to have been a variety of variola.

The fungus has now reached the limit of its vegetative or myceloid growth, which plainly ends at the sclerotium stage as our medicinal agent called ergot, by means of which the embryo and most of the caryopsides have been destroyed.

The hyphæ are now ready to spread in every direction and thus extend the vegetative growth, from which only we derive the peculiar medical properties of the *Claviceps* in their greatest intensity and power on the animal economy, and it is now that the greatest effects are produced which are included under the name of "ergotism."

A *post mortem* examination of the sheep showed the presence of the conidia among the "coffee ground" looking fæces. The fungus having now arrived at this stage awaits for appropriate weather and other suitable conditions for the fructifying metamorphosis.

At the end of August one or two of the ergots that had fallen with the stems of the grass on the damp ground I placed, for more convenient observation, on the moist soil of a flower pot. In a few days I noticed on the dark cuticle of the sclerotium several minute excrescences from which gradually emanated some stalks about 11 to 18 millimetres in length, each supporting a minute round head about 4 millimetres in diameter, in fact furnishing good characteristic specimens of *Claviceps purpurea*.

It is not to be wondered at that these fungi should have received the names of sphœria or torrubia, because they so much resemble the growth so often described as being found on the heads of caterpillars or larvæ, and used as a medicine in China and Japan.

A very remarkable change now took place in the oil that was so noticeable as long as the condition of sclerotium continued, but directly the mature *Claviceps* appeared the oil oxidized, dried up and was found no longer. The round heads of the fungus now became covered with a large number of brown dots, which eventually became the openings of pear-shaped sacs or asci of the perithecium. If a section was made with a sharp scalpel each ascus was seen to be filled with a glutinous substance containing seven or eight spores. These last adhered to the ergot, looking like a powdery coating and causing the production of many thousands of conidia on each ergot and ready for the evolution of fresh mycelium.

This seems to me the true mode of development of *Claviceps*. It commences and proceeds with the vegetative growth till it reaches the sclerotium stage and at that period possesses in the greatest vigour the medicinal characteristics of ergot.

I have, I think, conclusively found that ergot has the greatest medicinal power in the month of August, and that the experience of six or seven years shows that the same changes take place in the plant at the same period of every year.

It has been known to medical men that the so-called essences of ergot are so uncertain in their efficacy that many, in order to ensure success, have determined to use the powder itself. Dr. Kluge, of Berlin, observed some years since, that for some reason or other the properties of ergot varied according to whether it was gathered *before or after the harvest*. In the former case it had an energetic action, while in the latter it was frequently powerless.

The sheep were distinctly seen to choose the young green grasses and to particularly avoid the older and ripe ones, probably directed by the odour of trimethylamine, for I found that I could not produce this odour till the sclerotium was fully developed and the starch completely gone.

I therefore think the following conclusions may be safely drawn—

1. That for all medicinal purposes, or pharmaceutical preparations, ergot ought to be gathered in the months of August or September.

2. That ergot always attains its greatest intensity at the end of the vegetative period.

3. That the medicinal powers of ergot diminish or disappear as soon as the fructifying period commences.

I have chemically and microscopically examined the ergots produced from the *Lolium perenne* while the plants have been living. The infusion was first treated by the ether process of Stas. On the evaporation of the ether an oily residuum was obtained containing a minute quantity of a resinous substance. The extract was then dissolved in alcohol, afterwards mixed with water and filtered. Chloriodide of mercury caused a precipitate reminding one of a vegetable alkaloid.

I did not detect any crystals of cholesterine that are said to exist in *Secale cornutum*, but phosphoric acid was clearly shown by using molybdate of ammonia and nitric acid.

In toxicological investigations the microscope is the most to be depended upon. The conidia are very abundant and may always be detected in bread, pastry or flour, especially if acetic or chromic acids be used to make their presence more evident. The one-sixth or one-eighth of an inch is a sufficiently high power. I always find that this mode of detection is preferable to the use of potass and distillation alone. The little conidia may be generally observed in the intestinal canal of a poisoned person or animal.

The PRESIDENT, in inviting discussion, remarked that the Conference had been favoured by Mr. Stoddart with an extremely suggestive and interesting paper.

Mr. LUFF said he should like to ask two questions of Mr. Stoddart. Some months ago a toxicological case was entrusted to him for investigation. It was that of a young woman's stomach in which ergot was found. He would ask Mr. Stoddart whether he noticed in the stomachs of the sheep during *post mortem* examinations very rapid decomposition. He was present at the *post mortem* examination of the young woman and very rapid decomposition set in during the course of twenty-four hours. At the inquest the medical witnesses wished to show that that proved the presence indirectly of ergot. He also wished to ask Mr. Stoddart whether he noticed the presence of the poison in the second or in the fourth stomach of the sheep.

Mr. THRESH said he should like to know definitely whether it was the same fungus that produced ergot in the rye grass as produced it in the rye.

Mr. GREENISH thought this an extremely interesting subject to pharmacists, because ergot was the only fungus in the Pharmacopœia. To investigate the subject properly it really required a knowledge of botany, of the microscope and of fungology. It was important to observe that the ergot just referred to was not ergot of rye, but an ergot from one of the grasses, and it appeared to have been exceedingly active and very poisonous. There had been lately presented to the Museum of the Pharmaceutical Society some of the ergot of Diss, also a grass ergot from Algeria which was longer and more slender than the ordinary ergot of rye. It was said to be a much more active ergot. There had not been sufficient opportunity yet to enable this point to be decided, but it would be possible to get any quantity from Algeria. There was one point he could not very well understand. Mr. Stoddart had said that the ergot on the young grass was very poisonous to sheep; and he (Mr. Greenish) assumed that on the young grass it would not be the fully developed ergot. At the same time Mr. Stoddart had stated that the ergot for pharmaceutical purposes would be best obtained fully developed, and the fully developed ergot could not be got until about the month of August. He asked how it was that the ergot was more active before it was fully developed on the young grass, and yet that it should not be obtained for pharmaceutical purposes until it was fully developed.

Mr. UMNEY said, with regard to the closing statement of Mr. Stoddart's remarks on the pharmacy of ergot, viz., "that the preparation of ergot must either be an ethereal or an ammoniacal one," he would say that he must take exception. The ether directed in the Pharmacopœia process was used to extract the fixed oil, and for the preparation of the extract the ether was driven off and the oily residue thrown away, the preparation therefore was an aqueous one.

Professor ATTFIELD said that probably many cases of poisoning which had hitherto puzzled analysts were explicable now with the facts which Mr. Stoddart had brought forward. A few weeks ago he had had one of these puzzling cases brought under his own notice; and he mentioned it because he thought a great deal of light had been thrown upon it by what he had heard from Mr. Stoddart, and because it to some extent supported Mr. Stoddart's conclusions. Some heifers which were turned into a particular pasture died. He examined the contents of the stomachs of these animals, but could find no trace whatever of any of the ordinary poisons or even of unusual poisons. He suggested that the farmer should instruct a botanist to examine the pasturage for poisonous plants or plants which would be likely to produce irritation enough to cause death; but he examined the contents of the stomach microscopically as well as chemically and found present crowds of minute bodies which he now thought must be the conidia to which Mr. Stoddart had referred. They were minute things seen very easily with a quarter inch power. They were somewhat sausage shaped, only thicker at one end than the other; and they afforded evidence of structure. He believed they were identical with those alluded to by Mr. Stoddart.

Mr. STODDART, in summing up the discussion, alluded first to the question put by Mr. Luff as to putrefaction taking place in the stomach. He generally found that blood was the first thing to putrefy; and he believed that what he had alluded to as being comparable to coffee grounds was simply coagulated blood. Whenever he got a stomach—and they were very frequently brought to him—and he saw there was much congestion—in other words, much blood—he assumed that probably strychnine had been used. So accustomed had he been to see the effects of strychnine that he was often able to say whether animals or men had been poisoned by that means, as decomposition would set in sooner than by the use of any other poison. He had usually found that to be the case. In answer to Mr. Greenish he repeated what he had previously stated, that the best time to gather ergot was in its maturity in the sclerotium condition. With regard to Mr. Umney's observation it only proved what he had said, that doctors differed considerably.

The President said the Conference was much obliged to Mr. Stoddart for his extremely interesting paper, and gave him a cordial vote of thanks for his labours in this direction. *(To be continued.)*

BRITISH ASSOCIATION.

The Process of Investigation in the Exact Sciences.*

BY G. JOHNSTONE STONEY, M.A., F.R.S.

The process of investigation in the exact sciences is fundamentally one in all cases. It has been well described by Mill in the third book of his 'Logic.' Nevertheless it is notorious that minds which are well fitted for some branches of physical inquiry find difficulty—sometimes insuperable difficulty—in pursuing others. It is not every eminent mathematican who would have made an equally good chemist, or *vice versâ*. This is because there exists a practical distinction separating the investigation of exact science into two well-marked classes when they are viewed, not as they are in themselves, but in their relation to the powers of us human beings. I refer to the distinction between the experimental method or the method of observation, on the one hand; and the deductive method, or the method of reasoning, on the other. All valid investigations in exact science appeal to what can be directly perceived, and all lead to a conclusion which can be reasoned out from it; but there are some of these investigations in which the main difficulty consists in making the appeal to the senses, and there are others in which the main difficulty lies in the process of reasoning.

To contend with these difficulties successfully requires very different qualities of mind and body. In experimental science the powers principally called into requisition are readiness and closeness of observation, dexterity in manipulation, skill in devising expedients, accuracy in making adjustments, and great patience. It also requires that the investigator should have an accurate memory of what else he has witnessed resembling the phenomenon under observation, that he should be quick to detect every point of agreement and difference that can be perceived, and be skilful to select those which are significant, and to employ them as materials for provision to guide his further proceedings. But the strain on the reasoning powers is generally less, often of trifling amount. The question is put to Nature, and it is Nature usually that gives the bulk of the answer. The most striking monument of splendid achievements by the experimental method of investigation unaided by the deductive method is to be found in the science of chemistry.

An equally typical instance of the power of the deductive method is the science of mechanics. This science, which has sunk deeper into the secrets of Nature than any other science, and which is the science towards whom all other physical sciences are at present more or less gravitating, is essentially deductive. There is little or no difficulty about its fundamental data. They are facts of Nature so patent to all men, and so indelibly implanted in human conception, that some persons have supposed that we have an intuitive perception of them. But, while the materials from which the mind is to work are thus easily obtained, it has taxed to the utmost the reasoning powers of understandings like Newton's to evolve the few consequences of them which are already known, and the investigator has to call to his assistance every aid to prolonged consecutive thought which mathematicians can devise.

In grappling with the problems of Nature we are seldom allowed the choice of the method of investigation we shall employ. This is commonly settled for us and not by us. Where we cannot advance without further information, we must make further observations, *i.e.*, we must employ the experimental method, the appeal *ad experientiam*: where we cannot advance without understanding better what the information we possess really amounts to, we must employ the deductive method.

No reach of intellect applied to the materials in existence before 1860 could have elicited the fact that iron exists upon the sun. This great discovery was made by Professor Kirchhoff, a scientific man who was equally versed in both methods of investigation. On the present occasion it was the experimental method he employed. He applied to the scrutiny of the sun's spectrum four prisms of the most homogeneous glass that could be procured, figured with the greatest accuracy that the eminent artist Steinheil could attain. He expended far more pains on their adjustment for each successive part of the spectrum than any of his predecessors had done, and he was rewarded by a more perfect vision of the sun's glorious spectrum than had met the human eye before. In a collateral inquiry, suggested by an observation made by Foucault, he and Bunsen placed a metallic vapour emitting bright rays in front of a still brighter incandescent body, so that the light from the brighter background had to pass through this vapour, and they found that this vapour now caused dark lines in the spectrum occupying the positions which its own bright lines had before filled. Professor Kirchhoff thereupon added an appliance to his spectroscope which enabled him to bring a metallic spectrum and the solar spectrum together into the field of view, alongside of one another. On accomplishing this he saw sixty of the brightest of the iron rays as continuations of sixty of the strongest of the dark lines in the sun's spectrum; and by an elaborate scrutiny, he satisfied himself that the observations had been pushed to a sufficient degree of exactness to make sure that a deviation would have been detected in any one of these sixty cases if it had amounted to as much as one-fourth of the average interval between consecutive lines of the solar spectrum. From this it was obvious that the sixty coincidences are not due to chance, but indicate that there is really iron vapour in the path of the rays. It will be observed that Kirchhoff's great merit and the real difficulty of his work lay in the scientific foresight and the industry which were required to frame hypotheses that were worth testing, to guide the investigation by these hypotheses, to contrive, construct, and adjust adequate apparatus, and to make with it the elaborate observations and the exact observations and maps which were necessary. But when by these means the new facts had been brought to light, the inference from them that there is iron in the atmosphere of the sun was an easy one. This example will better convey than a definition what are the characteristic features of an experimental inquiry.

On the other hand, no series of observations or experiments, however skilfully arranged, could have enabled anyone to understand the cause of that familiar but truly surprising phenomenon that a top stands upon its peg while it is spinning. But a full explanation of it is within the reach of any student who will train his mind to reason consecutively, and avail himself of the aids to prolonged consecutive thought which mathematicians have contrived. He will then see that the most obvious and familiar mechanical facts involve as necessary consequences all the phenomena which he finds in the

* Extract from a Presidential Address to the Mathematical and Physical Science Section, August 21, 1879.

schoolboy's top, in the physicist's gyroscope, and in the precision and nutation of the heavens. This then is a problem of Nature which falls within the province of the deductive method.

Wherever data are known exactly, these inferences from these data, however remote, may be depended upon as corresponding with what actually occurs in Nature. And if in such cases the mind of man has proved equal to the task of drawing inferences which can effectually grapple with the problems he finds around him in the Universe—which is, alas! as yet but too seldom—then will the deductive method, our plummet, explore depths in the great ocean of existence which our anchors of experiment could not have reached.

The distinction which is here made between deductive and experimental investigations would have no place in a logical system. But it has direct reference to human convenience, and derives its importance from this circumstance. It is obvious, too, that an investigation may partake of both characters—that it may require all the powers of the scientific observer to get at the facts, or even to appreciate them, and all the resources of the mathematician to elicit the consequences of them. For instance, on beginning his electrical studies, the student of Nature must master a mixed experimental and deductive inquiry to get at the elementary fact that free electricity resides either at or outside the surfaces of conductors; and he must engage in a further inquiry, and one only within the reach of a trained mind, to deduce from this the law of the inverse square. And, again, no full appreciation or even intelligent use of the common electrostatic and electrodynamic measures which he meets at the threshold of his electrical studies is within the reach of the mere experimentalist or the mere theorist. And if this treacherous ground lies before the immature student at his entrance, what shall we say of the bogs he struggles into as he advances? We are perpetually meeting with inquiries of this mixed character in electricity and some of the other physical sciences, but they are comparatively rare in either medicine or chemistry, and none that is difficult lies in the path of the beginner. How many students are there who are made to slur over the above and a multitude of similar difficulties, and who are told that they are learning science, when in fact what they are really learning is the pernicious habit of being content to see Nature through a fog or through other men's mental eyes?

In mechanics valuable progress can be made by the mere mathematician, the student of deductive science; and in chemistry similar progress can be made by the mere experimentalist. Of all the physical sciences these are the most purely deductive, and the most purely experimental. What I desire particularly to invite attention to is that the two great methods of investigation may best be acquired in these two sciences, and that for a really sound grasp of the remaining physical sciences, and especially with a view to further advance in physical science, a command of both methods of investigation is essential.

We must bear in mind, too, that either method of investigation may be misapplied, and that this is a risk carefully to be guarded against. The deductive method when misapplied lands us in speculation, the experimental method becomes empiricism; and it so happens that the sciences of mechanics and chemistry are not only monuments of the power of the two great methods of investigation, but instructive examples of their weakness also. For in chemistry, scarce any attempt at prolonged reasoning, carrying us by any lengthened flight to a distance from the experiments, can be relied on. The result has seldom risen to anything better than speculation. And on the other hand, in mechanics, conclusions which depend on experiments only are empirical; that is, they are deficient in accuracy, and their relation to the other phenomena of the science is left in darkness. Here, then, we find in these two sciences not only how strong these two methods of investigation are, but how weak they may become if misapplied.

Parliamentary and Law Proceedings.

An Act to Continue and Amend the Petroleum Act, 1871.

Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1. This Act may be cited as the Petroleum Act, 1879.

This Act shall be construed as one with the Petroleum Act, 1871, and together with that Act may be cited as the Petroleum Acts, 1871 and 1879.

2. Whereas by the Petroleum Act, 1871, it is enacted that the term "petroleum to which this Act applies" means such of the petroleum defined by that Act as, when tested in manner set forth in Schedule 1 to that Act, gives off an inflammable vapour at a temperature of less than 100° of Fahrenheit's thermometer, and it is expedient to alter the said test: Be it therefore enacted that—

In the Petroleum Act, 1871, the term "petroleum to which this Act applies" shall mean such of the petroleum defined by section 3 of that Act as, when tested in manner set forth in Schedule 1 to this Act, gives off an inflammable vapour at a temperature of less than 73° of Fahrenheit's thermometer.

Every reference in the Petroleum Act, 1871, to Schedule 1 to that Act shall be construed to refer to Schedule 1 to this Act.

3. A model of the apparatus for testing petroleum, as described in Schedule 1 to this Act, shall be deposited with the Board of Trade, and the Board of Trade shall, on payment of such fee, not exceeding five shillings, as they from time to time prescribe, cause to be compared with such model and verified every apparatus constructed in accordance with Schedule 1 to this Act which is submitted to them for the purpose, and if the same is found correct shall stamp the same with a mark approved of by the Board and notified in the *London Gazette.*

An apparatus for testing petroleum purporting to be stamped with the said mark shall, until the contrary is proved, be deemed to have been verified by the Board of Trade.

All fees under this section shall be paid into the Exchequer.

4. The Petroleum Act, 1871, shall continue in force until otherwise directed by Parliament.

5. This Act shall come into operation on the thirty-first day of December one thousand eight hundred and seventy nine, which day is in this Act referred to as the commencement of this Act.

6. The Petroleum Act, 1871, shall be repealed after the commencement of this Act to the extent in the third column of the Second Schedule to this Act mentioned.

Provided that any sample of petroleum taken before the commencement of this Act shall be tested in manner set forth in Schedule 1 to the Petroleum Act, 1871, and any offence committed before the commencement of this Act shall be prosecuted, and any investigation, legal proceeding, or remedy in relation to such offence, or to any act done before the commencement of this Act, shall be instituted, carried on, and have effect as if the provisions of this Act, other than those continuing the Petroleum Act, 1871, had not been passed.

First Schedule.

Mode of testing Petroleum so as to ascertain the Temperature at which it will give off Inflammable Vapour.

Specification of the Test Apparatus.

The following is a description of the details of the apparatus:—

The oil cup consists of a cylindrical vessel 2″ diameter, $2\frac{2}{10}$″ height (internal), with outward projecting rim $\frac{5}{10}$″

wide, $\frac{3}{8}$" from the top, and $1\frac{7}{8}$" from the bottom of the cup. It is made of gun metal or brass (17 B.W.G.) tinned inside. A bracket, consisting of a short stout piece of wire bent upwards and terminating in a point, is fixed to the inside of the cup to serve as a gauge. The distance of the point from the bottom of the cup is $1\frac{1}{2}$". The cup is provided with a close-fitting overlapping cover made of brass (22 B.W.G.), which carries the thermometer and test lamp. The latter is suspended from two supports from the side by means of trunnions upon which it may be made to oscillate, it is provided with a spout, the mouth of which is one-sixteenth of an inch in diameter. The socket which is to hold the thermometer is fixed at such an angle and its length is so adjusted that the bulb of the thermometer when inserted to its full depth shall be $1\frac{1}{2}$" below the centre of the lid.

The cover is provided with three square holes, one in the centre, $\frac{5}{10}$" by $\frac{4}{10}$", and two smaller ones, $\frac{3}{10}$" by $\frac{2}{10}$", close to the sides and opposite each other. These three holes may be closed and uncovered by means of a slide moving in grooves, and having perforations corresponding to those on the lid.

In moving the slide so as to uncover the holes, the oscillating lamp is caught by a pin fixed in the slide, and tilted in such a way as to bring the end of the spout just below the surface of the lid. Upon the slide being pushed back so as to cover the holes, the lamp returns to its original position.

Upon the cover, in front of and in line with the mouth of the lamp, is fixed a white bead, the dimensions of which represent the size of the test flame to be used.

The bath or heated vessel consists of two flat-bottomed copper cylinders (24 B.W.G.), an inner one of 3" diameter and $2\frac{1}{2}$" height, and an outer one of $5\frac{1}{2}$" diameter and $5\frac{3}{4}$" height; they are soldered to a circular copper plate (20 B.W.G.) perforated in the centre, which forms the top of the bath, in such a manner as to enclose the space between the two cylinders, but leaving access to the inner cylinder. The top of the bath projects both outwards and inwards about $\frac{3}{8}$"; that is, its diameter is about $\frac{6}{8}$" greater than that of the body of the bath, while the diameter of the circular opening in the centre is about the same amount less than that of the inner copper cylinder. To the inner projection of the top is fastened, by six small screws, a flat ring of ebonite, the screws being sunk below the surface of the ebonite, to avoid metallic contact between the bath and the oil cup. The exact distance between the sides and bottom of the bath and of the oil lamp is one-half of an inch. A split socket similar to that on the cover of the oil cup, but set at a right angle, allows a thermometer to be inserted into the space between the two cylinders. The bath is further provided with a funnel, an overflow pipe, and two loop handles.

The bath rests upon a cast-iron tripod stand, to the ring of which is attached a copper cylinder or jacket (24 B.W.G.) flanged at the top, and of such dimensions that the bath, while firmly resting on the iron ring, just touches with its projecting top the inward-turned flange. The diameter of this outer jacket is $6\frac{1}{2}$". One of the three legs of the stand serves as support for the spirit lamp attached to it by means of a small swing bracket. The distance of the wick holder from the bottom of the bath is 1".

Two thermometers are provided with the apparatus, the one for ascertaining the temperature of the bath, the other for determining the flashing point. The thermometer for ascertaining the temperature of the water has a long bulb and a space at the top. Its range is from about 90° to 190° Fahrenheit. The scale (in degrees of Fahrenheit) is marked on an ivory back fastened to the tube in the usual way. It is fitted with a metal collar, fitting the socket, and the part of the tube below the scale should have a length of about $3\frac{1}{2}$" measured from the lower end of the scale to the end of the bulb. The thermometer for ascertaining the temperature of the oil is fitted with collar and ivory scale in a similar manner to the one described. It has a round bulb, a space at the top, and ranges from about 55° F. to 150° F.; it measures from end of ivory back to bulb $2\frac{1}{4}$".

Note.—A model apparatus is deposited at the Weights and Measures Department of the Board of Trade.

Directions for applying the Flashing Test.

1. The test apparatus is to be placed for use in a position where it is not exposed to currents of air or draughts.

2. The heating vessel or water-bath is filled by pouring water into the funnel until it begins to flow out at the spout of the vessel. The temperature of the water at the commencement of the test is to be 130° Fahrenheit, and this is attained in the first instance either by mixing hot and cold water in the bath, or in a vessel from which the bath is filled, until the thermometer which is provided for testing the temperature of the water gives the proper indication, or by heating the water with the spirit lamp (which is attached to the stand of the apparatus) until the required temperature is indicated.

If the water has been heated too highly, it is easily reduced to 130° by pouring in cold water little by little (to replace a portion of the warm water) until the thermometer gives the proper reading.

When a test has been completed, this water-bath is again raised to 130° by placing the lamp underneath, and the result is readily obtained while the petroleum cup is being emptied, cooled, and refilled with a fresh sample to be tested. The lamp is then turned on its swivel from under the apparatus, and the next test is proceeded with.

3. The test lamp is prepared for use by fitting it with a piece of flat plaited candle wick and filling it with colza or rape oil up to the lower edge of the opening of the spout or wick tube. The lamp is trimmed so that when lighted it gives a flame of about 0·15 of an inch diameter, and this size of flame which is represented by the projecting white bead on the cover of the oil cup is readily maintained by simple manipulation from time to time with a small wire trimmer.

When gas is available it may be conveniently used in place of the little oil lamp, and for this purpose a test-flame arrangement for use with gas may be substituted for the lamp.

4. The bath having been raised to the proper temperature, the oil to be tested is introduced into the petroleum cup, being poured in slowly until the level of the liquid just reaches the point of the gauge which is fixed in the cup. In warm weather the temperature of the room in which the samples to be tested have been kept should be observed in the first instance, and if it exceeds 65° the samples to be tested should be cooled down (to about 60°) by immersing the bottles containing them in cold water, or by any other convenient method. The lid of the cup, with the slide closed, is then put on, and the cup is placed into the bath or heating vessel. The thermometer in the lid of the cup has been adjusted so as to have its bulb just immersed in the liquid, and its position is not under any circumstances to be altered. When the cup has been placed in the proper position, the scale of the thermometer faces the operator.

5. The test lamp is then placed in position upon the lid of the cup, the lead line or pendulum, which has been been fixed in a convenient position in front of the operator, is set in motion, and the rise of the thermometer in the petroleum cup is watched. When the temperature has reached about 66° the operation of testing is to be commenced, the test-flame being applied once for every rise of one degree, in the following manner:—

The slide is slowly drawn open while the pendulum performs three oscillations, and is closed during the fourth oscillation.

Note.—If it is desired to employ the test apparatus to determine the flashing points of oils of very low volatility, the mode of proceeding is to be modified as follows:—

The air-chamber which surrounds the cup is filled with cold water, to a depth of $1\frac{1}{2}$ inches, and the heating vessel or water-bath is filled as usual, but also with cold water. The lamp is then placed under the apparatus and kept there during the entire operation. If a very heavy oil is being dealt with, the operation may be commenced with water previously heated to 120°, instead of with cold water.

SECOND SCHEDULE.

Act repealed.

Year and Chapter.	Title.	Extent of Repeal.
34 and 35 Vict. c. 105.	The Petroleum Act, 1871.	Section three, from "and the term petroleum to which this Act applies" inclusive to the end of the section. Section eighteen.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[340]. Will any readers of the Journal kindly inform me if it would be right in making "ung. sulph. iodidi" to rub the iodide of sulphur with a little glycerine before mixing the lard, glycerine being a solvent for iodide of sulphur? INQUIRER.

[341]. The following prescription was presented to me to-day. Will some of your readers kindly inform me what the first ingredient is?—

℞ Ung. Calcis Hydr. Alb. . . . . . ʒij.
Ol. Amygd. Dulc,
Aq. Calcis . . . . āā ℥j.
M. ft. ung.
(Cream for the face). H. S. N.

[342]. Would some reader kindly inform me the cause of my failure in making ung. plumbi subacetatis compositum? I strictly followed the directions given in the B.P., but in the course of a week or so, the ointment began to change to a pale orange colour. The jar in which it is kept is free from lead, but it being standing next to the iodine ointment jar I thought that might be the cause. Having thrown the first lot out I began again, this time isolating the jar, but with no better results? AN APPRENTICE.

Correspondence.

THE INTRODUCTION OF CHLOROFORM.

Sir,—Referring to Mr. Brown's note on the introduction of chloroform, I subjoin the following extract from my laboratory book:—

154 lbs. chloride of lime,
$63\frac{1}{2}$ pints of wood naphtha.

The above mixed with a sufficient quantity of water was distilled in a large still heated with steam and the product distilled with strong sulphuric acid and again distilled with carbonate of baryta and dried chloride of calcium. The purified product weighed 13 lbs. 2 oz. and was supplied to Dr. Simpson, of Edinburgh, early in November, 1847, having been prepared by myself at the end of October and during the first few days of November in that year, and was, I believe, the first chloroform ever prepared as a commercial article in this country. Subsequently I prepared large quantities from pure spirit of wine which was found to yield a larger and purer product. At the time in question I was an apprentice to Mr. George Simpson, of Kennington, the head of the subsequently well-known firm of Simpson, Maule and Nicholson, manufacturers of aniline dyes.

13, *Curzon Street, W.* E. N. BUTT.

WEIGHTS AND MEASURES ACT.

Sir,—In the schedule of apothecaries' weights abstracted from the *London Gazette* of the 15th ult. and published in the Journal (Aug. 23), p. 145, I observe the largest single measure of weight is 10 ounces, equal to 4800 grains. I am at a loss to understand why this is the case when the troy pound contains 12 ounces and the sets of cup-weights in general use have always had this—the troy pound—as their largest weight. And will the 12 ounce weight now become illegal, or will it still be a lawful weight as being the silversmith's troy pound? I have not the late Act at hand, but I think the latter was legalized.

When the subject was before the Council, in your report I noticed the above peculiarity, but thought it was a misprint in the numerals 10 to 12, to which I had intended to draw attention. It had escaped my memory till now, when I again see the 10 ounce weight in print, with its equivalent in grains, which I think was not the case before.

This new weight will be a decimal blunder and a reproach on the originators of the Act for having discarded the metric decimal system.

Winchelsea. WM. MARTINDALE.

THE HEALTH OF THE DRUG TRADE.

Sir,—From frequent perusal of the Obituary in the *Pharmaceutical Journal*, and from other sources, my attention has been drawn to the peculiar fact that nearly 80 per cent. of chemists and druggists die at an age when men are generally supposed to be in their prime, both intellectually and physically, and a considerable number even under that age, while very few reach the allotted span of three score and ten years. The subject seems to me to be of sufficient importance to warrant a short discussion on the matter in the Journal. The question naturally arises, what are the causes of this lamentable fact? can that odour which is so characteristic of a chemist's shop be injurious to health? The atmosphere of our shops must frequently be vitiated by the escape of gases from many drugs and chemicals, whose injurious qualities, overloading the normal impure atmosphere which is generally found in large towns, cannot improve the condition of the respiratory organs.

In the absence of correct statistics as to the actual causes of death in each individual case, a just decision is impracticable, but I have been led to believe that consumption and cardiac affections are the two principal agents at work in our ranks. Do these insidious enemies find a footing amongst us through any fault of our own? Do the anxiety, the long hours, the constant deep attention which every druggist requires to devote to all the little minutiæ which go to make up his daily duties, and the want of that active exercise to the muscular system which is to be found in almost every other trade, induce towards an enervated nerve power?

This letter, I hope, will be the means of inclining some who are abler than I to give an explanation of the causes, so that those of our suffering brethren whose pale faces and degenerated nervous system may apply the remedy.

Edinburgh. J. K. NICOL.

"*Inquirer.*"—Under the circumstances you mention there may be a kind of acid fermentation set up, resembling lactic fermentation, but we are not aware that there would be any formation of valerianic acid.

"*Country Apprentice.*"—You are learning the business of a chemist and druggist as it is not unfrequently carried on in country districts. You are recommended to prepare for future eventualities by studying chemistry, botany and materia medica.

NOTES ON SOME JAPANESE DRUGS.

BY E. M. HOLMES, F.L.S.,
Curator of the Museum of the Pharmaceutical Society.

(*Continued from page* 103.)

HERBS AND LEAVES.

HAKKA (57):—*Mentha austriaca*, Jacq.? Fr. et Sav. vol. i. p. 366.

Syn. Mentha arvensis, L., var. *Javanica*, Bl.; Pharmacographia, p. 434, note 1; *Mentha arvensis*, var. *vulgaris*, Benth. MEGUSA, Sô mokou Zoussetz, vol. xi. fig. 27; Phonzou Zoufou, vol. xii. fol. 10.

This drug consists of the dried herb.

The leaves are lanceolate and nearly glabrous, with a tapering base and with few short but sharp serrations. The taste is powerfully pungent and strongly resembles that of *Mentha piperita*. The oil, however, of the two plants is not identical, as shown by Flückiger, since it does not give a fluorescence when treated with nitric acid.*

The leaves are probably used as tea by the Japanese. Mr. T. Christy informs me that he experienced great relief when in China, in an attack of sunstroke, by the application of the oil, which a Chinese doctor rubbed over his head. It produced a most profuse perspiration and tranquil sleep.

The Japanese peppermint plant has been attributed to *Mentha javanica*, Bl., by Flückiger and Hanbury; but all the specimens of that plant which I have seen have the taste of *Mentha viridis*, L., not of *Mentha piperita*, L. In the Sô Mokou Zoussetz the figure of the Japanese peppermint plant exactly corresponds to the drug; but is by mistake referred to *M. arvensis*, var. *vulgaris*, Benth., which is quite a different plant, with leaves widest below, like those of *M. arvensis*, and a similar taste. All the specimens of *M. Austriaca*, Jacq., including a type specimen, to which I have had access, have not the taste of peppermint. The plant yielding the Japanese peppermint oil must therefore be regarded as a yet unnamed form. In shape of the leaf and character of the calyx it seems to approach most nearly to *M. Canadensis*, but the leaves of that species, according to a living specimen of the hairy variety, kindly supplied by Professor Asa Gray, have a taste more approaching to pennyroyal.

KEI-NING-SOH (10):—*Digenea simplex*, Ag. (Algæ).

This seaweed is of a dull green colour, having lost its original purplish red tint by exposure to air and heat probably. It is well known that all seaweeds contain chlorophyll, the green colour of which in the case of red algæ is hidden by a red colouring matter, phycerythrine, and in the black or olive algæ by phycophæine and phycoxanthine.† By the action of fresh water and heat the colouring matter which conceals the chlorophyll is destroyed, and the presence of the latter becomes evident. From the quantity of sand and foreign matter present, the decoloration in this case would appear to be due to the action of the heat of the sun on a sandy shore, rather than to the effects of fresh water.

KING-KI-YO (15):—*Malva sylvestris*, Lin.

Syn. ZENI-AOI, Sô mokou Zoussetz, vol. xii. fig. 54.

This drug consists chiefly of the leaves of this well-known plant mixed occasionally with fragments of those of *Althæa rosea*, L. (Tachi-avi) and apparently also of *Malva pulchella*, Bernh. (Fuyu-avi). See Sô mokou Zouss., vol. xii. figs. 53, 55.

SHISSO (21):—*Perilla arguta*, Benth.; Fr. et Sav., vol. i. p. 365; Sô mokou Zouss., vol. xi. fig. 24; Phonzou Zoufou, vol. xii. p. 113 (calyx bad).

Syn. SISSOO, JAKOSJU, Miq. Prol., p. 36.

Shisso consists of the stems and leaves of the plant. The leaves are ovate, lanceolate, acuminate, the largest about two inches long by one inch broad, sharply serrate, and of a purplish tint underneath.

Shisso blossoms in September.

TO-YAK (17):—*Pleurogyne rotata*, Griseb. (Gentianaceæ); *Swertia rotata*, Thunb. Fl. Jap., p. 115.

Syn. SENBURI, TOYAKU; Sô mokou Zoussetz, vol. iv. f. 54.

This is a small plant, having a slight resemblance to centaury, but with pinkish-white flowers striped with purple, somewhat similar in size and shape to those of *Chlora perfoliata*; the leaves are linear-lanceolate, about one inch long and two or three lines broad in the middle. The taste is extremely bitter, like that of chiretta, and the odour hardly any. To-yak flowers in October. This plant is interesting botanically on account of the stigma being prolonged downwards over the edges of the valves of the ovary. The corolla has also at its base little glands terminating in hairs.

FLOWERS.

CHAU-TO-KO (13):—*Uncaria Gambir*, Roxb. (Cinchonaceæ).

Syn. TIAN-T'ANG, Porter Smith, Chinese Mat. Med. p. 224.

This drug consists of short portions of the slender stems half an inch to one inch in length and one to two lines broad, with one or two strongly recurved hooks. The whole is of a brown colour and has an astringent taste. These curious hooks do not consist, as described by Dr. Porter Smith, of the stipules, but of the stalk which bears the flower-heads. The flower stalks, as described in Bentley and Trimen's 'Medicinal Plants,' are furnished near the middle with a few bracts, beyond which the peduncle is more slender. After the fall of the fruit the portion of stem below the bracts elongates, hardens and forms a strong recurved hook by means of which the plant climbs. On some of the hooks the traces of the fall of the peduncle and bract may still be seen, on others, which have probably arisen from abortive inflorescences, there is no sign of them. It is probable that these hooks are also obtained from *U. acida*, Roxb., a plant which is used in the Malay Islands in the same manner.

The hooks possess astringent properties, and a wine is made from them used for infantile diseases, according to Dr. Porter Smith. Neither of these species are mentioned in Franchet and Savatier's work, and this drug may therefore be a Japanese importation from China.

BIAK-TAU KAH (52):—*Amygdalus persica*?

Syn. TOO, Thunb. Flor. Jap., p. 199; T'AU, Porter Smith, Chinese Mat. Med. p. 168.

These flowers evidently belong to some species of *Amygdalus*, and are called by Mr. Takemura "peach flowers." They are apparently derived from some cultivated species, since the majority of the blossoms

* *Pharm. Journ.* [3], vol. i., p. 682.

† Millardet, *Comptes Rendus*, Feb. 22, 1869.

are partially double. *Kah* means flowers, and *Tau* or *Too* is a sort of generic name both in Japanese and Chinese for fruits of the peach kind, and *Biak* means white, according to Mr. Takemura, so that some variety of *Amygdalus Persica* with white flowers may be the source of Biak-tau-kah. The dried flowers however have a slight pinkish tinge. Thunberg mentions a variety of peach with simple white flowers called "Sato Momu."

HOH-OH (32):—*Typha japonica*, Miq.

Syn. P'U HWANG, Porter Smith, Chinese Mat. Med., p. 224.

This yellow powder consists of the pollen. It is inflammable, like lycopodium, but shows a tendency to agglomerate into lumps. Dr. Porter Smith states that in China it is obtained from *Typha Bungeana*, and is used as a desiccant, astringent, styptic and sedative remedy, and also that it is made into a confection for external and internal use. It has neither taste nor odour.

The Chinese character, translated P'u hwang, is exactly the same as the Japanese character, Hoh-oh. P'u or Hoh being the name of the plant, and Hwang or Oh meaning yellow.

The spikes are said by Miquel to be used as a styptic.

The only species mentioned by Fr. and Savatier as a native of Japan is *T. japonica*, although the Phonzou Zoufou, vol. 33, figures two which are supposed to be (fig. 19 Kobo) *T. japonica*, Miq., and (fig. 20, Rindziakou) *T. angustifolia*, L.

IN T'YING (31):—*Artemisia capillaris*, Thunb.

Syn. INTSJIN; FKI IAMOGI and KAWARA IAMOGI; Kæmpf. Amœn., p. 897; IAMMA INTSJIN; Thunb. Fl. Jap., p. 309; KAWARA YOMOGI, Sô mokou Zouss. vol. xvi. fig. 27; Phonzou Zoufou, vol. xiv. fol. 2.

This consists of the flower heads, and bears some resemblance to Levant santonica, than which the flower heads are smaller. The paleæ are oval, obtuse and membranous, about six in number, and closely imbricated. The scales separate more readily than in santonica, and are mixed with the flower heads, as well as portions of the capillary leaflets. The taste is slightly pungent and aromatic, but not bitter.

The plant flowers in August, and is not an inland, but a littoral species.

SET-KOTZ-MO KAH (22):—*Sambucus nigra*, L.

Syn. NIWA TOKA, Tonga, Kæmpf. Amœn. fasc. v. p. 787; Thunb. Fl. Jap. p. 126.

This drug consists of the flowers freed from the stalks, and dried just before expansion. They are of a dark brown colour, and not to be compared in quality with those dried in this country. The species of *Sambucus* is given on Mr. Takemura's authority.

Thunberg states (p. 126) that neither this species nor *S. canadensis*, L., matures fruit in Japan, and are therefore evidently not natives. Probably for this reason *S. nigra* is omitted by Fr. and Savatier, in their Enum. Pl, Jap., p. 198.

SHIN-EE (4):—*Magnolia Yulan*, Desf.

Syn. SIN-Í; Porter Smith, Chinese Mat. Med., p. 142.

Shin-ee consists of the very young flower buds of this tree. The two outer scales are smooth, and the two inner are covered with a dense coat of silky hair; when these are removed the flower in a very rudimentary state may be traced. The taste is bitter and aromatic; of odour there is almost none.

According to Dr. Porter Smith, a kind of snuff made of the powdered drug was formerly used in China. It is probably imported from that country.

FRUITS AND SEEDS.

GOBO SEE (25):—*Arctium Lappa*, L. (Compositæ).

Syn. *Lappa Major*, Gaertn, Fr. et Sav. vol. i. p. 262; GOBO, UMMA BUSUKI; Kœmpf. Amœn. p. 828; Thunb. Fl. Jap. p. 304; KOUMA TORI BOKOUDSI, Phonzou Zoufou, vol. xv. fol. 23; GOBO, Sô mokou Zoussetz, vol. xv. fig. 33.

The small fruits of this plant are about a quarter of an inch long, linear, somewhat flattened, about one line wide at the apex, and tapering thence to the base. The taste is bitter and slightly pungent. They are of a greyish brown colour, speckled with minute black dots.

In Japan the burdock is cultivated as a vegetable under the name of gobo, and the root is used to put in soups. For this purpose it is taken up before the flowering stem appears (Kœmpfer). It is probably identical with the *Arctium edule* of Siebold. I have no information concerning the uses of this seed in Japan. Rather more than one hundred years ago they were used in this country in doses of one drachm as a diuretic and aperient, and the root is still used by herbalists in this country as an alterative in skin diseases and syphilis. The Japanese character for "see" is exactly the same as the Chinese for "tsze," and stands for "seed" in both cases.

GOME SEE (6):—*Schizandra nigra*, Max.

Syn. MADZI-SSA, Maximowicz, Diag. Pl. Nov. Jap. et Mandsh. Dec. x. p. 370.

This drug consists of reddish or black wrinkled fruits about the size of a pea, each containing two flattened kidney-shaped seeds. The seeds have a minutely tuberculated testa, and contain an oily albuminous nucleus. The berry is sweetish and mucilaginous, and the kernel of the seed has a slightly bitter oily taste, but no odour.

Gomichi is given by Franchet and Savatier as the Japanese name for *Schizandra Chinensis*, Baill. That plant, however, has smooth seeds. Maximowicz, in the work above quoted, states that *S. nigra* is at once distinguished from all the other species of this genus by the black berries with a glaucous bloom and the tuberculated seeds.

S. nigra is a climbing plant, clothing the pine and fir trees with its foliage in alpine woods, especially those of the Kundsho san chain of mountains in central Kiusiu. The fruit is ripe in October, and is considered edible.

The Chinese character Wu-wei-tsze, which, according to Dr. Porter Smith, is the Chinese name for the fruits of *Kadsura Chinensis* (*Schizandra Chinensis*, Baill.), is identical with the Japanese character above translated, gome-see, and means in both languages five-tasted seeds. The berries abound in a viscid mucus.*

GO-SIU-JU (50):—*Evodia rutæcarpa*, Benth.

Syn. *Boymia rutæcarpa*, Sieb. et Zucc, vol. i. p. 50; GO-SJU-JU; KAWA HASIKAMI, HABITE KOBURA,

* Porter Smith's 'Chinese Materia Medica,' p. 126.

Fr. et Sav. vol. i. pp. 71, 72; Phonzou Zoufou, vol. lxx. fol. 11.

This drug consists of the pedicels and very young fruits of the plant. The stalks are cylindrical, about one line in diameter, covered with down consisting of minute spreading hairs. The fruits are reddish brown, deeply pitted with oil glands, varying in size from a swan shot to a small pea, and divided half way down into five segments. The taste is decidedly rutaceous and pungent, although not exactly that of rue. The odour is very similar, but less powerful. Possibly the young fruits of *E. glauca*, Miq., are also used, since "koshiou you" is given as the Japanese name for this species in 'Phonzou Zoufou, vol. lxx., fol. 10.

Boymia rutæcarpa is a handsome shrub, six to ten feet high, and frequently cultivated in the south of Japan for its beauty. The flowers, which are diœcious, are produced in May and June. By the Japanese doctors of the Chinese school this drug is considered to be a most valuable remedy, and is used as a purgative, emmenagogue, sudorific and stimulant, and, in fact, seems to possess properties very similar to those accredited to the common rue.

KEE-KOCK (45):—*Citrus fusca*, Lour.

Syn. CHÍ-KOH, Porter Smith, Chin. Mat. Med. p. 66; CAY BAONG, CHI XAC, CHI KEN, Lour. Fl. Cochinchinensis, p. 467.

This drug consists of what appears to be fruits gathered when unripe, and then cut in half and dried. The rind is thick and externally of a dark or brownish black colour, internally whitish; the dried pulp is blackish. The taste is bitter and the odour very faintly that of orange. The drug is identical with that presented to the Museum of the Pharmaceutical Society by Dr. Porter Smith under the name of *Citrus fusca.*

The Japanese character is not, however, absolutely identical with the Chinese one given by Dr. Porter Smith.

The Japanese character translated "kee," and the Chinese "chí," is identical, but the one translated "kock" is not identical in appearance, although Mr. Takemura assures me it is identical in meaning with the Chinese character for "koh." Loureiro, however, gives as a synonym "chi xác," which more nearly approaches the Japanese name in sound.

Thunberg (Fl. Jap., p. 294) gives the very similar name "kikokf" as a synonym of *Citrus trifoliata*, L.

Citrus fusca is supposed by the Chinese to possess cooling, deobstruent and stomachic properties.

KETZ-MAY SEE (49):—*Cassia Tora*, L. (Leguminosæ). *Pharm. Journ.* [3], vol. vii. p. 350.

Syn. KIUEH-MING-TSZE, Porter Smith, Chinese Mat. Med. p. 54; KEUE-MING TSZE, Hanbury Science Papers, p. 231; TAGARAY-ELLEY, Ainslie Mat. Med. vol. ii. p. 405; KETSUMEI, Miq. Prol. p. 243; YEBISUGUSA, So mokou Zoussetz, vol. viii. fig. 1; Phonzou Zoufou, vol. xviii. fol. 12.

The seeds, which are to be seen in most collections of drugs from India or China, are of a dark brown colour and polished, about two lines long, quadrangular, oblique at both ends, but blunt at one end and pointed at the other, and having two very faint stripes on opposite sides.

Dr. Porter Smith states that in China they are used both externally and internally for sore eyes and for herpetic or furunculoid sores.

In India, according to Udoy Chand Dutt ('Hindu Mat. Med.,' p. 156), the seeds are dipped into the juice of *Euphorbia neriifolia* and made into a paste with cow's urine for keloid tumours; or equal parts of them mixed with the seeds of *Pongamia glabra* and a fourth part of the root of *Tinospora cordifolia* are made into a paste for ringworm.

Fr. et Savat. 'Fl. Jap.,' vol. i., express the opinion that neither this plant, nor *C. occidentalis*, nor *C. Sophora* grow spontaneously in Japan. The seeds of *C. Tora* are therefore probably imported into Japan. The Japanese and Chinese characters for *Cassia Tora* seed are identical, although in Chinese the word is pronounced, according to Dr. Porter Smith, Kiueh-ming-tsze.

KIEU-ESS (44):—*Allium senescens*, Thunb., Fl. Jap. p. 132.

Syn. YAMA-RAKKYO, Phonzou Zoufou, vol. xlv. fol. 13; Sô mokou Zouss. vol. vi. fig. 37; *Allium japonicum*, Regel., Fr. et Sav. vol. ii. pt. 1, p. 77.

These seeds have the appearance of ordinary onion seeds. They are black and angular, without odour, and have only a very slight alliaceous taste.

In China they are used for various fluxes and for hæmorrhages.

In 'Loureiro Fl. Cochin Chinensis' the term kieu is applied to three species, *A. triquetrum*, L., *A. odorum*, L., and *A. angulosum*, L.

(To be continued.)

LIQUID PREPARATIONS OF LACTUCARIUM.*

BY JOSEPH L. LEMBERGER.

In accepting the query to give a formula for a concentrated liquid preparation of lactucarium, from which can be made the syrup, tincture, or other preparations, the writer is fully aware of the difficulty usually met with in making the lactucarium preparations occasioned by the caoutchouc principle always present in this as well as most, if not all, the products from the lactescent plants; in order to overcome this difficulty petroleum benzin has been found the most practical, being efficient and cheaper than most of the solvents for caoutchouc. It was found that by beating the lactucarium in an iron mortar until it is well crushed it separates into layers, or plates, or very coarse granulation (according to its degree of dryness), as the nearest possible approach to comminution, it being impossible to powder it without the addition of sand or other foreign substance. Thus treated and macerated with benzin the caoutchouc principle is readily dissolved and the lactucarium is fitted for treatment with other menstruum. After numerous experiments the following is offered as a practical working formula for the—

Fluid Extract of Lactucarium.

Take of—

Lactucarium	16 troy ounces.
Petroleum benzin deodorized .	32 fluid ounces.
Diluted alcohol a sufficient quantity.	

Beat the lactucarium thoroughly in an iron mortar, then introduce it into a wide-mouth bottle of about three pints capacity, adding the benzin, corking tight, and allowing it to macerate, with frequent agitation, for twenty-four hours; then let it rest about twenty-four hours, or until the lactucarium subsides and the benzin solution becomes clear or nearly so; then, having decanted the benzin solution, transfer the lactucarium to a stone or glass slab or other similar vessel, spreading it as thin as possible, allowing it to remain in this situation until completely dry (at least twenty-four hours); then

* From the 'Proceedings of the American Pharmaceutical Association,' 1878.

rub it up in an iron mortar with an equal bulk of clean sand; next introduce it into a cylindrical percolator, first prepared with a disc of flannel and a thin layer of sand, pack lightly and add sufficient diluted alcohol to cover several inches, and after closing the outlet with a cork or otherwise allow it to macerate twenty-four hours; then percolate to exhaustion, reserving the first four fluid ounces. By means of a still reclaim the alcohol and evaporate the residue in a water-bath to ten (10) fluid ounces, mixing this with the reserved percolate and filter, adding sufficient diluted alcohol to wash the filter and remaining residue until the product weighs sixteen troy ounces.

With this fluid extract you can readily make—

Tincture of Lactucarium, as follows:—

Take of—

Fluid extract lactucarium . . 1 troy ounce (℥j).
Diluted alcohol. . . . . . q. s. for f℥viij.
A fluid drachm representing 7½ grains.

For—

Syrup of Lactucarium,

Take of—

Fluid extract of lactucarium . 1 troy ounce (℥j).
Simple syrup . . . . . . q. s. for f℥xvi.
A fluid drachm representing 3¾ grains.

SMILAX GLAUCA.*

BY JOHN BLANKENHORN, PH.G.

With the view of ascertaining the constituents of the long cylindrical light-coloured rhizome, a sample furnished by Professor Maisch was submitted to the following treatment:—Two pounds of the ground rhizome were exhausted by a mixture of two parts alcohol and seven parts water, and the percolate concentrated at a low temperature. After cooling, the whole was treated with acetate of lead until no further precipitate occurred, then filtered. The filtrate, thus deprived of nearly all colouring matter, was subjected to the action of sulphuretted hydrogen, in order to free it from lead, and again filtered. The sulphide of lead after thorough washing with water, was treated wlth boiling alcohol, filtered, the filtrate concentrated and spread on glass to scale; attempts were made at crystallization, but without success.

The precipitate with acetate of lead was thoroughly washed, suspended in water and decomposed by sulphuretted hydrogen, then filtered. The liquid was now evaporated; at first the colour was dark-red, and the colour of blue litmus was changed to red. Both characters became greatly augmented as the process of evaporation went on. A small quantity diluted with water gave the following reactions:—With alkalies, the colour was deepened; with ferric chloride, a greenish-black colour; with Mayer's test, a yellowish colour; with subacetate of lead, gelatinous precipitate; with solution of gelatin, gelatinous precipitate. These reactions showed the presence of tannin. After concentration to a small bulk, and setting aside for a few days, crystals of what appeared to be a magnesium compound were deposited. The filtrate from these crystals was now treated with twice its bulk of alcohol, filtered, and then found to be free from tartaric, citric and malic acids. After having been treated with ammonia and solution of alum, no precipitate was abtained with salts of iron, calcium, mercury and copper, but lead acetate occasioned a white precipitate.

The sulphide of lead remaining after the decomposition of the lead precipitate by H_2S was thoroughly washed and treated with boiling alcohol, filtered and allowed to evaporate spontaneously, then spread on glass to scale. The product was of a beautiful red colour, perfectly transparent, taste slightly bitter, wholly soluble in alcohol and partially so in water, but insoluble in ether and chloroform. Ammonia dissolved it, deepening the colour, and on the addition of an acid the colour was discharged. A small quantity dissolved in water with the aid of alcohol, and agitated, produced copious foaming, and was precipitated by acetate of lead. On digesting with water, a portion was dissolved, and on being evaporated was left behind as a red transparent mass; the portion insoluble in water dissolved in alcohol, and after evaporation left a brown transparent mass, both portions foaming on being agitated with water.

The filtrate, after precipitation by acetate of lead, left, on evaporation, an amorphous dark red-brown mass, with a tint of green, and perfectly transparent; the taste is very bitter and slightly acrid. It is freely soluble in alcohol and water, insoluble in ether and chloroform. With strong sulphuric acid it produces an orange-red coloration changing to brown.

The presence of starch, sugar, albumen, resin and pectic compounds was also incidentally noticed.

* From the *American Journal of Pharmacy*, June, 1879.

CHEMICAL NATURE OF PEPTONE.*

BY R. HERTH.

Peptone was prepared by digesting the finely powdered white of egg from 50 to 60 boiled eggs for 24 to 30 hours with a 1 per cent. solution of phosphoric acid, then treating with hot water, and digesting with 4 litres of a 0·65 per cent. solution of phosphoric acid and 40 c.c. of a clear pepsin solution which had been purified by dialysis, and was free from calcium and chlorine. When the liquid had become clear (after 5 or 6 hours) it was heated on a sand-bath, and freshly precipitated lead carbonate was added to neutral reaction. The small quantity of lead present in the filtrate was removed by means of sulphuretted hydrogen; the liquid was again filtered, concentrated on the water-bath, precipitated, and digested with concentrated alcohol, again dissolved, and the liquid reprecipitated. This process was repeated three times. The precipitated lead phosphate was quite white, showing the absence of sulphide. A concentrated solution of the peptone thus prepared gave a slight turbidity with potassium ferrocyanide and acetic acid. Various methods of purification were employed, but the reaction with ferrocyanide was invariably obtained. Whether this reaction is due to a trace of unchanged albumin in the peptone, is regarded by the author as a yet unsettled point.

In the original paper a number of analyses of the peptone are given, both of the substance prepared as described above and of the various precipitates obtained by fractionally precipitating with alcohol and with lead acetate and ammonia. These analyses show that peptone is not a mixture, but a distinct chemical compound. The percentage composition of peptone appears to be identical with that of albumin obtained from egg white. The author regards albumin as a polymeride of peptone, and the change brought about by the action of pepsin solution in albumin as analogous to the action of heat in effecting the change of paraldehyde into vapour of aldehyde.

A solution of peptone is not precipitated by many of the salts of heavy metals, by acids, or by boiling. Alcohol, mercuric chloride, and lead acetate, followed by ammonia, cause precipitates in solutions of peptone. The statement of Adamkiewicz (*Die Natur und Nährwerth des Peptons*, Berlin, 1877) that those reagents which precipitate egg albumin also precipitate peptone is regarded by the author as incorrect. Peptone forms compounds with metals analogous to those formed by albumin, but the compounds of peptone are generally soluble, while those of albumin are insoluble.

The author claims for his process of preparing peptone that it ensures a complete or almost complete conversion of the albumin into peptone, that it entirely removes syntonin, and that the absence of salts of the alkaline earths is also ensured. These salts are very difficult to remove from solutions of peptone.

The amount of ash in the peptone prepared by the author's process is not more than 1 per cent.

* From the *Journal of the Chemical Society*, August, 1879 (*Wien. Akad. Ber.* [ii], 76, 986—890).

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 13, 1879.

PROCEEDINGS UNDER THE PHARMACY ACT.

Although the present month is to a great extent devoted to holiday making by pharmacists, as well as others who have opportunity to do so, it has, as yet, not been altogether wanting in incidents of importance and interest to those engaged in this business. As will be seen from our report of legal proceedings this week, a step has been taken towards repressing the unlawful trade in scheduled poisons without the labels required by the Pharmacy Act, stating the name and address of the seller, and bearing the word "poison." The prosecution was instituted by direction of the Council of the Pharmaceutical Society in reference to the illegal sale of laudanum, a practice that has frequently been cause of complaint among chemists and druggists, besides being one that is extremely prejudicial to the wellbeing of the public. In some parts of the eastern counties, as many of our readers are aware, the habitual consumption of opium, in the crude state and in the form of laudanum, is carried on to a degree that is almost incredible, and the demand for the drug or preparations of it is so considerable that they are to be obtained at many of the small grocers' or other village shops throughout the district.

Of course the trade thus carried on by persons who are not registered in conformity with the provisions of the Pharmacy Act involves a breach of the 15th section of that Act, and renders the persons selling opium or any of its preparations, such as laudanum, liable to the penalty therein prescribed. It is therefore competent for the authorities of the Pharmaceutical Society, as charged with the execution of the law regulating the practice of pharmacy, to institute proceedings against offenders under this 15th section of the Act; but in the great majority of cases the persons so offending by the sale of laudanum or opium belong to the class of very small shopkeepers in villages, and owing to the difficulty as well as the expense of obtaining information and proceeding against offenders in distant parts of the country it has been found undesirable to have recourse to this mode of procedure as a general plan.

The illegal sale of opium and laudanum in the manner we now refer to is no doubt to some extent an interference with the privileges which are by law accorded to the legally qualified chemist and druggist in virtue of his conforming to those requirements as to education and examination which are held to be necessary for the interests of the public. The sale of these drugs by unqualified persons deprives those who have a right to deal in them of some business they might otherwise have, and of the profits arising from that trade. It may also be the case that the sale of these drugs will eventually lead to the usurpation of other parts of the business properly belonging to the chemist and druggist. In such cases, when clearly made out, it would undoubtedly be proper to enforce the provisions of the 15th section of the Pharmacy Act as a means of protecting the interests of the pharmaceutical body, and with that object to make use of the funds and resources of the Pharmaceutical Society. But this protective application of the Act being only incidentally a result of the provisions for securing the main object of protecting the public interests, and the petty sale of laudanum, etc., being more directly pernicious to the public health than to the trade interests of chemists and druggists, it is more fitting that its prosecution should be conducted under the 17th section of the Pharmacy Act. It is in that section declared to be unlawful to sell poison without a distinct label having the word "poison" and the name and address of the seller. This is a provision made for the safety of the public, to warn people against the dangerous character of certain drugs or preparations, and designed, in case of their criminal misuse or of accident, to furnish a clue to the discovery of the person by whom they have been misapplied. It is entirely a provision for the protection of the public; it is fully sufficient for that purpose, and as the capability of enforcing it is not confined to any particular body or set of individuals any person can be the prosecutor in a case of the kind now referred to.

One of the devices by which it has been sought to make this illegal sale of poison evade the provision of the Pharmacy Act has been to affix a label bearing the name of some registered person, but the present case at Horncastle serves to illustrate the insufficiency of this proceeding to protect the seller against conviction, and it is to be hoped the decision of the magistrates will be a timely warning to others engaged in similar ways.

It is also evident that the plea of selling with a patent medicine stamp will not avoid conviction, and that if some trouble be taken to obtain definite evidence of this mode of selling laudanum or other preparations, as suggested by Mr. Hampson, it may soon be demonstrated that unregistered persons adopting this plan are liable nevertheless as contravening the law.

THE WEIGHTS AND MEASURES ACT.

Among other matters that have attracted attention within the past few weeks is the new Act in reference to weights and measures. Some uneasiness is experienced in regard to the carrying out of the provisions of this Act, but we believe there is really no reason to fear vexatious interference.

We understand that no arrangements have yet been made for affixing a Government mark of verification to the glass measures used by chemists.

An idea seems to prevail that all weights and measures must have the stamp of the particular district in which they are used. This is clearly an error and should be corrected. The Act does not thus needlessly interfere with traders, but it specially provides that a weight or measure stamped by a duly appointed authority shall be deemed legally authorized for the whole kingdom irrespective of districts.

FORMATION OF A PHARMACEUTICAL SOCIETY IN CONSTANTINOPLE.

Although the regeneration of Turkey is not a very hopeful subject, the pharmaceutical portion of the Turkish community appear to be making an effort to raise themselves more nearly to the position occupied by followers of the same calling in other lands. Nor have they taken action a minute too soon, for never was pharmacy at a lower level in Turkey than now. It is true that the cumbrous alembic and pan of former times have disappeared, but they are not replaced by the glass retort or the porcelain capsule; neither is it to the delicate modern balance or graduated burette that the old weighing machine and rude measuring vessels have given way. The laboratory as a rule is absolutely wanting and the shelves are now filled with foreign specialties, drugs which were originally derived from the country now coming back to it in the shape of preparations from Paris, Vienna and other places. This appears to be attributed to a great extent to the law regulating the practice of pharmacy, which sets no limit on the number of pharmacies, and whilst pharmacists are placed by it under severe restrictions as to the sale of poisons and active medicines it is alleged that the sale of such articles by lower classes of traders is winked at.

On the 9th of June last a number of pharmacists met in the room of the Imperial Society of Medicine in Pera and agreed to form a "Société de Pharmacie de Constantinople," which should have for its objects to raise the level of pharmacy in Constantinople and other cities of the Ottoman empire, to assist the authorities in all scientific questions within its competence, and the defence of professional interests. After the election of officers,—C. Bonkowski Effendi being chosen the first President and J. Zanni the General Secretary,—the statutes of the Society were agreed to, and a copy ordered to be sent to Munif Effendi, Minister of Public Instruction, with a request for his approbation and protection of the Society as a work of public utility. The President was also requested to put himself in communication with other societies abroad asking for their advice and assistance.

The second meeting was attended by the Minister of Public Instruction, who assured the Society of the sympathy of the Imperial Government, and, what was quite as important, the Secretary was able to state that one hundred and forty pharmacists had expressed their desire to become foundation members. Several papers were read, and it was decided to make arrangements for the publication of the proceedings; the outcome has been the appearance of the first number of a journal, which is to be supplied free to the members. Steps have also been taken for the foundation of a library and museum, and in order to bring the literature of other countries within the reach of the members generally, committees of gentlemen acquainted with the respective languages have been appointed to prepare reports on the salient features of the journals and other books received, to be read at the weekly meetings.

It is a somewhat "far cry" from London to Constantinople, but we feel justified in assuring the members of the new Society that they have the hearty sympathy of British pharmacists in their efforts to improve the status of their common calling in the East.

THE METRIC SYSTEM.

Those of our readers who are interested in the progress of the metric system will be glad to learn that the subject came under the consideration of the British Medical Association during its recent meeting in Cork, and that, on the motion of Mr. Ernest Hart, a committee was appointed to consider and report whether it would be desirable to adopt the metric system in medicine in Great Britain and Ireland, and whether the British Medical Association should by any means, and if so by what, facilitate its introduction. The Committee consists of Dr. Clifford Allbutt, Dr. Lauder Brunton, Dr. A. Carpenter, Dr. Farquharson, Dr. T. Frazer, Dr. Harvey, Dr. Quain, Dr. Sieveking and Mr. Ernest Hart.

In introducing the subject Mr. Hart said the metric system had made great progress, and now the profession in Great Britain was to some extent isolated, since foreigners were cut off from following the results of work carried out by their English colleagues through not being able to follow the British system of notation, while the British medical man could not follow the system now adopted in foreign countries. Dr. Seguin, in supporting the motion, gave an account of the "brilliant metric campaign" in America, which has resulted in the adoption of the metric system in many public departments and by several medical societies, including the American Medical Association. In the new edition of the 'National Dispensatory,' by Stillé and Maisch, the metric weights are given second; but Professor Maisch states that had he not been hindered he would have given all the weights and measures of this book either preeminently or exclusively in the metric language.

EXEMPTION OF PHARMACEUTICAL CHEMISTS FROM JURY SERVICE.

As the lists of persons liable to serve on juries are now being exhibited at the doors of all places of public worship, we take the opportunity of suggesting to pharmaceutical chemists the advisability of examining them. If their names have been improperly included it is necessary, in order to secure exemption from service, to give proper notice to the parish authorities within the specified time.

Provincial Transactions.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

A lecture was delivered by Mr. S. F. Burford, on Thursday evening, August 14, before the above Association on "The History of Chemistry," being the opening lecture of a course on chemistry.

The lecturer said he thought it advisable in commencing a series of classes on chemistry to give the members a general view of the history of chemistry from the earliest times. Quoting from the works of Frankland and Fownes for a good definition of the term chemistry and what was embraced therein, and the various laws which governed it, he went on to say that as far as could be learnt the origin of chemistry was lost in antiquity. Tubal Cain has been considered its founder, as he was conversant with the art of working in metals, but it was more likely that it took its rise among the early Egyptians. Thoth or Æthotis is the first Egyptian of whom mention is made as having been a chemist. Siphoas, surnamed Hermes by the Greeks, 1900 B.C., wrote forty-two books on philosophy, and from him chemistry was entitled the Hermetic philosophy.

The priests of Egypt, though they studied chemistry with considerable success, veiled their discoveries in mystery and hieroglyphics, so that their studies were lost to others. Nevertheless they seemed to have been well acquainted with the arts of making imitations of precious stones, working metals, etc. They were also conversant with the uses of nitrate of silver, which they employed to write on linen, evidence of which is to be found on the linen bandages around mummies. From the Egyptians the Israelites gained some knowledge of chemistry, and Moses must have been acquainted with it to enable him to dissolve the Golden Calf, which Stahl states was rendered soluble in water by means of liver of sulphur.

During several centuries the study seemed to have been neglected till it appeared among the Arabians. In the ninth century Gebber, of Thus, in Persia, wrote three excellent books on chemistry; and so this study passed through the various stages of superstition and alchemy when men spent best part of their lives in the vain effort to transform the baser metals into gold and to discover the elixir of life. Even as late as 1825 the study of alchemy was pursued in England.

The lecturer then reviewed in detail the various studies of Lavoisier, Boyle, Locke, Brandt, Glauber, Roger Bacon, Leibnitz and Newton with their discoveries, going minutely into the studies of Priestley, Faraday, Davy, to our own time, passing to the statements of Lockyer and the announcement that Meyer had decomposed the element chlorine.

The lecturer concluded by remarking that it was impossible to glance around without seeing the benefits which every day accrue from the study of chemistry in the arts, manufactures, and in medicine, contributing to the health and happiness of the human race. The human mind cannot depict in its entirety the magnificent future of chemistry, but overwhelmed with the vastness which everywhere surrounds them, the noblest, purest minds return from contact with this awful infinity, and like the Angel in Jean Paul Richter's dream can only find relief in tears.

At the conclusion of the lecture, which was listened to with marked interest, a vote of thanks to the lecturer was proposed by Mr. J. J. Edwards, seconded by Mr. Brampton and carried.

MEETING OF CHEMISTS AND DRUGGISTS AT LIVERPOOL.

A general meeting of the chemists and druggists of Liverpool was held on September 1, at the Royal Institution, to resist the tendency to reduction of prices of proprietary articles. The chair was taken by Mr. A. Redford, President of the Registered Chemists' Association. The good attendance showed the interest generally taken in the subject of the meeting. Communications were received from Messrs. C. Jones, Birkenhead; Greenall, Flint; Stanton, Rock Ferry; Barton and Williams, approving the object of the meeting.

The Chairman, Messrs. Shaw, Symes, Edisbury, Marson, M. Hughes, Turner, T. F. Abraham, Peet, Woodcock, Warhurst, Wright, Hocken, Paddock, Wharrie, Mackinlay, Fletcher, Lloyd of Garston, and Messrs. Ball, Fore and Cooke, of Birkenhead, spoke with only one exception strongly against departing from makers' advertised prices. It would inevitably lead to reduction in other departments of the business, and the opinion was strongly expressed that its effects would be disastrous, and that no sufficient reason at present existed to justify its adoption. The meeting adopted resolutions affirming the determination of the trade generally to maintain the uniformity attainable by adhering to the makers' advertised retail prices.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page* 197).

The next paper read was on—

THE POLARIMETER AND ITS USE IN PHARMACY.

BY CHARLES SYMES, PH.D.

For the development and perfecting of the science and practice of pharmacy, various instruments and forms of apparatus have from time to time been introduced; it is not, however, to a new instrument that I am desirous of directing your attention, but to one which, although it came into existence some sixty years ago, has not in this country and in recent times received the amount of attention which it appears to me to merit, nor has it been applied to many purposes for which it seems calculated to be of use.

In its variously modified forms it is known as the polariscope, saccharimeter, polaristrobometer and polarimeter, men of science and manufacturers having progressively introduced such alterations as appeared desirable for the better accomplishment of the object aimed at, viz., polarizing a ray of light and accurately measuring the amount of rotation produced in that ray when it is passed through an optically active liquid or liquid possessing rotatory power. My chief aim in bringing this subject before the members of the Conference is to offer for their consideration some of my experience and to render familiar, as far as I am capable of so doing, this instrument which has hitherto been dealt with chiefly in works of a purely scientific character, and which has been regarded by the working pharmacist as outside his province and useful only in the prosecution of abstract science. That too little is known of its general application has long been my opinion, but this was brought more forcibly to my mind in June of last year, when (in company with Mr. Greenish) I paid a short visit to M. Petit, of Paris, and found him using the instrument of Laurent practically in his business for determining the purity of certain alkaloids, etc., and was assured by him that the results obtained were as trustworthy as those of the most accurate chemical analysis. To accomplish the object already mentioned and render the subject thoroughly clear to those who have not previously given any attention to it, I may be allowed to say a few words on polarized light.

A ray of common light, as you will be aware, is assumed to consist of vibrations in the ethereal medium or luminiferous ether occurring in two directions at right angles to each other, and by interference the primary planes are constantly shifting. If, however, these two vibrations are split up by the absorption, reflection or dispersion of one, or by refraction of both, the remaining portion, or one of the portions separated, constitutes a ray of polarized light and as the phenomenon of interference ceases it vibrates in one plane only. If now this is made to traverse certain media, the plane no longer remains in this direction, but is deviated either to the right or left, and is caused to rotate or assume a spiral form, and it is as already stated for the measurement of the amount of rotation caused by different fluids when so traversed that the polarimeter has been constructed.

The property possessed by quartz of circularly polarizing a ray of light was known to Sebeck and Arago, but it is to Biot in 1818, that we owe the discovery of the property possessed by many fluids of rotating a ray of plane polarized light. He states that this occurred to him accidentally whilst examining crystallized laminæ, placed in highly refractive media, such as oil of turpentine. He thoroughly investigated the phenomenon, and laid the foundation of a very important study, his early results being obtained by means of an instrument devised by himself, not unlike the polariscope attached to the microscope, except that the polarization was obtained by reflection from a blackened mirror and that the analyser was placed in the centre of a graduated disc. When the analysing prism was so placed as to obscure the polarized ray, on interposing a tube containing an active fluid the light was again found to pass until the analyser had been rotated through a certain number of degrees; that number being taken as the rotatory power of the fluid; but it was found difficult to determine the exact point of maximum darkness, and somewhat wide and inaccurate results were obtained. M. Soleil, an instrument maker of Paris, next constructed with considerable ingenuity and skill an improved form, by the use of which much greater accuracy could be obtained. In it the light first passes through a doubly refracting prism as analyser, then through a plate of quartz 3·75 mm. thick (subsequently replaced by a double plate); then through the fluid under examination, another plate of quartz, the compensator consisting of two wedges of quartz, and finally through the analyser. To this there was added what Soleil called a *produce of sensible tints*, consisting of a prism, Galileo telescope and quartz plate. On one occasion I spent a profitable hour or two in thoroughly examining this instrument, taking it to pieces and tracing the tortuous course of a ray of light through it; the study was interesting as showing what optical skill can accomplish and what complicated means had here been employed to surmount difficulties, which have since been overcome in a more simple manner. The special features in this instrument are first, that the ray of polarized light emerging in a vertical plane from the prism meets the double plate of quartz, one half of which rotates to the right, the other half to the left, the rotation being sufficiently great (90°) to decompose the ray and to produce a rose-violet tint uniformly over the whole field. This is known as the sensitive or transition tint, also the tint of passage. Secondly, the analyser is fixed with its axis corresponding to that of the polarizer, the amount of rotation produced being measured by compensation, effected by a plate of quartz, divided into two wedges and fitted with rack and pinion motion, by which they are moved over each other so as to increase or diminish the thickness; they are also attached to a vernier and scale. When the compensator is at zero, the whole of the disc is rose-violet, but the introduction of an active fluid causes one half to become red; the compensator is then moved through a sufficient number of degrees to restore uniformity and the amount of rotation is thus ascertained. Actual degrees are not marked in the scale, but the rotation produced by a plate of quartz 1 mm. thick, equal to that given by 200 mm. of solution of sucrose (16·19 grams in 100 c.c. of water), being marked on the scale and divided into 100 equal parts.

The instrument was specially constructed with a view to its use for sugar solutions and is best known as Soleil's saccharimeter, of which there are several modifications, such as the Soleil-Ventzke, Soleil-Scheibler, etc.

Accurate as were the results obtained by this means, there were some difficulties, such as the interference of coloured solutions with the sensitive tint, the shortness of the scale, etc., which have caused it to be superseded by more simple forms in which, as in Biot's instrument, the analyser is made to rotate, and these forms have been adopted by the two opticians Duboscq and Laurent, who may be regarded as the successors of Soleil.

In 1860, Professor Jellett, of Dublin, described to the British Association at Oxford, a new analysing prism, which he had invented, by which greater accuracy could be obtained than by any previous arrangement. The report is as follows:—"Professor Jellett described to the section a new analysing prism, by which the plane of polarization of polarized light may be determined with great precision. This instrument consists of a large prism of calc-spar, which is reduced to the form of a right prism by grinding off its ends, and sliced lengthwise by a plane, nearly, but not quite perpendicular to its principal plane. The parts into which the prism is thus divided are joined in reversed positions and a diaphragm with a circular opening is placed at each end. The light which passes through both diaphragms produces a circular field, divided by a diametrical slit into two parts, in which the planes of polarization are slightly inclined to each other. If then light, which has been previously polarized, be transmitted, it will be extinguished in the two parts of the field of view in positions which lie close together, and the light will become uniform in a position midway between these. This position determines the plane in which the incident light was polarized with a precision much greater than has been otherwise attained. Professor Jellett stated that the different observations did not differ from one another by an angle greater than a minute, and that the instrument was equally applicable to the case of homogeneous light."

The first practical application of this invention was in the construction of a polarimeter for the Professor by Bryson in that year, and the manufacture is continued by the same optician at the present time; it is the most simple form with which I am acquainted, efficient and inexpensive; it is the instrument now before you, the one with which my observations have been made, and which I have compared with those of Wild, Laurent and Duboscq, with very satisfactory results. The instrument of the last named maker still retains the double quartz plate of Soleil, but dispenses with the compensator, having been fitted with a Jellett's prism as analyser on a suggestion made by him in 1869.

That of Laurent has as its special feature the polarized ray passed through a diaphragm with circular opening, one half of which is covered by a plate of quartz, the division of the field by this means giving great precision to the readings; the analyser is an ordinary Nicol's prism. By this means the optical work is simplified as compared with the old form and the perfection of working is enhanced. Wild's polaristrobometer, manufactured by Hermann and Pfister, of Berne, is a special form of the instrument. It is somewhat elaborate in construction; the readings are taken at the disappearance from the centre of the field of certain lines or bands which cross it and which are produced by two plates of calx spar crossed at right angles to their principal faces. Those who work with this instrument speak of it as giving very satisfactory results. In 1872, Professor Jellett, in a paper read before the Royal Irish Academy, described a "new optical saccharometer," an ingenious arrangement by which the polarized ray is made to traverse a fluid, the rotatory power of which is previously determined and which is opposite in character to that of the fluid to be examined. In general terms it might be described as an instrument by means of which the relative rotatory power of any transparent fluid to that of a standard fluid may be accurately determined. Although delicate in its results it is somewhat troublesome in working and does not appear to have come into general use.

Originally, ordinary daylight, or that from an Argand lamp was used; but on discarding the more complicated instrument of Soleil, with its compensator, whereby the decomposition of the light due to the unequal refrangibility of the different rays was overcome, monochromatic light was adopted. Different operators, however, used different coloured rays with, as a matter of course, different results; hence it became necessary when stating the rotatory power of a body to indicate by what ray the reading was taken, and this still obtains to a large extent; thus, in the *Agenda du Chemiste* last year there are four tables giving the rotatory power of 76 bodies — 12 by the "*teinte du passago*," 7 by the red ray, 10 by the yellow, and 20 without any indication as to the ray, and the remainder indicated by letters corresponding to certain Fraunhofer lines, as used by the authorities from whom the results are quoted. It is true we have a factor, ·767, by which to multiply the values obtained by the yellow ray to convert them into those which could be obtained by the red, but it has been shown that this is not constant for all bodies. Further, one object of a table is to show at a glance without calculation the relative rotatory power of different bodies; now this clearly cannot be the case with such tables as those referred to. This chaotic state of things is to some extent in process of rectification, and modern instruments are all constructed with a special view to their use with the yellow flame, corresponding to the line D of the spectrum, or in other words, with a Bunsen flame containing a salt of sodium. This gives a grey field quite as sensitive as the transition tint, and where observations are continued for any length of time it is far less fatiguing to the eye of the observer.

Certain natural crystals possess high rotatory power. Thus a plate of quartz 3·75 mm. in thickness gives a rotation of 90°, whilst a column of English oil of turpentine, 100 mm. in length, gives only 14°·30. Some few salts, such as bromate and chlorate of sodium, acetourate of sodium, and hyposulphite of lead possess double rotatory power; but most inorganic salts, and some liquids, such as water, alcohol, ether and chloroform, are inactive. The activity in crystals and liquids depends on different causes, the former belongs to the domain of physics, the latter to that of chemistry, and it is this, viz., the molecular rotatory power, which we are more especially considering. The rotation produced by any given liquid (all else being equal) depends on the length of the column; it will be evident therefore that to have uniformly correct results the greatest accuracy must be observed in this respect, and that either the same length of tube must always be used or the readings must be brought to the same standard by calculation. The usual working length is 200 mm., but most operators supply themselves with tubes of 100, 50, and even 25 mm., as some of the fluids to be operated on possess so much colour that light will not pass through a larger column satisfactorily. It is desirable to use the larger tube whenever available, inasmuch as the error will be thereby diminished; but whatever be the dimensions of the tube used the results should be stated in terms corresponding to a column of fluid 100 mm. in length, this now being generally accepted, and $[\alpha]$ is used to indicate the molecularly rotatory power of such a column. Hesse, however (*Chem. Centr.*, 1875, 369; *Journ. Chem. Soc.*, 1876, 667), in referring to the results obtained by De Montgolfier, Weiss and Biot, points out the difference obtained by the ray D, the red and transition tints, and concludes that this symbol is equivocal, and suggests that it is better to use α_D for the rotatory power obtained by the yellow ray, as has indeed been the practice for some time in Germany.

When the transition tint was almost exclusively adopted the sign $[\alpha]$ was used to indicate the rotatory power read by it, otherwise it would have been more simple to have adopted this sign where the sodium ray was used, and to have used the qualifying letter only when other rays were employed, which is now rarely done.

Temperature influences the rotatory power to some extent, 15·5° C. (60° F.) being that at which readings are usually taken, and it has been found that the rotation decreases as the temperature increases, and *vice versâ*; but Landolt has shown that the diminution is not always uniform at all temperatures for the same body, or equal for all bodies. He gives as examples—

Oil of Turpentine $[\alpha]_D$ 36°·61: diminished rotatory power for an increase of 1° C. = ·004437.

Oil of Orange $[\alpha]_D$ 115°·31: diminished rotatory power for an increase of 1° C. = ·12371.

This diminution being represented graphically, not by a straight but by a slightly curved line. This, I think, would depend entirely on the expansion and rate of expansion of the liquid, inasmuch as an increase of temperature would necessarily increase the volume and reduce the number of molecules in a column of a given length; the slight expansion of the tube would tend in some degree to compensate for this, and in most fluids the difference for two or three degrees of temperature is so slight that it might be disregarded as being less than the probable error of observation.

Magnetism also influences rotation; indeed some bodies which are void of this property under ordinary circumstances will under its influence exercise it in a marked degree. The discovery of this phenomenon we owe to Faraday (*Phil. Trans.*, 1846, p. 1), and it has been further investigated by De La Rive (*Archives des Sciences, etc.*, vol. xxxii., p. 193; *Annales de Chimie*, 4th series, vol. xv., p. 57; *Phil. Mag.*, 4th series, vol. xl., p. 393); this is, however, a study in itself, and those who wish to prosecute it will find abundant matter of interest in the papers quoted; suffice it to say that under the influence of magnetism the same law holds good as regards decreased rotation for increased temperature.

The advantage of having certain commonly occurring liquids, such as those mentioned, void of activity, is obvious, as it enables us to make concentrated solutions of most solid substances, such as sugar, camphor, the alkaloids, etc., and to select a menstruum in which the body is most soluble, since *concentrated* solutions are most desirable, inasmuch as the calculation is made for the solid substance, and any error in observation will be increased in proportion to the dilution. Not only so, but it has been shown by Landolt (*Deut. Chem. Ges. Ber.* [9], 901—904) that to obtain accurate results, *saturated* solutions are absolutely necessary, for as in the case of temperature so in dilution, the effect cannot be represented graphically by a straight line. In concentrated solutions the divergence is only a few tenths of a degree, and the rotatory power of the body remains the same whatever be the (inactive) solvent employed, but observations taken with dilute solutions are utterly worthless. He further finds (Liebig's 'Analen,' clxxxix., 241—337) that some substances have an increased proportional rotation by dilution, whilst others are diminished; turpentine and ethyl tartrate always show increase, nicotine and camphor both show diminution, and these results are constant with all solvents.

Organic liquids and solutions are sometimes so much coloured that light will not pass through even 25 mm. sufficiently for our purpose. In such cases filtration through charcoal is usually resorted to; this under ordinary circumstances removes enough of the colour to admit of the observation being made, or indeed sometimes entirely decolorizes. But this procedure introduces a possible source of error, inasmuch as it has been shown by Dr. Stammer (*American Chemist, from the Sugar Cane*, *Pharm. Journ.* [3], vol. i., p. 926), that in the case of saccharine solutions the char absorbs sugar from the first portion of the liquid, which passes through and so reduces the strength and rotatory power. This would doubtless occur equally with solutions containing alkaloidal bodies and possibly some others; but as the char becomes saturated before it loses its decolorizing property, if a sufficient quantity be passed through, and the latter portion be taken for examination, the chance of error on this point is obviated.

The great commercial industry in which the polarimeter has been most useful is the sugar trade, and as the expenditure of large sums of money is not unfrequently dependent on the results so obtained, it is not surprising that the greatest perfection in construction and working has been sought for its special requirements.* There is, however, good reason to believe that of the other spheres of usefulness as yet unknown (in addition to those which are known) some are closely allied, whilst others belong to the domain of pharmacy. By its means (as already stated) the purity of the alkaloids can be readily determined; castor oil, croton oil, and doubtless some others of this class possess their specific rotatory powers, whilst the majority of essential oils do so in a high degree. Landolt, who has worked largely with bodies of a definite and constant chemical constitution, does not appear to have as much faith in its application to essential oils on account of some amount of variation dependent on soil, climate, etc., and in his recently published memoir he devotes but little space and consideration to them.

Oil of turpentine and other volatile oils were, however, amongst the first liquids examined in this way, and connected with which an interesting incident occurred. Biot, in announcing his discovery in 1818, called special attention to the fact that whilst in quartz or rock crystal there existed two opposite directions of rotation, in oil of turpentine the rotation was in one direction only, viz., from the right to the left of the observer, and this was the same in direction, although slightly different in degree for all samples examined. This statement remained unchallenged until 1843, when Dr. Leeson read a paper before the Chemical Society of London, entitled "Observations on the Circular Polarization of Light by transmission through Fluids." In this paper he stated that every sample of oil of turpentine which he had examined possessed a *right handed* rotation coinciding in direction with that produced by essence of lemon. These conclusions were so thoroughly opposed to those of Biot, that Dr. Pereira undertook to further investigate the subject, and by procuring reliable samples of French oil of turpentine from M. Guibourt, of Paris, he was enabled to demonstrate the fact that both observers were correct; that the French oil rotated to the left, the English or American to the right, and that a mixture of the two in proper proportions possessed no rotatory power whatever. (*Pharm. Journ.* [1], vol. v., p. 67.)

My first experience in the use of the polarimeter was in a direction not altogether pharmaceutical, but one which nevertheless merits attention from pharmacists, viz., in the examination of urine; it is a legitimate branch of our calling and one which medical men are usually willing to delegate to us; it possesses considerable interest and the remuneration is not influenced by unfair competition on the part of uneducated outside traders. It was diabetic urine containing in round numbers only 2 grains sugar per ounce; subsequently other experiments were made with samples containing larger quantities, but my experience led me to the conclusion that this method of determination is more troublesome and not more accurate than the copper test of Fehling or the recent one of Pavy, although its use has been recommended by Méhu and others. Passing on to essential oils, the work became interesting, although occasionally disappointing; for example, essential oil of bitter almonds distilled in this country, that from abroad which is often obtained from a mixture of peach kernels and almonds, and the artificial, or oil of mirbane, are all optically inactive, hence the polarimeter does not furnish us with a means of distinguishing between them. Other results were very satisfactory. Thus, finest imported otto of rose is levogyrate, giving a rotation of $-3{\cdot}52°$. A common quality was found to be dextrogyrate giving $+1{\cdot}50°$. Now the lower qualities of otto are known to contain varying proportions of oil of geranium; but on examining the only sample of this oil which was then at my disposal and which had been received from the south of France, it was found to give $-6{\cdot}73°$. This, then, could not have been the article used in adulterating the sample in question; but subsequently on examining the Turkey oil of geranium a solution of the problem was furnished, since it gave a rotation of $+1{\cdot}72°$ and indicated that it constituted the bulk of the so called common otto of rose. It was found too that otto of rose distilled in this country possessed an opposite rotatory power to that of the finest imported, as indicated in the table appended to this paper. On examining many samples of oil of lavender it was found that some of the commoner were adulterated with turpentine, and there was no difficulty in determining whether this had been done in France or England, on account of the different rotatory powers of the turpentines in the two countries. Whilst prosecuting this study my attention was directed to an excellent paper by Dr. J. H. Gladstone on essential oils (*Jour. Chem. Soc.*, new series, vol. ii., p. 1), in which he gives the specific gravity, rotatory power and refractive indices of a number of essential oils; also to a less important paper by Dr. Julius Maier, of New York, "Detection of the Adulteration of Essential Oils with Oil of Turpentine" (*Chemical News*, vol. xi., p. 301, from the *Amer. Journ. Science*, xxxix.; p. 273). Since the publication of these, some oils have come into use which were then less known than at the present time and some others are now supplied from different localities; it was therefore thought desirable to go over the ground anew and to compile a table giving the rotatory power and specific gravity of a somewhat larger number. Such a table is appended to this paper, the samples of oil operated on being the most reliable I could obtain, except where a second quality is mentioned for comparison, and all that were sufficiently colourless to be viewed through a column of 200 mm. were so examined. Some oils, such as those of hops, cassia, chamomiles, myrtle, etc., could only be read through 100 mm.; whilst some, such as patchouli and cajuput, admitted only sufficient light through 50 mm. All have been calculated to 100 mm. and at a temperature of $15{\cdot}5°$ C. Many results were obtained which being unimportant are not here recorded, but all tended to experience, and as deductions from which might be mentioned that turbidity even though very slight, materially interferes with the accuracy and sharpness of the readings; it is therefore necessary to filter any oils or solutions which are not perfectly bright. Age does not influence to any extent the optical activity of essential oils. Oil of cloves, new and colourless, and samples of a light sherry and dark sherry colour all registered very nearly the same, and samples of English oil of lavender less than a year, four years and five years old differed from each other less than one degree.

The *modus operandi* is exceedingly simple. A correct zero must be first obtained thus—one of the tubes being filled with distilled water, the glass disc is slid on so as to exclude air bubbles, and screwed firmly down. It is then placed in position and the instrument brought opposite to a sodium flame; the operation must be conducted in a dark room, or a black covering cloth be used. The analyser is then set so that the arrowhead on the vernier points to 0 on the scale when the whole of the disc is at a maximum of obscurity, *i.e.*, both halves equally obscure; it is necessary to take several readings of this and note down the results, taking the mean of the observations, and if, as sometimes happens, there is any difficulty in getting an exact zero it is convenient to make a note of the error and add or subtract this from the subsequent readings.

* Those who are interested in the various kinds of sugar will do well to peruse an excellent paper by Dr. O. Hesse, 'The Behaviour of Solutions of some Substances to Polarized Light' (*Pharm. Journ.*, 3rd series, vol. vii., pp. 191, 410 and 473).

If now the tube be replaced by one containing an optically active liquid, it will be found that the field is entirely illuminated, or that one half is so whilst the other is obscure. The analyser is then rotated until equal obscurity is regained and the number of degrees, minutes or decimal parts of a degree, through which it has been moved, as well as the direction, is noted. For each of the following results ten readings were taken; two of these (the highest and the lowest) were struck out, and the sum of the others divided by 8 gave the mean reading, or where the 200 mm. tube was used, division by 16 gave at once the correct mean for 100 mm. It is, of course, necessary from time to time to check the accuracy of the zero, just as a careful dispenser does the correctness of his scales.

With solid substances, a saturated solution being made in water or other suitable inactive liquid the specific rotatory power $[\alpha]$ is found by dividing the amount of observed rotation α, by the length of the column in decimetres l, by the weight of the active body in each unit of liquid w, and by the density of the solution d thus,—

$$[\alpha]=\frac{\alpha}{l\times w\times d}=$$

For the loan of authentic specimens of some of the following oils I have to thank Mr. E. M. Holmes, Curator of the Pharmaceutical Society's Museum.

Specific Gravity and Rotatory Power of Essential Oils.

Oil of—	[a]=100 mm. 15·56° C.	Sp. gr.	Rot. p.
Anise	Pimpinella Anisum	0·936	+ 1°·00
Do.	Illicium Anisatum	0·980	− 0°·82
Ajowan	Ptychotis Ajowan	0·919	0
Angelica	Archangelica officinalis	0·897	+ 1°·78
Almond, Eng.	Amygdalus communis	1·049	0
Do. Foreign	Do. ?	1·063	0
Do. Artificial	Mirbane	1·152	0
Amber	Succinum	0·859	+ 0°·85
Bay	Laurus Nobilis	0·904	− 18°·88
Bergamotte	Citrus Limetta	0·872	+ 31°·25
Birch	Betula alba	0·872	+ 2°·18
Canada Balsam	Abies Balsamea	0·914	− 30°·07
Clove Bark	Dicypellium Caryophyllatum	1·052	− 2°·25
Cardamoms	Elettaria Cardamomum	0·976	+ 14°·59
Cedrat	Citrus medica	0·969	− 3°·00
Cedar, Commercial		0·968	− 16°·00
Do. Red	Juniperus Virginiana	0·960	− 28 ·75
Caraway	Carum Carui	0·940	− 20 ·68
Cassia, Pure	Cinnamomum aromaticum	1·053	− 1°·00
Do. Commercial		1·021	+ 2°·02
Cascarilla	Croton Eluteria	0·888	+ 8 ·65
Chio Turpentine	Pistacia Terebinthus	0·889	+ 22°·55
Cinnamon	Cinnamomum Zeylanicum	1·025	0
Do. Leaf	Do.	1·060	0
Citron	Citrus medica	0·901	+ 38°·31
Cherry Laurel	Lauro-Cerasus	1·046	0
Citronelle	Andropogon Nardus	0·881	0°·81
Cloves, Eng.	Caryophyllus aromaticus	1·064	+ 0°·50
Do. Foreign	Do.	1·064	+ 0°·32
Chamomile, Eng.	Anthemis Nobilis	0·906	− 0°·95
Do. Foreign	Do.	0·910	+ 6°·16
Coriander	Coriandrum sativum	0·876	+ 10°·65
Cummin	Cuminum Cyminum	0·933	+ 4°·29
Cajuput	Melalueca minor	0·924	− 1°·52
Cubebs	Piper Cubeba	0·924	− 29°·07
Copaiba, New	Copaifera multijuga	0·920	− 13°·50
Do. Old	Do.	0·920	− 12°·52
Camphor	Dryobalanops aromatica	0·956	+ 7°·87
Dill	Anethum graveolens	0·860	− 6°·24
Elemi	Canarium commune	0·867	− 3°·65
Eucalyptus	Eucalyptus Globulus	0·881	− 36°·30
Do.	E. Amygdala, odorata	0·912	− 42°·33
Erigeron	Erigeron Canadense	0·885	+ 72°·41
Fennel	Fœniculum dulce	0·998	+ 25°·71
Geranium, French	Pelargonium species	0·906	− 6°·73
Do. Turkey	Andropogon Schœnan.	0·880	+ 1°·72
Do. Indian	Andropogon	0·896	0
Do. Spanish		0·911	− 4°·45
Ginger, Jamaica	(Eng. dist.)	0·853	− 27°·15
Do.	Do.	0·870	− 52°·25
Do.	(Distilled Abroad)	0·907	− 65°·00
Ginger Grass	Andr. Schœnanthus	0·951	+ 39°·65
Hyssop	Hyssopus officinalis	1·005	− 23°·63
Hops	Humulus Lupulus	0·890	+ 1 ·42
Horsemint, Amer.	Monarda punctata	0·934	− 0 ·76
Juniper, English	Juniperus communis	0·882	− 5 ·00
Do. Foreign	Do.	0·855	− 18 ·71
Jaborandi	Pilocarpus pennatifolius	0·879	− 4 ·10
Lavender, Eng., New	Lavandula vera	0·887	− 8 ·29
Do. Do. Old	Do.	0·903	− 8 ·48
Do. Foreign petal		0·876	− 5 ·93
Do. Do. spike	Lavandula Spica	0·880	+ 13 ·75
Lemons, best Commercial	Citrus Limonum	0·856	+ 52 ·05
Do. extracted by Spirit	Do.	0·852	+ 57 ·23
Do. Distilled	Do.	0·848	+ 22 ·10
Do. obtained by Sponge Process (Hanbury)	Do.	0·957	+ 24 ·26
Limes	Citrus Limetta	0·887	− 43 ·80
Lign Aloe	Elaphrium species	0·925	− 2 ·45
Mustard	Sinapis nigra	1·000	0
Do. Artificial	Sulphocyanide of Allyl	1·010	0
Myrrh	Balsamodendron Myrrha	0·989	− 59°·06
Myrtle	Myrtus communis	0·898	+ 18°·79
Myrcia	Myrcia acris	0·939	+ 6°·59
Neroli	Citrus vulgaris Flowers	0·873	+ 10 ·62
Nutmeg	Myristica officinalis	0·988	+ 24 ·22
Olibanum	Boswellia Frereana	0·872	− 4 ·61
Origanum Vulgare, true	—	0·891	− 30 ·27
Do. Commercial, white	—	0·877	− 16 ·20
Do. Commercial, yellow	—	0·877	− 23 ·74
Do. Commercial, red	—	0·876	− 15 ·15
Oreodaphne Opifera (from British Guiana)	—	0·917	+ 27 ·56
Orange, Sweet	Essence de Portugal	0·848	− 16 ·40
Orange Bitter, Bigarade	—	0·856	− 2°·30
Do. Bigarade, distilled	—	0·850	− 3°·10
Patchouli, French	—	0·988	− 57°·10
Do. Penang	—	0·970	− 48°·26
Parsley	Petroselinum sativum	1·000	− 8°·90
Do. Seed	Do.	0·945	− 14°·75
Pennyroyal, English	Mentha Pulegium	0·945	+ 7°·10
Do. Foreign	—	1·019	− 8°·30
Do. American	Hedesma Pulegioides	0·938	+ 29°·82
Pimento	Eugenia Pimenta	1·036	+ 2°·35
Peppermint, English	Mentha piperita	0·912	− 21°·23
Do. Foreign	Do.	0·924	− 7°·49
Do. Japanese	Mentha Canad?	0·880	− 21°·81
Petit Grain	Citrus vulgaris, leaves and shoots	0·900	− 4°·14
Rhodium	Genista Canariensis	0·931	− 10°·28

Oil of—	[a]=100 mm. 15·56° C.	Sp. gr.	Rot. p.
Rose Otto (distilled in England) . .	—	0·854 +	2°·50
Rose Otto, Finest Imported . . .	—	0·877 −	3°·15
Do. Common	—	0·867 +	1°·50
Rosemary, English .	Rosmarinus officinalis	0·881 −	16°·47
Do. Foreign .	—	0·952 +	4°·47
Rue	Ruta graveolens . .	0·886 −	3°·61
Sassafras (English distilled) . . .	Sassafras offic. . .	1·072 +	2°·64
Do. Commercial	Do.	1·084 +	2°·64
Sandal Wood (Eng. distilled) . . .	Santal. Alb. . . .	0·958 +	2°·36
Do. Foreign	—	0·986 +	8°·29
Spearmint, English .	Mentha viridis . .	0·950 −	30°·28
SolidagoOdora, sweet scentedGoldenRod	—	0·912 +	10°·53
Savin, English . .	Juniperus Sabina .	0·927 −	32°·78
Do. Foreign . .	—	0·884 +	2°·25
Sweet-flag	Calamus aromat. .	0.926 +	14°·31
Do. Commercial	—	0·957 +	19°·60
Sage	Salvia officinalis . .	0·925 +	12°·23
Silver-fir	Abies pectinata . .	0·864 −	14°·18
Scotch-fir	Pinus sylvestris . .	0·886 −	9°·78
Tansey	Tanacetum vulgare .	0·923 +	29°·48
Thyme	Thymus vulgare . .	0·891 −	10°·60
Turpentine, American	—	0·870 +	14°·30
Do. French	—	0·938 −	25°·35
Verbena	Andropogon Citratus	0·890 −	2°·61
Valerian	Valeriana officinalis .	0·971 −	31 ·50
Wintergreen . . .	Gaultheria procumlens	1·162 +	0 ·81
Wormwood . . .	Artemisia Absinthium	0·971 +	17°·43
Wormseed	Chenopodium anthelminticum . .	0·941 −	8°·53
Ylangylang . . .	—	0·056 −	20°·10

Mr. Stoddart referred to the extensive use of the polarimeter in the examination of sugar, but said that the value was affected by the difficulty of determining the zero, as in Soleil's polarimeter, different people arriving at different conclusions respecting shades of colour.

Mr. Umney, adverting to the results Dr. Symes had obtained from the various oils, said he should expect to get a different result from the grass oil of India (Andropogon), than from the geranium oil obtained in the south of France.

Professor Attfield observed that the substances Dr. Symes had examined were nearly all mixtures of distinct things. The polariscope was extremely useful in examining a solution of a single substance, such as sugar, but it was not so useful in other cases unless the nature of the constituents of the mixture was known. Nevertheless, such observations as Dr. Symes's must be useful if they were multiplied, especially as a substance such as an essential oil, when properly obtained and pure, might give a fair average amount of rotation to a polarized ray of light. But he would suggest that many observations would be necessary on the same essential oil before they could well trust to the figures given to them. He hoped Dr. Symes would continue the subject. Perhaps, also, Dr. Symes with his intimate knowledge of the modes of construction of polariscopes would eventually be able to put pharmacists in the way of obtaining a cheap variety of the instrument.

The President said Dr. Symes had spoken of the use of the polarimeter in detecting sugar in urine, and it was a nice point for the physician to discover when the last trace of sugar disappeared from a patient's urine. Before the sugar was lost altogether it became a very difficult matter to estimate the exact percentage by the ordinary process, and he found when sugar existed in less than 1 per cent. in urine it was difficult to determine the exact percentage by the ordinary process. If this instrument, therefore, would detect more minutely the exact proportion when it arrived at such a degree of dilution it would be very useful. Although they might arrive at the exact figure as to the rotatory power of different essential oils, would not the figures have to be varied according to the age of each particular sample?

Dr. Symes, replying, said that most persons had no difficulty in getting the coloured zero with the Soliel instrument, but the maker finding that it did not suit the eyes of all observers introduced what he called *a producer of sensible tints*, whereby the flax flower tint could be changed for some other; it consisted of a Galileo telescope and quartz plate. He could scarcely understand any difference existing between the estimation of sugar by chemical means and by the polarimeter. Reading sugar solutions was almost a profession in itself, and the French who are sellers of sugar usually read higher than the English who are buyers. He regarded both Fehling's and Pavy's tests for diabetic urine as equally accurate with the results obtainable by the polarimeter; they were less troublesome, and the work could be with more confidence delegated to another person. He hoped to go on with the study and that others would take it up, so that ultimately the subject migh tassume a more definite and important position pharmaceutically. He then spoke of the desirability of obtaining cheaper instruments, and agreed with Professor Attfield that they ought to get them at half their present price.

A vote of thanks was then passed to Dr. Symes for his paper.

The next paper read was on—

The Application of Chloroform in the Testing of Drugs.

BY L. SIEBOLD.

In the 'Year-Book of Pharmacy' for 1877 there occurs an abstract of an article by Dr. C. Himly on the Detection of Mineral Adulterants in Flour by means of Chloroform. Having frequently tried this test and finding it extremely useful both as a qualitative and as a quantitative process, it appeared to me desirable to ascertain to what extent it might be advantageously employed in the testing of powdered vegetable drugs. As many of the latter are lighter than chloroform, and the usual mineral adulterants sink in that liquid, it was but reasonable to infer that this mode of separation might prove of value to the pharmacist.

I will not trouble the meeting with the details of my experiments, but confine myself to a brief summary of the results. In each experiment a small quantity of the dry powder was well shaken with about half a test-tubeful of chloroform, and the mixture allowed to stand at rest for twelve hours. The following drugs were found to rise so completely to the surface of the chloroform, that the observation and estimation of any mineral adulterant became a very simple and easy task:—Acacia, tragacanth, starches, myrrh, Barbadoes aloes, jalap, saffron, cinchonas, nux vomica, mustard, white pepper, capsicum and guarana. Known quantities of selenite and of chalk were added to these drugs, and subsequently determined by running the lower stratum of the chloroform with the sediment into a small dish, carefully pouring off the chloroform, drying the sediment at a gentle heat and weighing it. The result in each case was very satisfactory. No such accuracy could be attained by incineration, as in the presence of chalk there was always a loss of carbonic acid, and in that of selenite a loss of water and of oxygen, the sulphate being partly reduced to sulphide. An estimation of these adulterants by the usual analytical processess would, of course, give exact results, but prove much more tedious.

Both for qualitative and for quantitative purposes, the chloroform test therefore answers extremely well with the drugs named. In the case of the following substances no complete rise to the surface of the chloroform took place, but a portion was found to float and another portion to sink, though the absence of mineral adulterants was proved by analysis:—Gamboge, scammony, opium, soccotrine aloes, liquorice root, ginger, colocynth, cousso, ipecacuanha, cinnamon and cardamoms. Of the last two by far the greater portion was found to sink in chloroform. But even in these cases the test is not altogether without value, for a careful inspection of the sediment will show whether or not it is a mixture of various substances, differing in appearance, weight, etc. The mineral adulterant will generally, in such a case, form the lowest stratum of the sediment. A comparison with a genuine sample helps to arrive at a correct conclusion. Moreover, the chemical examination of the sediment gives results which cannot always be obtained by testing the ash. Take the case of cinnamon, for instance, which contains organic calcium salts. These upon incineration leave calcium carbonate, and a qualitative analysis of the ash would therefore fail to show whether this calcium carbonate was solely the result of ignition, or whether a part of it pre-existed in the cinnamon powder as an adulterant; while the addition of hydrochloric acid to the lowest stratum of the chloroform sediment would settle this point at once.

It is, however, in the case of the drug first named that I wish specially to recommend this mode of testing to pharmacists.

The next paper was by the same author on—

Note on the Behaviour of Iodine to Chloroform, and a New Test for the Detection of Alcohol in Chloroform.

Every chemist knows the beautiful purple colour of a solution of iodine in chloroform. It does not seem to be so generally known, however, that this colour varies with the degree of purity of the chloroform employed, and that this variation of colour is due to the presence or absence of alcohol.

A solution of iodine in pure chloroform is deep purple-violet, or if very weak it is purplish-pink, while a solution of the same substance in alcohol is brown, red or yellow, according to its strength. In solutions of iodine in mixtures of chloroform and alcohol, the colour of the alcohol solution so predominates over that of the chloroform solution, that the presence of even a small percentage of alcohol may be readily recognized in a sample of chloroform by comparing the colour of its iodine solution with that of a solution of iodine in perfectly pure chloroform. This mode of testing, however, would necessitate the use of exactly equal proportions of iodine, and of iodine of the same quality and purity, as otherwise the difference in the depth of coloration would materially interfere with the result. I therefore propose the following *modus operandi*, which on the strength of numerous trials I can recommend as a very simple, expeditious and reliable one:—

Introduce a small quantity of iodine into about 10 to 15 c.c. of the chloroform to be tested, shake until the solution has acquired a deep purple or purplish-red colour, not so deep, however, as to render it opaque, and decant the solution from the undissolved iodine. Divide the solution into two equal parts, which place in two separate test tubes of equal diameter, shake one with about four times its volume of water, and keep the other as it is, for comparison. The water will absorb the alcohol, and what settles down is a solution of iodine in pure chloroform, the colour of which will be exactly the same as that of the other portion if the chloroform was pure, but will distinctly differ from it if the sample contained alcohol. With 2 per cent. of alcohol or more, the difference of colour is very striking indeed; with 1 per cent. it is very distinct, and in the presence of only half a per cent. it is still clearly discernible. As little as half a per cent. of alcohol can therefore be readily detected in this manner. By resorting to distillation, a quarter of a per cent. and even less of this impurity may be detected by using the first portion of the distillate for the test. It is a curious fact, that, though chloroform boils at 62° C., and alcohol not under 78° C., the first portion of the distillate is richer in alcohol than the original sample, and that the distillation, if continued, finally leaves pure chloroform quite free from alcohol in the retort. The cause of this must be sought in the different densities of the vapours of alcohol and chloroform, that of the former being 23, while that of chloroform is nearly 60. I think, however, that the test as above described, without the trouble of a distillation, is sufficiently delicate for all practical purposes, and that it will commend itself in that form especially to pharmacists, on account of its simplicity and ease of application.

A third paper, by the same author, was a—

Note on the Specific Gravity of Liquids.

While the great usefulness of the hydrometer for the rapid determination of the specific gravity of all kinds of clear liquids is universally recognized, there appears to be anything but unanimity of opinion as to the value of this instrument as an indicator of the specific gravity of mixtures owing part of their weight to the presence of undissolved or suspended matter. I have therefore made a number of experiments with the object of deciding whether or not the indications of the hydrometer may be depended upon in the case of mixtures containing insoluble powders, oils, resins, etc., uniformly suspended. The results were as follows:—

Mixtures of Precipitated Chalk, Mucilage of Acacia, Syrup and Water—

	Specific gravity by hydrometer.	Specific gravity by balance.
No. 1.	1·106	1·1066
„ 2.	1·070	1·0710

Mixtures of Magnesia, Mucilage and Water—

	Specific gravity by hydrometer.	Specific gravity by balance.
No. 1.	1·059	1·0598
„ 2.	1·036	1·0359

Mixture of Precipitated Chalk and Water only—

Specific gravity by hydrometer.	Specific gravity by balance.
1·037	1·0396

The difference in this case arose from the fact that it wasi mpossible to read off the specific gravity quickly enough, for in the absence of mucilage or any other binding substance, the chalk began to subside immediately after shaking, thus causing a continual decrease in the specific gravity.

Mixtures containing subnitrate of bismuth, heavy spar and other mineral powders, each suspended by mucilage, were tested in the same manner and likewise gave concordant results.

Emulsions of Oil of Almonds, Gum Acacia and Water—

	Specific gravity by hydrometer.	Specific gravity by balance.
No. 1.	1·010	1·0110
„ 2.	1·007	1·0070

Emulsion of Copaiba, Mucilage and Water—

Specific gravity by hydrometer.	Specific gravity by balance.
1·014	1·0144

Various Samples of Milk—

	Specific gravity by hydrometer.	Specific gravity by balance.
No. 1.	1·030	1·0305
„ 2.	1·028	1·0278
„ 3.	1·032	1·0316
„ 4.	1·029	1·0300

Officinal Mucilage of Acacia—

	Specific gravity by hydrometer.	Specific gravity by balance.
	1·165	1·1670

The last determination was made in order to see whether the great viscosity of the liquid would have any notable effect on the indications of the hydrometer.

All the determinations were made at 62° F. The set of hydrometers used consisted of instruments specially made for very short ranges of specific gravities, the correctness of which I had frequently checked in previous determinations.

The foregoing experiments prove that carefully made hydrometers afford reliable indications of the specific gravities of liquids, no matter whether their gravity is due to dissolved or suspended substances.

The PRESIDENT having invited discussion on these three papers—

Mr. MARTINDALE asked a question as to the detection of chloroform in dichloride of ethidene.

Mr. C. UMNEY much admired as a chemist the simple test for detecting the presence of minute quantities of alcohol in chloroform. But the Pharmacopœia recognized the presence of 1 per cent. of alcohol in chloroform of trade, and they as pharmacists must not encourage the idea that chloroform was not medicinally pure because the specific gravity was 1·490. The accuracy of this statement could be checked by calculating the specific gravity of a mixture of 100 parts of chloroform at 1·500 and 1 part of alcohol at ·795.

Mr. E. C. C. STANFORD said in using chloroform he did not know whether the presence of alcohol did not very often give a disagreeable colour to the iodine solution. He had now discarded it for some years, and used nothing but bisulphide of carbon. That was an exceedingly good method of testing certain substances, such as kelp, where the actual amount of iodine was not more than 0·5 per cent.

Professor ATTFIELD asked Mr. Siebold whether there really was any adulteration in powdered drugs; his own experience was that there was little or none.

Mr. REYNOLDS referred to the use of chloroform for testing drugs, and mentioned that he had by this means easily ascertained that the active constituent of an anthelmintic lozenge was santonin.

Mr. SIEBOLD said he had observed adulterations of powdered drugs during his experiments, but not many, and in order to see to what extent the test might prove available, he had himself adulterated most of the drugs experimented with. With regard to the solubility of alkaloids and some other constituents of drugs, alluded to by one of the speakers, he said that in every case in which chloroform dissolved anything from the substance under examination, it was necessary of course to wash the sediment with chloroform before drying and weighing it. He thought this mode of separating mineral from light organic substances might also prove valuable in certain toxicological analyses. Respecting the purity of commercial chloroform, he stated that among the samples he had examined those manufactured in this country were, on the whole, very pure.

A vote of thanks to Mr. Siebold for his papers was passed.

The last paper read at this sitting was on—

THE EXTRACTION OF PILOCARPINE.

BY A. W. GERRARD, F.C.S.,

Demonstrator of Materia Medica at University College.

Having during the past year worked some large quantities of the leaves of jaborandi (*Pelocarpus pennatifolius*) for the alkaloid pilocarpine, I on three occasions varied my process with the view of obtaining the most economical results.

Exhaustion of the leaves with water instead of alcohol was tried and abandoned, as the volume of water required for a thorough exhaustion was so large as to necessitate the employment of much time and unnecessary heat in its evaporation; and moreover the large yield of extractive, most of which was albumenoid, required considerable and prolonged washing with alcohol to free it entirely from commingled alkaloids.

A process similar to that adopted by Wright for exhausting aconite root, viz., treating the root with alcohol acidified with tartaric acid, was tried with the jaborandi leaves; the presence of the acid did not in any way influence the process or result, neither to its advantage nor dis advantage, simple alcohol being equally efficient as a solvent.

In my first process for the preparation of pilocarpine (*vide Pharmaceutical Journal*), I found on treating the concentrated washings of the alcoholic extract with ammonia instead of potash, that much brownish black colouring matter subsided, freeing the mother liquor from a very objectionable accompaniment; this observation several times repeated led me to believe that ammoniated alcohol might be with advantage substituted for ordinary alcohol as the solvent of the pilocarpine. Another reason why I considered the use of ammonia might prove advantageous was that most salts of pilocarpine are only sparingly soluble in cold alcohol, but the hydrate is freely soluble, and in the percolation of the ammoniated spirit through the drug, the ammonia would liberate the alkaloid, which would be freely taken up by the alcohol. Tested on a small scale this process was successful, and the experiment was repeated upon 100 lbs. of jaborandi leaves as follows: 84 per cent. alcohol was treated with 1 per cent. of strong solution of ammonia, and the leaves percolated to exhaustion with this solvent, the alkaline alcoholic percolate was made neutral with tartaric acid, the alcohol distilled, and the residue treated with excess of ammonia and alcohol, again distilled and the pilocarpine dissolved out from the residue with chloroform converted into nitrate and crystallized to purity from boiling absolute alcohol.

The yield of alkaloid by the above process was greater than I had previously attained by other methods of working upon the same sample of leaf; the yield being ·7 per cent., and the ammonia (as I inferred it would) effectually liberated the pilocarpine, so that a comparatively small volume of alcohol was required for its solution, also leaving behind the brownish black colouring matter. The contact of free ammonia with the alkaloid during percolation might be objected to as likely to produce decomposition. This does not appear to be the case judging by the yield.

To purify the nitrate of pilocarpine, which is by far the best and most convenient salt for medicinal use, it is usual to boil the crude brown coloured salt of the first crystallization with absolute alcohol and set aside for a few hours, when the separated crystals may be thrown on a filter and washed with cold alcohol until colourless; the mixed washings will by further treatment yield a further supply of crystals, and the process may be carried on until at last will be obtained a viscous dark brown mass still containing alkaloid but no longer crystallizing. This residue is best worked up by treating with a large volume of water, and allowing to stand for twenty-four hours, when the larger part of the colour separates in flocks, falling to the bottom of the vessel; the solution now evaporated will again crystallize, and the crystals can be treated as beforementioned.

The percentage of pilocarpine in different samples of jaborandi is very variable, one specimen yielding me only ·03 per cent. whilst from others I have obtained ·3, ·5, ·7 per cent., the leaf giving the lowest percentage possessed the true characters of *Pilocarpus pennatifolius*, except that it was much thinner. I was unable to trace its source, but the differences I have alluded to lead one to think that it may be a second variety or grown in a different locality than that from whence we obtain our regular supplies of jaborandi. At any rate it is important to know that there are inferior qualities of the drug which if used in making tinctures, extracts, etc., would possess but little therapeutic value and this is an additional argument for the use of definite principles in medicine such as is found in the alkaloid pilocarpine, which is one of the most powerful and certain diaphoretics known in materia medica.

Mr. Martindale said that having worked at pilocarpine he thought he might have a prior claim to Mr. Gerrard for having first purified the crude crystals of nitrate of pilocarpine. Mr. Gerrard read a paper and showed specimens of nitrate of pilocarpine at the Bristol meeting. The crystals exhibited were contaminated with uncrystallizable matter. Towards the end of 1875, he (Mr. Martindale) worked some bark and stem of jaborandi, from which he got two drams of crude pilocarpine, and on January 18, 1876, experimenting with this, he dissolved it in one ounce of absolute alcohol, and added fifteen minims of nitric acid previously diluted with fifteen minims of distilled water. The small crystals separated readily and were purified by pouring off the spirit, by dissolving in boiling absolute alcohol, from which they separated free from colour. A quarter of a grain administered by the mouth produced the usual perspiration and salivation in forty minutes. The action was over in three hours. A physiologist who had worked a great deal at the subject had informed him lately that pilocarpine did not produce all the actions of jaborandi. It possessed the sialogogue and diaphoretic properties, but did not produce the same action on the heart as the extract of jaborandi. This was probably the effect of a second alkaloid. He should have liked to have asked Mr. Gerrard if he had sought for this in the uncrystallized residues in making this nitrate of pilocarpine.

Mr. Williams said Mr. Gerrard had suggested a new and very important process and they ought to thank him very much for his discovery by which they could get a better yield at a smaller expense of spirit. Not only was credit due to him for this discovery, but for the liberality with which he had made it known.

A vote of thanks was passed to Mr. Gerrard for his paper, and the first day's sitting of the Conference terminated.

The proceedings on Wednesday morning were commenced by the reading of a paper entitled—

Notes on Petroleum Spirit or "Benzoline."

BY ALFRED H. ALLEN.

Although it is well known to professional chemists that petroleum spirit is composed of hydrocarbons quite distinct from those constituting coal-tar naphtha, among the general public, and to a certain extent among people possessed of some knowledge of chemistry, great confusion has arisen as to the nature of the liquids known in commerce as "benzine," "benzene," "benzol," and "benzoline." Of these, the hydrocarbon *benzol* or *benzene*, C_6H_6, is the chief and characteristic constituent of coal-tar naphtha, while it is present in very insignificant amount in petroleum spirit or mineral naphtha. The terms *benzine* and *benzoline* have no scientific application, and are merely commercial names for petroleum spirit. It is owing, in a great measure, to the similarity of these names to those of the chief constituent of coal-tar naphtha that confusion has occurred, but it has been made far worse by the accidental or intentional substitution of one liquid for the other, until it is difficult to obtain the coal-tar product retail, even when it is asked for by its proper name. This would be of but little consequence if the two liquids were of exactly similar nature, but in certain cases they present decided differences of behaviour, although in general characters there are very close resemblances.

The following tabular statement of the characteristic differences between petroleum spirit and coal-tar naphtha has been compiled from various sources and includes a few original tests. All the characters given have been carefully verified by actual experiment on representative samples of commercial petroleum spirit and coal-tar benzol.

Petroleum Spirit, "benzoline," or "benzine."	*Coal-Tar Naphtha, or "benzol."*
1. Consists of *heptane*, C_7H_{16}, and its homologues.	1. Consists of *benzene*, C_6H_6, and its homologues.
2. Heptane contains 84·0 per cent. of carbon.	2. Benzene contains 92·3 per cent. of carbon.
3. Burns with a somewhat smoky flame.	3. Burns with a very smoky flame.
4. Commences to boil at 54° to 60° C.	4. Commences to boil at about 80° C.
5. Specific gravity about ·69 to ·72.	5. Specific gravity about ·88.
6. Smells of petroleum.	6. Smells of coal-tar.
7. Dissolves iodine, forming a solution of a raspberry red colour.	7. Dissolves iodine, forming a liquid having the colour of a solution of potassium permanganate.
8. Does not sensibly dissolve pitch, and is scarcely coloured by it, even on prolonged contact.	8. Readily dissolves pitch, forming a deep-brown solution.
9. When shaken in the cold with one-third of its volume of fused crystals of absolute carbolic acid, the latter remains undissolved.	9. Miscible with absolute carbolic acid in all proportions.
10. Requires two volumes of absolute alcohol, or four or five volumes of methylated spirit of ·828 specific gravity for complete solution at the ordinary temperature.	10. Miscible with absolute alcohol in all proportions. Forms a homogeneous liquid with an equal measure of methylated spirit of ·828 specific gravity.

Although the foregoing tests are abundantly sufficient for the distinction of petroleum spirit and benzol, when applied to mixtures of the two products they are of but little value even as qualitative indications, and in that case the density is the only one of the above characters which is capable of giving even an approximation to the quantities in which the constituent liquids are mixed.

The action of nitric acid on coal-tar naphtha is well known to result in the formation of nitrobenzene and its homologues, and has been employed by Schorlemmer for detecting traces of benzene, etc., in petroleum. On the other hand, the action of nitric acid on the hydrocarbons of the paraffin series, which constitute practically the whole of petroleum spirit, is almost *nil* in the cold, even if fuming acid be used, and is very limited in extent if hot acid be employed, provided that the very strongest be avoided. I found by experiment that the action of nitric acid on petroleum spirit was, under certain conditions, even more limited that I had supposed, and eventually I found that by employing the acid in a particular manner it was not only possible but easy to effect a tolerably perfect quantitative separation of coal-tar naphtha and petroleum spirit.

The following was the mode of treatment eventually employed, and, by adhering to it, it is possible to detect and approximately estimate the proportion of petroleum spirit existing in a mixture of it with benzol, in ten or fifteen minutes:—

A known measure of the sample (from 4 to 6 c.c.) was treated with four times its measure of yellow nitric acid of 1·45 specific gravity. The mixture was made in a flask, to which a condensing arrangement was attached. Slight heat was applied externally by means of a flame if the spontaneous action was not sufficiently vigorous. After about five minutes the contents of the flask were cooled, and then poured into a narrow graduated tube. Any oily layer was measured and removed with a pipette, and the remaining liquid poured into a large excess of water.

When ordinary petroleum spirit is thus treated the nitric acid becomes coloured more or less brown. Very little heat is evolved, but on applying moderate heat externally the production of red fumes proves the occurrence of a certain amount of action. The effect, however, is not so violent as I had anticipated from a perusal of Schorlemmer's description of the reaction, and, if the experiment be carefully made, the petroleum spirit employed forms a layer on the nitric acid, and on transferring the liquid to a graduated tube is found to occupy the original volume of the sample used. This is true whether petroleum spirit alone be operated on or whether it be previously mixed with various proportions of coal-tar naphtha. If the proportion of the latter be large, the quantity of nitrobenzene formed is larger than can be retained in permanent solution in the nitric acid. This fact causes no inconvenience, for the nitrobenzene forms a separate layer below the petroleum spirit, and in presence of nitric acid is not miscible with it. Nitrobenzene and petroleum spirit are perfectly miscible alone, but on shaking the mixture with strong nitric acid the nitrobenzene is dissolved out. It will be seen therefore that the reaction with nitric acid may be conveniently employed for the determination of petroleum spirit in admixture with benzene. Very fair approximate results are obtainable. If the layer of petroleum spirit be removed with a pipette and shaken with water to remove dissolved nitrous fumes, it is obtained in a suitable condition for further examination.

If, after removing the layer of unacted-on petroleum spirit, the nitric acid solution be poured into water, a very sensible turbidity is usually produced, even with petroleum spirit free from coal-tar products, and on filtering off the precipitate, or allowing it to settle, and decanting the liquid, distinct evidence of the formation of nitrobenzene is obtainable by the aniline test. When the more volatile portion of petroleum spirit is thus treated, the nitric acid is scarcely coloured at all, and hardly a trace of milkiness is produced when the acid is poured into water. The brown colour and turbidity on dilution increase with the boiling point of the sample of naphtha, and are strongest with kerosine oil; but in all cases in which petroleum products are treated with nitric acid, the quantity of precipitate on dilution is very insignificant. Although nitrobenzene is recognizable among the products of the action of nitric acid on petroleum spirit, as was shown long since by Schorlemmer, I do not think the turbidity produced on dilution is due solely to its formation. It is probably rather due to the production of various nitro-substitution products, as it is well known thet the higher numbers of the paraffin series are far more readily acted on by nitric acid than their lower homologues.

I have attempted to determine the proportion of benzene in a mixture with petroleum spirit, by measuring the nitrobenzene produced, but the results have not been satisfactory, partly in consequence of the solubility of nitrobenzene in water and acid liquids. By employing 250 c.c. of water for dilution, allowing the nitrobenzene to settle completely, decanting the greater part of the water, and pouring the "bottoms" into a graduated tube, the nitrobenzene may be readily measured. If an allowance of 1·5 c.c. be made for solubility in the one-quarter litre of acid liquid, the measure of benzene present in the sample taken may be roughly ascertained by multiplying the number of c.c. of nitrobenzene obtained by the factor 0·85. Thus if V be the volume in c.c. of nitrobenzene, then the benzene in the amount of sample taken was $(V+1·5)\times·85$. The method is not capable of giving accurate results, but may be useful in some cases as a check on the determination of petroleum spirit by measurement of the layer insoluble in nitric acid.

With a view of learning something respecting the proportion of heptane present in ordinary petroleum spirit, I made a mixture in equal measures of four samples of commercial "benzoline," such as is used for sponge lamps. This mixed specimen had a density of ·7001 at 15·5° C., and commenced to boil at about 54° C. It was distilled in the manner first described by Warren, in a flask furnished with an inverted condenser, filled with water, maintained at a temperature of 70° C., a second condenser being kept well cooled by a current of cold water. The distillation ceased when the temperature in the flask was 84° C., that is, 14° C. above that of the first condenser. The water in the first condenser was then raised to the boiling point, and the distillation continued till scarcely anything more came over, by which time the contents of the flask were at 114° C. The result of the distillation was as follows—for 100 measures of petroleum spirit taken:—

	Condensed below 70° C.	Condensed between 70° and 100° C.	Condensed above 100° C. (residue).
Percentage by measure . .	16	56	26
Density at 15·5° C., compared with water at same temperature	·667	·707	·742

The loss was about 2 per cent. of the original measure. Another specimen of petroleum spirit gave 22½ measures of distillate with the receiver at 70° C., 42 per cent. between 70° and 100° C., and 32 per cent. of residue; the loss being 3½ per cent. The densities of the three products were almost identical with those previously obtained.

The observed specific gravities of the first and second distillates correspond approximately with the recorded densities of hexane and heptane, and from this and the known boiling points of these liquids it is evident that the portion of petroleum spirit not condensed at 70° C. will consist chiefly of hexane and lower homologues, while the part condensed at 70° C., but distilling at 100° C., will be chiefly heptane and isoheptane. As, in the experiments described, this fraction measured from 42 to 56 per cent. of the entire spirit, it is evident that the proportion of heptane present equals if it does not exceed that of all the other constituents.*

The PRESIDENT said Mr. Allen's paper was an exceedingly useful and able one, and invited discussion of it by those who had knowledge of this particular class of chemicals.

Professor TICHBORNE (Dublin) said the paper they had just heard represented a class of papers exceedingly valuable to the analytical chemist, papers dealing with questions bearing on the reactions and detection of admixtures in articles met with in commerce. He should be glad if Mr. Allen would answer two questions. Mr. Allen mentioned that the solvent action of benzole and American light oils were different as regarded pitch. He presumed Mr. Allen meant coal-tar pitch. There were many pitches. One used in road making in Ireland was a pitch procured as a residue in distilling these American oils, and it was probable that that pitch would behave in the same way as regarded the heptane as the coal-tar pitch would behave as regarded benzole, that was, it would be soluble. He wished to know whether Mr. Allen had tried any experiments as regarded the action of these two solvent bodies upon creosote, and whether there was any difference. They knew already

* The physical properties of the benzoline examined by me are very different from those attributed to the liquid by Wiederhold, who on fractionally distilling benzoline of ·715 sp. gr., which commenced to boil at 60°, obtained—

48·6 per cent. of	·70 sp. gr.,	boiling at	100°.
45·7 ,,	·73 ,,	,,	200°.
5·7 ,,	·80 ,,	,,	above 200°.

that creosote was frequently adulterated with carbolic acid, and he desired to know if they had any means of distinguishing the adulteration by means of these solvents of creosote and carbolic acid.

Dr. SYMES said with regard to the odour of the two bodies in question, although they appeared to be somewhat similar, they smelt quite differently. If they were at all compared the odour was a very satisfactory test of the difference between the two, and if the admixture was agitated with water there always seemed to be quite sufficient evidence, not of the quantity, but of the presence of petroleum spirit. The difference in the solvent properties was very great. In separating chrysarobine from araroba the solvent powers of benzole were considerably greater than those of petroleum spirit, and a much larger yield was obtained. In exercising this great solvent property in this particular instance it perhaps produced a less pure product; but he had tried the solvent powers comparatively on some other bodies, and he thought it was exceedingly desirable to know thoroughly what they were using when they were supposed to use either petroleum spirit or benzole. A quantitative test which would readily determine the proportions in which the two had been mixed would doubtless prove valuable.

Professor ATTFIELD said some varieties of petroleums were so highly cleaned, that he questioned if they would be detected in benzole by their odour.

Mr. J. T. DOBB said Mr. Allen in his statement had referred to pitch. He should like to know if the kind of pitch that was used to ascertain the solubility was Swedish, Stockholm or mineral pitch. The gentleman who had previously addressed them spoke of pitch as a product of petroleum spirit from America, and used for roads only in Ireland. He found that in the distillation of tar the residue was pitch, commonly and commercially called mineral pitch. He had found himself that it was only partially soluble in petroleum spirit; but was perfectly soluble in coal-tar naphtha. He wished to ask Mr. Allen what kind of pitch he used to ascertain the solubility of petroleum spirit and the solubility of coal-tar naphtha.

Mr. ALLEN, in reply, said he was very glad gentlemen had called his attention to the kind of pitch he used. He certainly ought to have explained that he used coal-tar pitch. It seemed probable, as Professor Tichborne had suggested, that pitch from petroleum would dissolve in petroleum spirit better than the other. He might add that anthracene, one of the most characteristic constituents of coal-tar pitch, was much more soluble in benzol than in petroleum spirit. He had not made any experiments on wood pitch or petroleum pitch. He had never seen any petroleum pitch, and he would like to obtain a sample. In a paper, written by himself, that appeared in the 'Year-Book,' he had said, "Absolute carbolic acid dissolves half its volume of petroleum spirit, forming a clear liquid. On addition of a larger portion of petroleum spirit precipitation occurs. With one volume of carbolic acid and three of petroleum spirit, the layers have about the same measures as the original liquid. Each layer, however, contains both liquids, as may be proved by cooling the tube with a freezing mixture (or by wrapping filter paper round it, and dropping ether on the outside) when carbolic acid crystallizes out. Absolute carbolic acid is permanently soluble in about ten measures of petroleum spirit at 15·5° C. (=60° F.)." When carbolic acid was shaken with petroleum spirit it must not be supposed that the layers which separated consisted of the original liquors. Each was a solution of the one in the other. With ten measures of petroleum spirit to one of carbolic acid complete solution took place at ordinary temperatures. The solubility was enormously increased by rise of temperature, so that carbolic acid and hot petroleum spirit were miscible in all proportions.

Mr. Allen was thanked for his paper.

(*To be continued.*)

Parliamentary and Law Proceedings.

PROSECUTION UNDER THE PHARMACY ACT.

At the Horncastle Petty Sessions, held on Saturday, the 7th inst., before the Rev. Thomas Livesey (Chairman) and the Revs. Samuel Lodge and Arthur White, magistrates, a summons issued by Messrs. Clitherow and Elsey, of Horncastle, as agents for Messrs. Flux and Co., of London, solicitors of the Pharmaceutical Society of Great Britain, in respect of a sale of laudanum, by Robert Croft at his shop at Horsington on the 19th of July last, contained in a bottle not distinctly labelled with the name and address of the seller of the poison, was heard.

In the absence of the accused, a police constable proved due service of the summons.

Mr. Flux, addressing the Court, said that he appeared to support the case on the instructions of the Council of the Pharmaceutical Society of Great Britain, and as he understood that no prior case under the Pharmacy Act had been under the consideration of their Worships, he would shortly read the 17th section as being the one most especially applicable to the offence of the accused, and with the Court's permission would refer to earlier clauses as showing that in some respects the Pharmaceutical Society were specially charged with sundry duties concerning sales of poisons, and thus that the Council was justified in bringing this case before the Court in order to direct the attention of offenders and the public in the county to the law regulating the sale of poisons. He might mention that the consumption of laudanum in the county of Lincoln was excessive, that his clients had special means of information in regard to it, and had knowledge that the consumption of the dangerous and pernicious drug in and about the fen country had engaged the serious attention of the medical officers of the Privy Council. Laudanum was undoubtedly a poison, and Parliament had by the statute expressly enacted that opium and all preparations of opium should be deemed poisons, and that sales of them should be conducted by duly qualified persons known as chemists and druggists, and with certain formalities, which included labelling with the name and address of the seller. In respect of sales by unqualified persons, penalties were enacted, and in the instance under consideration, the sale had been made by a person not duly qualified, but with that class of penalties the Court had not to deal. The offence of the accused was that of having sold a poison without a label bearing the name and address of the seller so that on any improper use of the article there would not have existed, for the public protection, those traces concerning the sale which the law contemplated. He submitted that in thus bringing one case to the Court's attention and under public notice, his clients fulfilled their mission, and that it was now for the public and those generally charged with the administration of the law within the district to enforce the provisions of the statute. In regard to irregular sales any person might be the prosecutor in a case of the kind, whether the offender was or was not a duly qualified seller. Mr. Flux then read from the statute 31 and 32 Vict. c. cxxi, section 17, "It shall be unlawful to sell any poison, either by wholesale or retail, unless the box, bottle, vessel, wrapper, or cover in which such poison is contained be distinctly labelled with the name of the article and the word poison and with the name and address of the seller of the poison, and any person selling poison otherwise than is herein provided, shall upon a summary conviction before two Justices of the Peace, be liable to a penalty not exceeding five pounds for the first offence, and to a penalty not exceeding ten pounds for the second or any subsequent offence, and for the purposes of this section the person on whose behalf any sale is made by any apprentice or servant, shall be deemed to be the seller."

Police Constable Samuel Kempston, examined by Mr. Flux, proved knowing Robert Croft, who keeps a grocer's shop at Horsington. The name of Robert Croft appears over the door. On the 19th July last witness went to the shop, and asked of a person in charge of it if they sold laudanum, and was supplied with the article in a bottle, for which he paid 8½*d*. The bottle bore a label which did not mention the name or the address of Robert Croft. He kept the bottle in the condition in which he had received it until Wednesday, the 3rd instant, when he handed it to Dr. George May-Lowe.

By the Court:—The label bore the words "Laudanum—poison," and also the name of J. H. Elmitt, chemist, Horncastle.

Dr. George May-Lowe, of Lincoln, lately public analyst for the county, examined by Mr. Flux, proved having received the bottle from the constable, and having analysed the contents, and that the contents consisted of a preparation of opium called laudanum.

As the magistrates were engaged in consultation, the accused arrived and made a statement not disputing the facts proved, but adding that the bottle was stamped with a patent medicine stamp.

The Bench fined the accused £2 10*s*., and ordered him to pay costs, £2 12*s*. 6*d*.

The accused expressed his inability to raise the amount.

The Court (on the suggestion of Mr. Flux) informed the accused of the clause in the Act of Parliament which would expose him to a penalty of £10 on a second or any subsequent offence.

Arbitration in a Plaster Dispute.

In the High Court of Justice, Queen's Bench Division, there has recently been decided a case which should be of interest to those engaged in pharmacy.

The parties to the suit were Leslie and Co., Limited, of Walbrook, plaster spreaders, plaintiffs, and Gale and Company, wholesale druggists, of Bouverie Street, defendants. The warehouses of both firms being within the city of London, the case was heard at the Guildhall, before Mr. Justice Field and a jury.

Scientific evidence was given in support of plaintiffs' case by Mr. Oxton, F.C.S., and for the defence by Professors Redwood and Attfield.

The plaintiffs' claim was one of damages arising, it was alleged, out of defects in the manufacture of resin and white soap plasters, which the defendants, as wholesale druggists, had supplied to them in the ordinary course of their business. The plaintiffs' practice was, it would seem, to purchase the crude plaister, and spread upon tapes and other material for which their firm had obtained a reputation. In addition, it was also alleged that on account of the rancidity of the plaster, after it had been spread but a short time only, they had sustained a considerable loss.

After the case had been fairly opened, the learned counsel contended that it was one of those disputes that should have been referred to an arbitrator, and that even at this stage it would be much better for a referee to be appointed under the authority of the Court. As both parties, seemed desirous that the case should be decided at the present hearing a mass of evidence extending into the second day was taken, when the foreman of the jury expressed his conviction that the case ought to be decided by reference to an expert, in which opinion Mr. Justice Field quite concurred, and directed that both parties should agree upon some one conversant with the subject.

Mr. C. Umney, (Wright, Layman and Umney), of Southwark, was accordingly elected as referee, and his appointment was confirmed by Mr. Justice Field, who gave him full liberty to examine the respective parties and their witnesses upon oath. Evidence was taken upon three days at the Cannon Street Hotel, in the City of London, supported on both sides by the same scientific evidence as at the first hearing at Guildhall, Mr. Courtenay appearing for the plaintiffs and Mr. St. John Wontner for the defendants. Mr. Umney's award was as under:—

1. That the plaintiffs in this action were a firm of plaster spreaders, who had, during a period of several years supplied the medical profession and the public with adhesive and other plasters in a novel and most convenient form, but that the plaintiffs did not in any way manufacture the crude plasters of which their spread plasters were composed, neither did they, either through their managing director, Mr. J. S. C. Renwick, or their foreman, Mr. Wallace Burnett, profess to have knowledge of such manufacture.

2. That one of the shareholders in the company of which the plaintiffs' firm was composed, viz., Frederick Henry Smith, doctor of medicine of St. Andrew's University, and Fellow of the Royal College of Surgeons of England, who lays some claim to a knowledge of manufacture of crude, as well as spread plasters was, and is, entirely ignorant of the former, and the composition of plaster as detailed in the specification of letters patent of himself for the manufacture of tape plasters or bandages, dated January 16, 1874, was not only impracticable, but that he himself did never prepare any plaster either of such composition, or from such recipe that was suitable for producing spread plasters.

3. That the plaintiffs not being possessed of that special knowledge of manufacture which is necessary in order that the business of a plaster spreader may be successfully conducted resorted for the purchase of such crude plasters as they manipulated, viz., resin and white soap plaster, to wholesale druggists and others, part of whose business it is to prepare crude plasters (either from formulæ tabulated in the British Pharmacopœia, or from recipes which they find are generally approved by medical practitioners and pharmacists to whom they generally supply them), and that such crude plasters are made of different proportions of ingredients (notably in litharge and oil), as compared with those designedly made for spreading purposes, a fact well known to those conversant with each branch of this industry.

4. That the defendants were in the habit of preparing various plasters, including those used by the plaintiffs, and that they did from time to time supply such from their private recipes in preference to those compounded from official formulæ.

5. That the complaint made by the plaintiffs against the defendants' plasters was in the main non-adhesiveness and rancidity.

6. That the formula given in evidence by the defendants through one of their firm, Mr. J. S. Walton, who regulated the manufactures of their laboratory, was although non-official, a recipe from which good plaster could be made, and that, when carefully prepared, such plaster, from the fact that it contained to 100 parts of oleaginous or fatty basis upwards of fifty (54) parts of litharge, would not either be rancid or likely to become so during such time in which plasters are generally expected to remain in a sound condition, neither could it have been non-adhesive made from the proportion of ingredients combined with the amount of resin prescribed in the formula.

7. That the plasters sold by the defendants were divided into two portions, the one comprised in the total supply from May to September 12, 1877, and the other that manufactured and supplied subsequently.

8. That the plaster supplied previous to September 12, 1877, was prepared from commercially pure ingredients and was of good average quality, and although it occasionally contained specks caused by slight defects in certain brands of litharge, these were not uncommon, and might in all probability have been removed by judicious melting, straining and subsidence (by no means an uncommon process in the manipulation of plasters)

had plaintiffs or their workmen been conversant with such treatment.

9. That the defendants' plasters were good and fairly uniform, but even if this were not so, as applied to that supplied subsequent to September 12, 1877, no claim should be made for any defect therein, inasmuch, as remelting had been resorted to, and this was opposed to a stipulation made by the defendants in a letter written on or about that date which contained conditions upon which the defendants would continue to do business with the plaintiffs and their accountability for their plaster being only so long as it remained in the state supplied, and not after its condition had been altered by melting, spreading or any other process; the defendants having had at this time a clear notion that the complaint of previous plaster was in the main due to and caused by, the unskilled treatment to which the same was subjected in plaintiffs' factory prior to spreading, and they, therefore, clearly thought it expedient thus to protect themselves.

10. That plaintiffs' factory men were in the habit of melting the plaister in pipkins and other vessels over gas burners (Bunsen's) constructed to give a maximum of heat, and that they did not exercise proper precautions in so doing, stirring of the plaster during the melting process being only *sometimes* resorted to, as stated by W. Metzner, when diligent stirring to prevent decomposition was necessary.

11. That a plaster prepared since hearing evidence, in accordance with defendants' recipe gave, when chemically examined, results corresponding to those obtained from plaister put in evidence and fully corroborated the statements of Professors Redwood and Attfield.

12. Finally, that for the reasons previously stated the plaintiffs have not proved their case, and judgment, therefore, should be entered for the defendants.

The above award being taken up by defendants was handed to Mr. Justice Field, the plaintiffs raising objections to the same upon finding that it was adverse to them. Mr. Justice Field, however, confirmed Mr. Umney's award, and gave judgment for the defendants with costs.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

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[338]. Add the Liq. Ammon. Fort. drop by drop to the Arg. Nit. solution until the precipitate first formed is redissolved.

It is the formula for a dark brown hair dye, which I inserted in this Journal two or three years ago.

Hull. F. Staveley.

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[338]. In this prescription it is evidently intended that the Liq. Ammon. Fort. is to be added to the nitrate of silver dissolved in the water, until the precipitate which is at first produced is redissolved. This is a common receipt for hair dye, and is used after an application of a solution of pyrogallic acid.

W. Fowler.

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[340]. Iodide of sulphur should be triturated with a few drops of S. V. R. in making the B.P. ointment. It is less objectionable than glycerine, and it ensures the production of a faultless ointment.

In the next edition of the B.P. the form might, with advantage be altered to—

Take of

Iodide of Sulphur	30 grains.
Rectified Spirit	15 minims.
Prepared Lard	1 ounce.

Triturate the iodide of sulphur with the spirit in a porcelain mortar, and gradually add the lard, rubbing them together until the ointment is perfectly smooth.

R. H. Parker.

Review.

International Medical Pharmaceutical Dictionary, in three languages, French, English and German, compiled for the use of physicians and chemists in intercourse with foreigners, by George Herman Moeller, chemist, professor, etc. Munich: 1879. Jul. Grubert, publisher.

Perhaps a good dictionary may be considered one of the most valuable books in a library, and a library, however well chosen, must, without a dictionary, be considered incomplete; but there are dictionaries and dictionaries, and whilst there exists so great a variety and "still they come," it is necessary to use some discrimination as regards their choice.

The general principle in the arrangement of a dictionary should be that it contain the words or subjects of which it treats arranged in alphabetical order; but in modern times, to meet the extension in several branches of science, and the daily increasing desire for knowledge, works of very varied kinds have been prepared on the principle of alphabetical arrangement, and are termed dictionaries.

The title of the one before us is attractive; it professes to give the equivalent terms in three different languages necessary for mutual understanding of the medical man and the pharmacist in their intercourse with foreigners.

The book is divided into four parts; the first embraces materia medica, the second, man and his maladies, or the human body and its physiology, the third, pharmaceutics, the fourth, chemistry and physics, and these again are sub-divided; for instance, materia medica is subdivided into the therapeutic classification of medicaments, the pharmaceutic classification of the same, patent medicines with their prices, and finally the art of prescribing.

The materia medica proper embraces probably all the organic and inorganic materials that ever have formed a part of the materia medica of any European country, from "Ping-war-har-jamby" to "spirit of treacle." The second division, man and his maladies, is subdivided into physiology, including every part of the human body and diseases with all the "ills that flesh is heir to." The third, pharmaceutics, has in its subdivision every article required in pharmacy, from a bung to a thermometer, and every appliance found in the laboratory from a screw press to a gridiron. The fourth, chemistry, is so subdivided as to include the elements, simple combinations, and chemical analysis, from a simple element to a "compound atom," together with botany and zoology.

Every object in the several sciences named, with every term required to be used in their pursuit, are here given in three languages, followed by a complementary vocabulary, and a copious index in the German language, from which it may be inferred that the work is primarily intended for the German aerzte and apotheker. If it were reasonable to ask a person to employ his leisure time in learning a dictionary, doubtless much information would be acquired from this one, but life is too short to admit of such a luxury. The work may sometimes prove useful, but it is too diffuse to be readily available. Where there is a dictionary it can scarcely be said to supply a want, or where there is not one to compensate for the deficiency; and the labour bestowed upon it by the author will, we fear, be ill requited if its sale be dependent on its being used by physicians and chemists in Great Britain as an assistance in their intercourse with foreigners.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

A Request.

Sir,—With your permission, I wish to ask those who are in a position to give it, for tangible proof that the patent medicine stamp is used to cover the sale of scheduled poisons. As the sale of poisons under the guise of so-called patent medicines is likely to engage the attention of the Pharmaceutical Council, I am anxious to demonstrate by ample proof that the Act of Parliament is thus infringed.

May I ask therefore that members of the trade will kindly obtain for me, as soon as convenient, samples of poisons sold under cover of the medicine stamp, and that they may be sent to my address as annexed?

205, *St. John Street Road, E.C.* Robt. Hampson.

How can a Chemists' Assistant register Himself as a Dentist in bona fide Practice?

Sir,—The above question has been asked me during the last few months by numerous friends in both the dental and medical professions; in consequence I have been at considerable trouble to ascertain if any chemists' assistants really had registered as such, and I find that they have. I have also had chemists pointed out to me who have never done any dental operation beyond extracting a tooth, and have probably never seen inside a dental laboratory, and know absolutely nothing of "dentistry," who have registered as being in *bonâ fide* practice as dentists. Now the Act never contemplated registration by any persons other than those known as being engaged in the practice of dentistry, either separately or in conjunction with pharmacy or surgery.

It does not follow that because a chemist placed an engraved plate with the word dentist on it, upon his door, at the passing of the Act, that the law will recognize him as a dentist. A dentist in the eye of the law must have been a person engaged in every branch of the dental art, *i.e.*, able to undertake any operation and do any mechanical work that may be required for the mouth by the public.

The various dental associations, formed for the express purpose of sifting out fraudulent registrations, have an agent in every town now busily engaged in compiling a list of such registrations. Section xxxv. of the Dental Act, 1878, provides for such by fine and imprisonment.

Many think that because they have filled up the declaration paper sent by the Registrar, and received from him the "Dental Registration Certificate," that they are now safe; such, however, will not be the case without legal evidence of qualification and fitness, which will be demanded by the "British Dental Association." No chemist regularly engaged in "*bonâ fide* practice as a dentist" need fear any annoyance or subsequent trouble from the requirements of the Dental Act; such, however, as cannot bear the strictest investigation as being *bonâ fide* in practice at the passing of the Act had better at once, and previous to the publication of the register, apply to Mr. Miller, and have their names erased to prevent "Section xxxv." being carried into effect.

1, *St. Domingo Vale, Liverpool.* J. J. Musgrave.

Sp. Æther. Nitrosi.

Sir,—In your issue of August 2, there appeared a letter on this subject by Mr. W. Pollard in reference to the paper by me in the Journal of July 19. The usual derangement of business consequent upon holiday time must be my apology for the delay in replying.

Two questions appear to have suggested themselves to Mr. Pollard, and upon which he asks information.

1st. How is it that 2 per cent. of æther. is separated by the solution of calcic chloride, and only 1·72 is obtained by analysis?

In answer to this query, I must refer Mr. Pollard to the discussion that followed the reading of a paper at Bloomsbury Square, reported in the Journal, on page 377, vol. viii., 1877, and he will find it stated by some of the speakers that the ethereal fluid that rises in the tube is not all nitrite of ethyl, and the analysis I have given shows this to be true.

2nd. What becomes of two-thirds of the nitric acid used in the process?

Some of the nitric acid is decomposed by the alcohol, aldehyde and water being formed, a further portion remaining in the retort unused.

Bradford, Sept. 10, 1879. F. M. Rimmington.

Weights and Measures.

Sir,—Mr. Martindale in his note says that "the troy cup weights in general use have always had this, the troy pound of 12oz., as their largest weight." This is certainly not "always" the case, all the troy cup weights I have ever seen run thus—ʒij, ʒij, ʒiv, ℥j, ℥ij, ℥iv, ℥viij, going on to 16 and 32oz., the larger cup being always of the same weight as those fitting into it. I would give a hint to people having the larger cups of 16 and 32oz., that if the inspectors see them it may not be altogether pleasant, as these weights are not mentioned in the schedule and there is no standard for them; but in this as in some other matters connected with the Act, we can only hope the authorities will not ask too many questions.

Manchester. W. Wilkinson.

Liq. Kino ('Year-Book,' 1873).

Sir,—I take the opportunity now the subject is again before the members of the Conference and readers of your Journal to make a necessary correction. In the 'Year-Book' for 1873, in the paper on page 554, line 12, "four" should be "one and a half," which dilution would then bring the solution to the same strength as the tincture, *i.e.*, 2oz. Kino to Oj. I would ask those possessing the 'Year-Book' to make the necessary alteration. I did not observe the mistake till after the 'Year-Book' was published, and had not that paper been mentioned at the Sheffield Conference by Mr. Benger, I should not have thought it necessary to call attention to the error which was an oversight of mine at the time of writing the paper.

Sheffield. G. Ellinor.

Gilvach, M.—See a letter on the subject in the previous column.

F. Watts.—(1) *Ballota nigra.* (2) *Stachys Betonica.* (3) *Origanum vulgare.*

"*Querist.*"—The latest edition of Fownes's 'Chemistry' is the 12th, published in two volumes in 1877.

J. Thompson.—*Salvia verbenaca.*

G. R. P.—*Chenopodium album.*

J. H. Dingle.—(1) *Peplis Portula.* (2) *Usnea plicata.* (3) *Molinea cœrulea.* 4 and 5 belong to the genus *Ampelopsis*, but the materials are not sufficient to determine the species.

"*Fred.*"—The Army Medical Department.

"*Spes.*"—We are unable to give the information asked for.

"*Apprentice.*"—If possible, send the original prescription; probably you have misread it.

A. N.—See the discussion in the "Dispensing Memoranda" in vol. viii., pp. 19, 38 and 67.

"*Associate.*"—There is no such preparation in the United States Pharmacopœia.

E. T. Gregory.—You should apply to a respectable bookseller for the information.

T. P. Blunt.—The substance in question is not included in the schedule, it not being a cyanide.

D. Dickinson.—Registration in America does not protect a title in England.

W. J. Sanders.—Probably Galangal root (*Alpinia officinarum*, Hance).

Communications, Letters, etc., have been received from Messrs. Parsons, Hamilton, Long and Co., Dickson, Hopkinson, Fletcher, Howard, Benger, Robinson, Pope, Rimmington, Tait, Mason, Atkins, Naylor, Collier, Elton, Gosling, Draper, Landerer, Corder, Musgrave, Bostock, Barnaby, Stoner, Abraham, Laing, Norman, Chadwick, Tupholme, Junior, Tyro, Inquirer, Epsilon, Greek Fire, Ignoramus, Junius, Minor, Sandford, R. W., M. P. S., J. T., W. L., T. S. W.

NOTE ON GENTIAN ROOT.

BY O. CORDER.

Whilst walking through the Engadine, Switzerland, this summer, I found in some valleys, as in the Beveos Thal, great quantities of *Gentiana punctata*, and in one chalet saw several tons dug up for medicinal use; in others as in the Fex Thal, only *G. lutea* was noticed, and upon inquiry from a local botanist, M. Cavretzel of Pontresina, he informed me that I was correct in supposing that both are indiscriminately collected for pharmaceutical purposes. The two plants differ but little in the growing state, but when in flower would never be mistaken, *G. lutea*, having a yellow corolla and *G. punctata* a yellowish green one profusely spotted over with black dots.

THE PHARMACEUTICAL EXHIBITION IN HANOVER.

One of the most interesting features of the meetings of the Deutsche Apotheker-Verein consists in the exhibition of objects more or less closely associated with pharmacy, and the display in connection with the recent meeting in Hanover, although including many exhibits which have lost the charm of novelty, well recompensed the trouble of a careful examination. The larger portion of this exhibition was shown in the basement and gallery of a good sized hall in the "Odéon," adjoining the hall in which the meetings of the Association were held, but the machinery and larger pharmaceutical apparatus overflowed into the concert grounds, where they were placed under a long shed.

The number of exhibitors was considerable, the Catalogue containing 161 names. It was rather noticeable, however, that the manufacture of chemicals, as distinct from pharmaceutical preparations, was almost entirely unrepresented. On the other hand, several of the exhibits might be looked upon as being rather excrescences of pharmacy than pharmaceutical. Paper and labels, bottles and boxes, infants' foods and extracts of meat, condensed milk and soluble cocoa, aniline dyes and phosphorus paste, all had their exhibitors, and most of the cases were praiseworthy, but they presented in this direction little beyond what pharmacists are accustomed to see in this country.

Amongst the knickknackeries of elegant pharmacy one could hardly help being struck by the development in the preparation of gelatine capsules and perles. Some very fine and elastic specimens of these were exhibited by H. Kahle, of Konigsberg, and G. Pohl, of Schönbaum. In fact the gelatine capsule has developed in more ways than one, specimens being shown as containing 15 grams of oil. A remark as to the large size of these led to a practical demonstration with one by an obliging bystander, and the capsule was bolted without any indication of present difficulty or—what was quite as noticeable, perhaps—fear of subsequent inconvenience. Pastilles were also shown in considerable number, and of tempting appearance, one of sal ammoniac being frequently met with. Much nattiness was also evident in the getting up of plaster in small quantities, long strips of different widths being rolled up and enclosed in tin boxes for sale for a few pfennigs. Allied with these were also to be seen small rolls of linen, charged with plaster of paris, put up in air-tight cases, requiring only to be wetted to be ready for use as plaster bandages. It may be remarked here that some of the plasters appeared to be of admirable quality; especially may be mentioned an adhesive plaster on silk, exhibited by R. H. Paulcke, of Leipzig. This exhibitor also showed a fine specimen of glass wool, prepared from crystal glass and warranted to be free from lead, which metal has been alleged to be a source of impurity when glass wool is used as a filtering material.

Some very good specimens of drugs in powder, both coarse and fine, were shown by different exhibitors, notably by Dr. Brunnengräber, of Rostock, in whose case was also a fine cake of expressed oil of nutmeg. Many specimens of barks and roots cut small, but to a uniform size, for the convenience of pharmaceutical operations, were also to be seen, though perhaps the best show of these was made by W. Kathe, of Halle. Especially noticeable in this display were the fine specimens of rhizoma iridis, rhizoma galangæ, radix liquiritiæ, and radix rhei cut into small cubes. Some remarkably fine ergot was also shown by Mr. Kathe. It was stated to be the choice pickings of large parcels of ergot of rye collected in different parts of Germany, especially in Prussian Silesia, but the size was so enormous as to suggest the idea that it might have been parasitic on some other plant than rye.

A very fine case of pharmaceutical preparations was displayed by Dr. F. Witte, of Rostock. It contained a very large and handsome crystallization of caffein, but of not less interest was a series of preparations of pepsin and peptones. Amongst these was an "Eisen-pepton," prepared from a fibrin peptone. It is claimed that iron administered in combination with peptone is presented to the stomach in a form in which it does not cause irritation to the mucous membrane and is very easily assimilable. This preparation is in the form of powder, is said to be easily and perfectly soluble in water at a temperature of 28° C., and to contain 5 per cent. of iron oxide. A "tinctura episcopalis" gave rise to some speculations as to its possible origin, which were by no means allayed by the subsequent visit to the old cathedral at Hildesheim, where the remains of several bishops are supposed to lie at rest.

Attention has recently been directed to the subject of crystallization, and especially to the behaviour in this respect of solutions of isomorphous salts to each other. A case of crystals exhibited by F. Meyer, of Geestemünde, contained some very fine crystals, which well illustrated some principles laid down in two papers that have appeared in this Journal during the present year.* One very fine and perfect octahedron of chrome alum crystallized over ordinary alum weighed 1550 grams. From mixtures of solutions of the two alums the crystallization of chrome alum appears to take place most rapidly at starting, as indicated by the centre of the crystal being much darker than the outer portion. Judging from similar evidence, when a crystallization of magnesia sulphate is grown over nickelous sulphate the greater part of the deposit takes place at the ends of the prism as compared with the sides.

In the exhibit of Schmidt and Haensch, of Berlin, was an instrument that promises to respond to what was mentioned at the recent Conference meeting at Sheffield as a desideratum. This was a small polarimeter, which is described as a "half-shade Mitscherlich." From a cursory examination it appeared

* *Pharm. Journ.* [3], vol. ix., pp. 678 and 769.

to be a fairly good and delicate instrument,—the vernier being graduated to degrees representing each 1 per cent. of sugar,—and the price was five guineas. It is probable that an opportunity of examining this instrument, as well as a low-priced, but apparently very good, students' microscope, will be afforded at an evening meeting in the coming session. Some of the microscopes of this firm were fitted with an ingenious arrangement by which, after the traveller has carried the object glass from end to end horizontally across the field of vision, upon reversing the movement the object glass is, by a ratchet action, shifted vertically just sufficiently to expose a fresh field, and thus a systematic examination of an object can be attained.

In the machinery and apparatus shed were some very handsome and comprehensive pharmaceutical apparatus, aiming at the same objects as those described and illustrated in this Journal in the papers by Mr. Corder and Mr. Schacht.* A small vacuum apparatus, valued at £35, was also exhibited by F. H. Meyer, of Hanover. There were also several pharmaceutical presses. One consisted essentially of two vertical plates, with cavities to contain hot water, and was worked by a double screw (one to each plate). In another the pressure was effected by drawing four wedges placed above the pressure plate from an inclined into a perpendicular position. Mills, apparatus for filling, corking and washing bottles, etc., were also shown, but these call for no particular remark. There was also a small stove, adapted for the use of petroleum as a source of heat.

Different people have different tastes, and to some probably the small side room, devoted to the "Historisch-pharmaceutische Anstellung," was the most acceptable part of the whole. This was the first time in connection with this Association that an attempt had been made to gather together literary and other antiquities more or less belonging to pharmacy, and the committee at Hanover may be fairly congratulated upon the success that followed their effort. This is not the place for a catalogue, but it may be mentioned that the collection included some very curious old specimens of pharmaceutical utensils, including a brass mortar, which has just completed its five hundredth year, as would appear from the inscription, "GHEGOTE VAN IAN VERPIET. 1379." Some bezoar stones, mounted in gold filagree and formerly worn as charms, recalled a materia medica that has passed away. But this was done more vividly by a case of ancient remedies from the Altstaden Apotheke. It contained a large number of specimens in small bottles, and among those of which the labels could be deciphered were the following:—viperarum spinæ, viperarum exuviæ, dentes lupi, dentes hominis, pili cervi, pili leporis, pili hirci, calculus ex vess. fel. bovini, calc. ex vess. humanæ, priapus cervi, testiculi equi, testiculi cervi, testiculi cervis, testæ fluviatilis, succinum rubrum, succinum artificiale, stercus pavonis, stercus murium, stercus hirudinum, stercus equorum, stercus columbarum, and stercus anseris. There was a considerable collection of old documents, consisting of "privilegiums," indentures, certificates, and the like, most of them bearing a date in the latter half of the eighteenth century, but some much earlier. Many of these documents were elaborately emblazoned and otherwise ornamented, and most of them were written in the German language and characters. Amongst the books were several very old herbaria and herbals, a number of old pharmacopœias, mostly of German states, but some British, and several ancient works on alchemy and chemistry. Perhaps, as Victor Meyer has recently shown that it is not always safe to overlook as exploded the theories of these old masters, there may be a tendency just now to hunt up the literature of the past for hints. It will not therefore be out of place to conclude this notice with mention of the 'Zymotechnia Fundamentalis, or the General Principles of the Art of Fermentation,' published at Frankfort in 1734, a book which appears promising forage ground at a time when the nature of the "elements" is so much discussed, since it claims on the title-page to describe how a true sulphur may be artificially produced ("*wie ein wahrer Schwefel durch Kunst zum Vorschein zu bringen*").

* *Pharm. Journ.* [3], vol. vii., p. 349, and vol. viii., p. 225.

CITRATES OF QUINIA.*

BY A. F. MANDELIN.

The author has made investigations in the pharmaceutical laboratory of the University of Dorpat, under Professor G. Dragendorff, on the composition of various citrates of quinia which may be obtained of a definite composition. He first gives an historical review of the labours of his predecessors.

Dr. Guleani, of Venice, was the first who proposed (in 1832) a method for preparing a citrate of quinia by double decomposition of sulphate of quinia and sodium citrate. The former salt may be either neutral or acid; according to its nature the proportions of the two salts required to react upon each other will somewhat vary, but they will yield in each case the same product, namely, a neutral salt.†

a.) $3(2Qu.H_2SO_4)$ + $2Na_3H_3(C_6H_5O_7)_2$‡ =
neutral quinia sulphate + "acid" sodium citrate =
$3Na_2SO_4$ + $2(3Qu.2Ci)$.
sodium sulphate + neutral quinia citrate.

b.) $3(Qu.H_2SO_4)$ + $2Na_3C_6H_5O_7$.
acid quinia sulphate + neutral sodium citrate.
$= 3Na_2SO_4$ + $3Qu.2Ci$.
sodium sulphate + neutral quinia citrate.

Wittstein analysed the crystallized salt and found it to correspond to a formula which in the new notation would be $2Qu.Ci.5\frac{1}{2}H_2O$.

Dr. Hager, in 1859, directed to prepare it from 10 parts of citric acid and 29 parts of pure quinia. Its composition was given as $3Qu.2Ci.10H_2O$. In 1875, the same author changed his directions to 1 part of citric acid to 3·5 parts of pure quinia. He called the resulting salt neutral citrate of quinia, and gave its composition as $2Qu.Ci.7H_2O$. In 1876, however, he reduced the proportion of quinia to 3 parts, and returned to the original formula, namely, $3Qu.2Ci.10H_2O$.

The Austrian Pharmacopœia directs to saturate citric acid with freshly precipitated quinia hydrate. Dœbereiner (1861) gives for this the following formula: $2Qu.Ci$.

Geiger, in 1845, directed the same method of preparation.

The Netherland Pharmacopœia (1871) directs 1 part of citric acid and 3 parts of quinia hydrate, which yield, according to Stœder (1878), a salt of the composition $3Qu.Ci.10H_2O$.

* From *New Remedies*, September, 1879. Abstract of a paper by K. F. Mandelin. *Chinincitrater: Undersökningar i farmaceutiska laboratoriet i Dorpat. Af K. F. Mandelin, fr. Jœnsuu i Finland.* 8vo. Dorpat, 1879.

† Throughout the above text we have abbreviated the formula for *quinia* ($C_{20}H_{24}N_2O_2$) by "*Qu.*," and the formula for *citric acid* ($C_6H_8O_7$) by "*Ci.*"

‡ This stands really for $2Na_3C_6H_5O_7 + 2H_3C_6H_5O_7$.

Wurtz gives the composition $2\,Qu.Ci.5\,H_2O$.

The author now proceeds to give an account of his own investigations. He brought together citric acid and quinia in four different proportions, and analysed the resulting crystallized salts with the following results:—

a. Three molecules of quinia and two molecules of citric acid. He obtained a salt containing 0·3963 per cent. of water, 72·99 per cent. of anhydrous quinia, and (28·14 per cent. corrected) 26·62 per cent. of citric acid, and corresponding to the formula 3 Qu.2 Ci.

b. One molecule of quinia and one molecule of citric acid. The resulting salt was anhydrous, and contained 64·55 per cent. of anhydrous quinia and (32·43 per cent., corrected) 35·45 per cent. citric acid. Composition: Qu.Ci.

c. One molecule of quinia and two molecules of citric acid gave a salt containing, when dried in the air, 0·60 per cent. of water, 63·79 per cent. of anhydrous quinia and 35·59 per cent. of citric acid (calculated by difference). The composition is, therefore, probably the same as that of the preceding salt. Hesse has already stated that by treating one molecule of quinia with a little more than one molecule of citric acid, a salt of the composition Qu.Ci. is obtained.

d. Two molecules of quinia and one molecule of citric acid. This salt contained 1·14 per cent. of water, 78·28 per cent. of anhydrous quinia, and 20·32 per cent. of citric acid. Composition: $2\,Qu.Ci.\frac{1}{2}H_2O$.

The solubilities of the three obtained citrates are the following in 100 parts of water:—

	Cold. Parts.	Boiling Parts.
Basic Quinia Citrate (2 Qu.Ci.)	0·1093	2·25.
Neutral „ „ (3 Qu.2 Ci.)	0·1133	2·39.
Acid „ „ (Qu.Ci)	0·1566	2·60

PETROLEUM FROM THE CASPIAN.*

A correspondent of the *Daily News*, writing from Baku, on the Caspian, gives an account of the petroleum springs existing there. All around Baku the ground is sodden with natural issues of naphtha. In some places the earth is converted into a natural asphalte, hard during cold weather, but into which the foot sinks a couple of inches at midday. Add to this that, owing to the scarcity of water, the streets are moistened with coarse black residual naphtha. It effectually lays the dust during fifteen days. After this period a thick brown dust lies four or five inches deep in the roadway, over which the numerous "phaetons" or street carriages glide so softly and noiselessly that the foot passenger is frequently in danger of being run over. When a north or west wind arises, the air is thick with impalpable marly earth, combined with bitumen. The least glow of sunshine fixes this indelibly in one's clothes. No amount of brushing or washing can remove it.

The shores of Baku bay north of the town trend towards the east, and some five or six miles distant are the petroleum, or, as they are termed, the naphtha springs. The surrounding district is almost entirely destitute of vegetation; and in its midst are some black-looking brick buildings, interspersed with curious wooden structures, twenty feet high, resembling Continental windmills. These latter are the pump or well-houses covering the borings for oil, and in which the crude liquid is brought to the surface. All around smells of petroleum, and the ground is black with waste liquid and natural infiltrations. Boring for naphtha is conducted much in the same manner as that for coal. An iron bit, gouge-shaped, is fitted to a boring bar, eight or ten feet in length, which is successively fitted to other lengths as the depth of the piercing increases. This depth varies from fifty to one hundred and fifty yards, this difference existing even at very short horizontal distances, sometimes not over forty yards. Layers of sand and rock have to be pierced. It is in the sand that often the greatest difficulties have been met with. A loose boulder will meet the boring tool, and displacing itself leave the passage free. But when the rods are withdrawn to allow the introduction of the tubes which form the lining of the well, the boulder falls back to its place, and baffles all attempts to continue the orifice. This boulder difficulty is the great terror of those commencing to bore. Sometimes, after a lengthened discharge of heavy carburetted hydrogen, the naphtha rises to the surface, and even flows over abundantly, as in the case of the artesian well. Under ordinary circumstances, it has to be fished up from a considerable depth. The boring is generally ten, or at most eighteen inches in diameter. A long bucket, or rather a tube stopped at bottom and fifteen feet in length is lowered into the well, and drawn up full of crude petroleum, fifty gallons at a time. This, which is a blue-pink transparent liquid, is poured into a rudely constructed, plank-lined trough at the door of the well-house, whence it flows by an equally rude channel to the distillery. The distillation is conducted at a temperature commencing with 140 degrees Centigrade, much lower, I am told, than the first boiling point for that from Pennsylvania. When no more oil comes over at this heat, the result is withdrawn and the temperature increased by ten degrees. This second result is also laid aside, and the heat being again increased a third distillation is carried on until no further easily evaporated liquid remains. This last is the best quality of petroleum for lamps. That which preceded it is the second quality; and the first, or highly volatile, liquid is either thrown away or mixed with the best and second best as an adulteration. The thick dark brown treacly fluid remaining after distillation is termed astalki, and is that used for the irrigation of the streets. The distilled petroleum, if used in lamps, would quickly clog the wick with a carbonaceous deposit. Previous to being offered for sale, it is placed in a large reservoir, within which revolves a large paddle-wheel. Sulphuric acid is first added, and after being allowed to settle, the clear top liquor is drawn off, and similarly treated with caustic potash. After this it is ready for sale. Up to the present, the residues, after the acid and potash treatments, have not been utilized. I have no doubt but that, later on, valuable products can be derived from them. With the astalki, or remnant after the first distillation, it is different. For years past it has been the only fuel used on board the war ships and the mercantile steamers of the Caspian. At Baku its price is only nominal, vast quantities being poured into the sea for lack of stowing space or demand. In cooking apparatus it is used, and for the production of gas for lighting purposes. In the latter case it is allowed to trickle slowly into retorts raised to a dull red heat, pure gas with little graphite being the result. Weight for weight this waste product gives four times as great a volume of gas as ordinary coal. By distillation at a high temperature and treatment with an alkaline substance, a product is obtained which is used as a substitute for oil in greasing machinery.

Apart from the local use of petroleum for lighting purposes, and its exportation for a similar use, comes its application to steam navigation. With the old-fashioned boilers in use, having a central opening running longitudinally, no modification is necessary for the application of the new fuel. A reservoir, containing some hundred pounds weight of the refuse (astalki), is furnished with a small tube, bearing another at its extremity, a few inches long, and at right angles with the conduit. From this latter it trickles slowly. Close by is the mouth of another tube, connected with the boiler. A pan containing tow or wood saturated with astalki is first introduced to heat the water, and once the slightest steam pressure is produced, a jet of vapour is thrown upon the dropping bituminous fluid, which is thus converted into spray. A ligh

* From the *Journal of the Society of Arts*, August 29, 1879.

is applied, and then a roaring deluge of fire inundates the central opening of the boiler. It is a kind of self-acting blow-pipe. This volume of fire can be controlled by one man by means of the two stop-cocks as easily as the flame in an ordinary gas jet. This I have repeatedly witnessed on board the Caspian steamers. As regards the expense, I give the following data on the authority of a merchant captain who has used naphtha fuel for years. His steamer is of four hundred and fifty tons, and of one hundred and twenty-horse power. He burns thirty poods per hour of astalki to obtain a speed of thirteen nautical miles in the same time. One pood is about thirty-three English pounds (16 kilogrammes), and costs on an average from five to six pence. Thus a twenty hours' voyage at full speed for such a vessel costs about twelve pounds sterling. The fuel is as safe and occupies much less space than the amount of coal necessary to produce a similar effect, not to speak of the enormous difference in price, and the saving of manual labour. Two engineers and two stokers suffice for a steamer of a thousand tons burden. With the immense supply of natural petroleum, as yet only very slightly developed, and its application to the already guaranteed railway from Tiflis to Baku, and to the inevitable future ones beyond the Caspian over the plains of the far East, I think this subject is worthy of every attention. Yet there are proprietors of large tracts of petroleum-bearing ground whose capital rests unproductive because of a want of demand. The island of Tchilican, not far from Krasnavodsk, teems with the precious liquid. The sea-ward cliffs are black with its streams flowing idly into the sea; and a natural paraffin, or "mineral wax," is found abundantly in the island and in the low hills a hundred versts west of Krasnavodsk. All round Baku the ground is full of naphtha. In hundreds of places it exhales from the ground and burns freely when a light is applied. Only a couple of months ago the volatile products produced a remarkable effect a couple of miles south of Baku. A large earth cliff fronting the sea was tumbled over as by an earthquake shock and, as I saw myself, hugh boulders and weighty ship's boilers were thrown a hundred yards. In some places I have seen fifty or sixty furnaces for burning lime, the flame used being solely that of the carburetted hydrogen issuing naturally from fissures in the earth.

OIL OF GAULTHERIA.*

BY JOSEPH BRAKELEY, PH.G.

The manufacturers of this oil are generally men of limited means and knowledge, and the apparatus used is very crude and simple in its arrangement, being easily taken down and removed to other parts when the supply of leaves is exhausted. This generally occurs in two or three years.

The first point in locating, after finding where the plant grows plentifully, is to secure a stream of water with enough fall to allow it to be carried to the top of the refrigerating tub. Under a rough shed the apparatus is erected, consisting generally of an ordinary copper whisky still with a capacity of from two to four hundred gallons, enclosed in brick work, and with the head only projecting. The still is connected with a copper worm, and a cask or tub to receive the distillate completes the arrangement. The process followed is the one generally used in distilling volatile oils. The leaves are placed in the still, covered with water, and heated by an open fire beneath. The steam carrying the volatile oil passes through the worm, is condensed, and the product is collected in the receiving vessel. The oil settling to the bottom, most of the water is dipped out and used again with the next lot of leaves, while the oil is collected by means of a tin separating funnel. The advantage of using the same water in each succeeding operation seems to be understood and is in general practice.

The above method is the one nearly always followed, and the amount of volatile oil obtained varies from ·66 per cent. to ·80 per cent. This is the percentage as given to me by a number of manufacturers. From their statements I believe the average yield to be about seven-tenths of one per cent. From certain facts given to me by one manufacturer I believe that were a close wooden cask or vessel substituted for the metallic still, and live steam introduced and passed through the leaves, a larger product would be obtained. This process was the only exception to that usually followed. He made his still of heavy tin plate in place of copper; this would be of the usual size and shape, and one would last five or six months. He always noticed that when the still was new and first used the amount of oil produced was very large, and gradually and steadily grew less as the still became older. Finally he would hardly get ·5 per cent of oil, and would be obliged to throw the still aside. On examining it then he would find it very much corroded and eaten away inside where the steam and oil came most in contact with the metal. He also noticed that a brown spongy mass would collect in the bottom of the receiving vessel, and that the amount of this deposit seemed to be inversely in proportion to the yield of oil. That is, when the still was new it would be almost wanting, and would gradually increase with the age of the still. This decrease in yield could hardly be ascribed to the plant giving a greater quantity of oil at one season of the year than at another, as the stills were renewed at different times in the year, and always with the same result. The most probable couclusion is that the oil acts on the metal at the temperature used in distilling, and forms the deposit referred to as collecting in the oil. I could not ascertain if other manufacturers using copper stills had noticed the same corroding effect, but as the average yield with all seemed to be about the same, I should think it very probable. This same party used also a false bottom in his still, supporting the leaves over a small quantity of water, merely the steam passing through the leaves. He found this arrangement to give better results. There was an arrangement by which the overflowing water from the receiving tub was returned directly and continuously to the still, thus retaining the water there at a constant level.

The oil as thus obtained has the specific gravity 1·17 and is of a pale red to a deep brown colour, and by most manufacturers is thus sent into the market, packed in tin cans of various shapes and sizes. One party uses animal charcoal, obtaining a product entirely colourless. He tried redistilling the oil with water and a small quantity of fixed oil, but did not get a satisfactory result; then he tried filtering through animal charcoal and was still unsatisfied. Then he adopted the plan of maceratiug the charcoal with the oil for several days and then filtering off the oil, which is thus well decolorized. The filter and charcoal are returned to the still with the next lot of leaves, thus losing no oil.

The leaves are gathered principally by woman and children. The price paid varies with the locality and abundance of the plants, seldom going below 1·00 dollars or over 1·75 dollars per one hundred pounds. To gather fifty pounds of leaves is considered a good day's work. The average is less, being nearer twenty-five or thirty pounds. The wages earned are small, but the entire family will turn out in the morning, so that by evening they will have collected a good quantity. The people, though, are apt to be indolent, and the manufacturer often finds himself without the material to operate on, and so earns rather a precarious living. None, so far as I know, have ever grown rich at the business, and the decline in the price of the oil in the market of late years has still further reduced their profit.

* From the *American Journal of Pharmacy*, September, 1879.

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 20, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE STATE OF PHARMACY IN GERMANY.

PHARMACEUTICAL affairs in Germany are at the present time in a state of agitation in reference to several important questions, the discussion of which will not be without some interest on this side of the Channel as throwing a light upon subjects which have here engaged the attention of pharmacists during the last few years. As our readers are probably aware, the practice of pharmacy in Germany has been for ages carried on under conditions especially favourable for the interests of those engaged in the business. The old established usage by which the possibility of competition was almost done away with is a condition so foreign to our experience at home that some will be inclined to envy the position of a German pharmacist under that *régime*, and almost to wish that something of the same kind could be established here.

Unquestionably the system of limitation of pharmacies in Germany has been productive of good, inasmuch as it has tended to make the business one eminently attractive for men of capital and scientific ability, and it has had the further effect of making the position of the pharmacist in Germany one very superior to that which must be taken as obtaining in regard to the general body in this country. But as in process of time it happens with most old institutions, their merits fall into disregard, so with the established system of limitation of pharmacies in Germany; there has grown up a feeling of dissatisfaction with it and a desire to replace it by a more free exercise of individual inclination.

Even among the proprietors of old-established German pharmacies the opinion is held that the restrictions which have been in force to prevent the opening of pharmaceutical establishments are out of date and not suited to the present requirements of society. Consequently there is an eager controversy going on as to the relative advantages of the protective system and that which is proposed as its substitute on the basis of absolute free trade principles.

Since Germany became one, the two pharmaceutical associations of North and South Germany have been united, but the official amalgamation has not obliterated either in the north or in the south the desire to hold a prominent, if not a preponderating, position in the regulation of pharmaceutical affairs. The union of Germany has in this respect, as in others, given additional force to the desire of Prussia to take the lead, and of Berlin to imitate the *rôle* of Paris in being Germany as Paris has been France. Those who know the character of the Germans who are not Prussians will be able to understand that this endeavour meets with strenuous opposition among those whom we may term provincial Germans, and hence it is possible to recognize in many of the proceedings of the German Pharmaceutical Association an expression of this contest between centralization and provincialism which gives marked animation to the discussions of various subjects.

The constitution of the German Association is especially representative, and the maintenance of active centres for the transaction of business relating to pharmaceutical affairs, is one of the best features of this body. It is one which, if properly used, scarcely admits of the complaint that the provinces are not adequately represented or that the ruling body can be insensible to the representations of its provincial members.

Among the subjects which commanded most attention at the late meeting in Hanover, the re-construction of the statutes of the Association is perhaps the most important to those immediately concerned, but as it would be unreasonable to expect that it would have the same interest here, it will suffice to say that most of the principal pharmacists in Germany are actively engaged in the consideration of this matter. Next in order and in import for the well being of the pharmaceutical body, comes the question as to the system of education to be adopted. On this point there is great diversity of opinion, some adhering to the old system of education in the pharmacy, while others lean to or advocate the adoption of a system of university education. For both views cogent arguments are adduced and equally cogent objections are brought forward on either side. A special committee has been appointed by the Association to consider and report upon this matter, and we shall take the opportunity, when this report appears, to place before our readers the substance of the views put forward on the subject.

The preparation of a new Pharmacopœia is another subject which engaged the members of the Association at the late meeting. At the meeting in Coblentz last year a committee was appointed to deal with this subject and some steps were taken to that end, but a number of difficulties have arisen to prevent the presentation of a report, and at the meeting in Hanover various questions connected with the subject were discussed. As the chief among these we may mention the following:—Whether the Pharmacopœia should be published in Latin or in German? Whether chemical formulæ should be used? Whether in naming metallic compounds the name of the metal should be placed first? Whether the use of synonyms should be limited?

The discussion of these and other questions occupied a considerable time, and from the interest manifested by the speakers it was evident that the pharmacists of Germany are determined to have some considerable voice in the construction of their new book of law.

In speaking of the Coblentz meeting last year we pointed out that one of the most striking impressions produced upon us as strangers was the amount of attention devoted to matters connected with "trade interests." The same tendency was this year equally manifest, and though running in a direction somewhat remote from the mere endeavour to monopolize the trade in patent medicines it served to show that if the material well-being of the pharmaceutical body is to be maintained, or if possible augmented, it is only by the active co-operation of those engaged in the business that this can be done. While looking over the records of the work done by the provincial branches of the German Pharmaceutical Association it was impossible to avoid drawing a comparison, or rather a contrast, between the general activity there displayed and the small extent to which this is the case throughout this country. The number of our provincial associations is also disproportionately small, and though some of them are well kept up there is too frequently an absence of any sustained effort to advance the interest of the business or even total quiescence except when some burning question is being agitated. In this respect there is much to be learnt with profit from the example of our German colleagues and we trust the opportunity may not be missed.

THE LOCAL GOVERNMENT BOARD ON THE WORKING OF THE SALE OF FOOD AND DRUGS ACT.

It is satisfactory to learn from the returns in the Report of the Local Government Board just issued that the proportion of the samples analysed under the provisions of the Sale of Food and Drugs Act in the year 1878 reported to have been adulterated is lower by 2 per cent. than in the preceding year. The total number of samples reported upon was 16,191, and of these 2,782, or 19·2 per cent., were returned as adulterated. Too much importance, however, must not be attached to these figures, for irrespective of the fact judiciously emphasized in the Report, that these percentages are based on the results of analyses as given in the quarterly reports of public analysts, and not upon the number of cases that have been tested in a law court, it needs only a glance at the abstract of returns to see that the figures may be affected seriously by local conditions and the number of samples examined, as well as the idiosyncrasy of the analyst. Thus in the column showing the percentage proportion of samples reported to be adulterated in the different counties we find Bucks returned as 0; Rutland, 0; Anglesey, 7·4; Bedford, 7·7; and Gloucester, 7·8; whilst Essex stands at 71·4 and Cumberland at 62·5 per cent. It can hardly be contended that these figures represent correctly the relative proportions in which trading in adulterated articles exists in these counties. Moreover, the whole returns would be affected to the extent of 2 per cent. if spirits were excluded from the calculation, and the diversity of opinion as to what constituted an adulteration of spirit, until the passing of the Act of last session, is notorious.

The number of samples of "drugs" reported to have been examined is 491, of which 125, or 25·4 per cent. have been returned as adulterated. Here again there is great diversity, Lancaster returning 22 adulterated out of 45, or nearly 50 per cent., whilst Lincoln reports none adulterated out of 25. The Board expresses regret that more samples of drugs are not submitted to analysis, "for it is obvious that prescriptions may have very different effects, according as they are made up with genuine or with adulterated medicines," and it then goes on to quote the report of the analyst for the West Riding of Yorkshire as to the evil results attending the dilution of sweet spirit of nitre with water. The aptness of the apposition is not, however, quite evident, in the face of the fact that in few, if any, recorded cases of a conviction for the sale of adulterated sweet spirit of nitre has the vendor been a registered chemist and druggist. Moreover, "sweet spirit of nitre" is not a preparation that would be used in dispensing.

On the 31st of December, 1878, the number of authorities who had appointed analysts was 196,—49 counties, 108 boroughs, and 39 district boards and vestries in the metropolis,—and 5 other boroughs had made arrangements with the county analyst or the analyst of a neighbouring borough.

THE LOCAL SECRETARY OF THE CONFERENCE AT SHEFFIELD.

Those who had the opportunity of taking part in the very successful gathering of the British Pharmaceutical Conference at Sheffield will be able to understand that very much of their enjoyment in various ways was due to the exertions of the Local Committee. Organizations of this kind sometimes fail to do what they should do, and then they are very difficult to get at for punishment by those who suffer for their shortcomings; but though in general they may be destitute of some of the usual attributes of humanity it is certain that when they do their work well they must possess a head to direct and a working hand to execute. In neither of these was the Sheffield Local Committee wanting, and it is with great pleasure we learn that the services of Mr. Maleham, the Local Secretary upon whom devolved the arduous labours of preparing for the meeting, have met with recognition from his colleagues, and that they have expressed their appreciation of his zealous exertions by presenting him with a handsome piece of silver plate as a token of their respect and admiration. We are sure that few who were present at the Sheffield meeting will fail to be gratified at hearing this.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page* 217.)

The next paper read was on—

The Valuation of Citrate of Iron and Quinine.

BY FREDERICK W. FLETCHER, F.C.S.

Notwithstanding the large number of papers which have been published during the last few years on the estimation of quinine in the Citrate of Iron and Quinine of the British Pharmacopœia, there still appears to be a lack of trustworthy information upon one point in the process which ought by no means to be overlooked. Recorded observations have hitherto been confined, with scarcely an exception, to the determination of the total alkaloid present in the citrate, without regard to its purity as quinine. That such should have been the case is not, however, surprising, when it is remembered that, until recently, the separation of quinine from some other cinchona alkaloids closely resembling it in their behaviour to certain solvents was a matter of extreme difficulty. But the process described by Dr. Paul, in the valuable paper which he communicated to the Pharmaceutical Society at an Evening Meeting in February, 1877,* may be said to have revolutionized the subject of quinine analysis. In that paper, it will be recollected, the author stated that a sample of sulphate of quinine, containing an admixture of no less than thirty per cent. of sulphate of cinchonidine might, if examined by the Pharmacopœia test, be passed as pure quinine. That this astonishing statement was well grounded, anyone who has since interested himself in quinine analysis can testify. Nor indeed was the possibility of such an extensive adulteration a matter of fancy. Not long since I met with a parcel of German quinine containing over twenty-five per cent. of sulphate of cinchonidine, and the opinions of those most competent to judge, confirm my own experience that from ten to fifteen per cent. of cinchonidine is invariably present in certain brands of foreign quinine.

The question now arises, whether if such sulphate is used in the manufacture of citrate of iron and quinine the Pharmacopœia test will detect the cinchonidine. The reply, as might have been expected, is in the negative. The alkaloid obtained from the citrate in the manner directed in the Pharmacopœia will dissolve in pure ether, even though 25 per cent. of its weight is cinchonidine. But this is not all. The process of extraction of the alkaloid by ether, which has now superseded the characteristically indefinite official test, will not eliminate cinchonidine for the same reason that it fails to do so when applied to sulphate of quinine. It is therefore necessary to have recourse to some other method. The process which I have devised for the purpose, and which I have found to succeed remarkably well, is simply an adaptation of Dr. Paul's plan of fractional crystallization. It is exceedingly easy of application, and although a considerable quantity of the citrate has to be operated upon, there is little or no loss of quinine, most of the alkaloid being recovered as sulphate. It has, moreover, the advantage of combining three operations in one, as the results indicate:—(1) The exact amount of anhydrous alkaloid; (2) The proportion of the latter which can be converted into crystallizable sulphate of quinine; and (3) The percentage of alkaloids other than quinine.

The operations involved are briefly as follows:—Place 20 grms. of the citrate in a 100 c.c. flask, dissolve in 50 c.c. of distilled water, and add gradually an excess of ammonia (·960), shaking well after each addition. This is important, in order that the quinine may separate in a state of fine division, as otherwise it is apt to be thrown out in tough lumps, difficult of subsequent solution. Pour in 25 c.c. of washed ether, and agitate with a rotatory motion till the alkaloid has completely dissolved. Transfer the mixture to a small glass separatory funnel, and having run the lower stratum of liquid back into the flask, pour the ethereal solution into a 100 c.c. platinum capsule. Treat the liquid in the flask with 20 c.c. more ether, and proceed as before. Repeat this operation a third time. The capsule containing the mixed ethereal solutions is then placed in a saucer of water, and the ether blown off by a current of air from a Fletcher's bellows. This immersion of the capsule in water obviates the tendency of the ether to creep up the sides. The platinum dish, which will now contain a pasty residue, is next placed in the air-bath, previously heated to 120°, and in fifteen minutes desiccation is complete. After cooling in an exsiccator, the capsule is covered and removed to the balance. The weight, minus that of the capsule and cover, multiplied by 5, is the percentage of total alkaloid. I may mention that having made many hundreds of analyses by this process, I can testify to the accuracy of the results obtained. In cases where a determination has been repeated, I have never found the results to vary more than 0·1 per cent. When an estimation of total alkaloid only is required, 2 grms. of citrate is a sufficient quantity to operate upon.

The anhydrous alkaloid is now to be converted into basic sulphate. Since a molecule of the latter salt contains 648 parts of quinia to 98 parts of sulphuric acid, and as decinormal sulphuric acid contains 4·9 grms. of H_2SO_4 per litre, it follows that one grm of anhydrous quinia will require 30·86 c.c. of decinormal sulphuric acid to effect its conversion into basic sulphate. The weight of anhydrous alkaloid in grms. is, therefore, multiplied by 30·86, and the number of c.c. of decinormal sulphuric acid thus indicated are run into the platinum capsule from a burette, and the former being placed on wire gauze over the flame of a rose burner, the contents are briskly stirred until the alkaloid is all taken up and a clear solution obtained. This is then transferred to a flask and allowed to cool spontaneously. The crystalline mass which will then have formed is thrown on to a small calico filter, about three inches square, stretched over a beaker, and, when drained, tightly squeezed to remove the last few drops of liquid. The latter is then filtered into a stoppered graduated tube of about 150 c.c. capacity, and its volume noted. 20 c.c. of washed ether and an excess of ammonia are then introduced, and the whole, after being well agitated, is set aside for six hours.

In the meantime the squeezed residue is detached from the calico filter, dried in the air-bath at a temperature of 100 degrees C. and weighed as anhydrous sulphate of quinine $\left\{ (C_{20}H_{24}N_2O_2)_2 \cdot H_2SO_4 = 746 \right\}$. To express the result in terms of ordinary crystallized sulphate $\left\{ (C_{20}H_{24}N_2O_2)_2\ H_2SO_4, 7\tfrac{1}{2}H_2O = 881 \right\}$ the weight found is multiplied by $\left(\frac{881}{746} = \right) 1{\cdot}18$. To this is added the amount of the latter contained in the mother liquor which has been separated (and which may be estimated to contain 1 part in 750), and the total will then represent the proportion of anhydrous alkaloid which can be converted into sulphate.

At the expiration of the time mentioned, the tube which has been set aside is examined, when the cinchonidine and quinidine present will be found to have crystallized out at the junction of the two liquids. The stratum of ether is removed by a small Nessler pipette; the crystals washed with two successive portions of 10 c.c. of ether, the last few drops of which can be absorbed by a little roll of filter paper. The crystals are then thrown upon a double-tared filter, made of two papers weighed one against the other, dried at 120°, and placed on the balance, the outside paper acting as a counterpoise. In practice I find that the weight of this first crop of crystals represents on an average two-thirds of the total cin-

* *Pharm. Journ.*, [3] vol. vii. (1877), p. 653.

chonidine or quinidine present. If, therefore, the amount does not exceed ·1 grm. the percentage of these alkaloids may be estimated to be below 5 per cent. Should the first weighing exceed this limit, the sulphate obtained from the first crystallization must be dissolved in 100 c.c. boiling water, and treated as before, the weight of alkaloid separated by ether being of course added to the amount first obtained.

As thus described the process may seem tedious, but in reality it is not so. Not counting the time which must be allowed for crystallizing, the entire estimation may be completed in something under two hours. The method, of course, does not distinguish between quinidine and cinchonidine, the usual tests for which must be applied to the solution of the mixed sulphates. This, however, is a point of minor importance, as the question of chief interest for the pharmacist is the determination of the exact amount of pure quinine present in the citrate. Two examples will be sufficient to illustrate the working of the process.

A. 20 grms. citrate taken. Yield of anhydrous alkaloid —extracted as above, by ether and dried at 120° C., = 2·67 grms., or 13·35 per cent. The number of c.c. of decinormal sulphuric acid required to convert it into sulphate was therefore (2·673 × 0·86 =) 82·5 c.c. This volume was run in from a burette and the alkaloid dissolved in the manner described. When cool, the filtered mother liquor, which measured 85 c.c., was treated with ether and ammonia. The first crop of crystals of cinchonidine weighed when dry ·113 grm., the second ·06 grm., therefore $\frac{(\cdot113+\cdot06)\times100}{2\cdot67}=6\cdot4$, which represents the percentage of cinchonidine in the total alkaloid. The sulphate obtained in the first crystallization weighed, when dried at 100°, 2·67 grm., or (2·67 × 1·18 =) 3·1 grms. of ordinary crystallized sulphate. On adding to this the amount present in the 85 c.c. mother liquor, which will equal $\frac{85}{750}=\cdot11$ grms., we get (3·1 + ·11 =) 3·21 grms. of sulphate of quinine. The weight of anhydrous alkaloid found by experiment being 2·67 grms. would be equivalent to 3·6 grms. of sulphate; the cinchonidine found represents ·15 grms., so that the crystallizable salt would stand as 3·4 grm. *found* against 3·6 grm. *calculated*, proving the absence of any appreciable amount of amorphous alkaloid.

B. 20 grms. of citrate taken. Yield of anhydrous alkaloid 3·06 grms., or 15·3 per cent. Weight of cinchonidine found, first crystallization, ·120; second, ·065 = $\left(\frac{(\cdot120+\cdot065)\times100}{3\cdot06}\right)$ 6·04 per cent. of the total alkaloid. The hot aqueous solution of the sulphate was sherry-coloured, and the sulphate which separated on cooling was very far from being white. It weighed when dry 2·46 grms., equal to (2·46 × 1·18 =) 2·9 grms. crystallized sulphate. This amount, *plus* ·113 grms., the quantity estimated to be present in 85 c.c. mother liquor, and ·15 grms. allowed for first crop of cinchonidine, gives a total of 3·16 of crystallizable salt. But the weight of anhydrous alkaloid found was 3·06 grms., equivalent to $(3\cdot06\times\frac{881}{648}=)$ 4·16 of crystallized sulphate; the difference of 1 grm. must therefore be considered to be amorphous alkaloid—which would thus constitute over 30 per cent. of the whole.

Whether the presence of 5, 10 or 20 per cent. of cinchonidine would bring a sample of citrate of iron and quinine, which nevertheless answered the B.P. test, within the reach of the Adulteration Act, is a point upon which I offer no opinion. An eminent analyst, with whom I was lately discussing the subject, took the negative view. If such is really the case, a revision of the Pharmacopœia will come none too soon. The plausible excuse which is sometimes set up, that manufacturers cannot perfectly separate the cinchonidine from the quinine except at a greatly enhanced cost, is utterly without foundation. The white sulphate manufactured both by Messrs. Howard and Mr. Whiffen I have never found to give the slightest reaction with Paul's test, and what is a still more striking fact, the so-called unbleached quinine of the latter maker is frequently quite free from cinchonidine. Certain of the foreign makes are also, as a rule, unimpeachable in this respect, whilst on the other hand, some others are systematically adulterated.

It may be worth noting, as a matter of practical interest, that the substitution of 1 per cent. of cinchonidine for quinine, in the manufacture of citrate of iron and quinine. reduces the value ½*d.* per ounce for each such addition; and when it is remembered that the Pharmacopœia test will easily pass 20 per cent. of cinchonidine, and that the consumption of the citrate is considerably over 100,000 ounces per annum, the valuation of this preparation resolves itself from a chemical into a question of commercial interest.

The PRESIDENT said this was one of those useful practical papers the importance of which appealed to them, and as there were practical manufacturers of the article present it would be interesting to hear what they had to say on the subject.

Mr. UMNEY said that the subject of citrate of iron and quinine had for some years been of interest to him. In a paper by himself in the *Pharmaceutical Journal*, August 30, 1873, he endeavoured to show that the Pharmacopœia directions and its test for this salt were written in somewhat of a haze. Those who remembered citrate of iron and quinine in its infancy would bear him out that it was customary for the labels to bear the words "this preparation contains an equivalent of 25 per cent. of sulphate of quinine." Even latterly the same labels have been affixed, but to some the statement "that this preparation contains 16 per cent. of quinia" has been added. The compilers of the Pharmacopœia presumed that from one part of quinine sulphate they would obtain by the formula indicated four parts only of citrate of iron and quinine. Now as a manufacturer he knew that from 100 ounces of sulphate of quinine he could produce 445 to 450 ounces of citrate of iron and quinine. The starting point, therefore, was wrong, and it was absolutely impossible to get a preparation working by that formula that would contain the equivalent of 25 per cent. of sulphate of quinine. This had been pointed out in the *Pharmaceutical Journal*, and he had no doubt some alteration would in the next Pharmacopœia be made in this respect. The Pharmacopœia in directing the precipitation of the alkaloid limited them to the quantity of water. It prescribed that 50 grains should be dissolved in one ounce of water, and that the precipitate when dried should weigh eight grains. They were therefore to infer that it contained 16 per cent. of anhydrous quinia. Now the experiments of Mr. Fletcher would show that citrate of quinine and iron would not give 16 per cent. of anhydrous quinia. To obtain the alkaloid anhydrous they must resort to a temperature of about 225° F., and such heat must be continued for four or five hours, for at 212° F. the precipitate would for hours continue to lose weight. He maintained that the tests in the British Pharmacopœia wanted revising, or one day pharmacists might find themselves landed in great difficulty with gentlemen known as public analysts. It had been given on the authority of a public analyst, in the case Mr. Fletcher had mentioned, that a prosecution would be with a negative result. Another point required modification. Mr. Fletcher had referred to the dissolving of cinchonidine by ether. Had the Pharmacopœia limited the quantity of ether used they might have prescribed the ether test with advantage. The question of the purity of the quinia precipitate was a very important one, for cinchonidine was now largely used, and was unquestionably a valuable remedy. He thought the paper was a most important one, and that the observations on the revision of the Pharmacopœia were not the least important part of it.

Mr. A. H. MASON (Liverpool) said that whilst it was universally admitted that the Pharmacopœia test was faulty, it was quite possible to guard against trouble from public analysts by adding such a quantity of quinine to the formula as shall yield the desired percentage to the Pharmacopœia test, and this plan was now adopted by some manufacturers.

Professor ATTFIELD said it was only fair to the editor of the British Pharmacopœia to say that at the meeting of the Conference in Glasgow that gentleman admitted that the quantitative test for quinine in citrate of iron and quinine was not all that could be desired, and thought that it was important to go a step further so that they might arrive at more accurate results.

Mr. SYMES said it had been shown in Mr. Fletcher's paper and the discussion—indeed, it had become a recognized fact—that the Pharmacopœia process strictly followed did not yield the product it described, and the tests given would not detect a considerable amount of impurity if present. Professor Attfield had stated that in justice to the editor of the work he should say that he was now aware of this. He (Mr. Symes) wished to remark that this being the state of things with regard to so important a preparation, it furnished further evidence of the necessity for a new edition of the Pharmacopœia, and he thought in justice to pharmacists this work ought to be proceeded with in a much more active manner than it appeared to be doing.

The PRESIDENT said he might be pardoned for the reflection that the discussion seemed to indicate how desirable it was that in the re-arrangement of the next Pharmacopœia pharmacists proper should be well represented. He hoped they would join him in a vote of thanks to Mr. Fletcher.

Mr. FLETCHER said he quite agreed with Mr. Umney that the B.P. test was most unsatisfactory, and as a manufacturer he could also endorse Mr. Umney's statement that citrate prepared strictly in accordance with the directions of the Pharmacopœia would not be found to contain 16 per cent. of quinine. With regard to what Mr. Mason had said respecting the 16 per cent. of alkaloid, it should be borne in mind that the Pharmacopœia method of weighing the alkaloid precipitated by ammonia was not intended to give anhydrous quinia. The precipitate was generally regarded as a tri-hydrate, 16 parts of which were equivalent to 13·7 parts of anhydrous quinia. He had verified this experimentally by adopting a slight modification of the process described in the *Pharmaceutical Journal* a few months since by Mr. W. Stevenson. Instead of dissolving the citrate in water he dissolved it in a saturated aqueous solution of quinine, containing a very small quantity of ammonia. The quinine, precipitated in the usual way, was then thrown upon a double tared filter, washed free from iron by a further quantity of the ammoniacal solution of quinine, and the precipitate dried without heat. Proceeding in this way, a sample of citrate which yielded to ether 13·7 per cent. of anhydrous quinia would afford very nearly 16 per cent. of air-dried alkaloid.

Mr. E. DAVIES, F.I.C., sent a paper on "The Estimation of Water in Iodine," which was read by Mr. Benger.

THE ESTIMATION OF WATER IN IODINE.

BY EDWARD DAVIES, F.C.S., F.I.C.

In endeavouring to discover a method for quantitatively determining the moisture in iodine several difficulties had to be overcome, owing to the conditions laid down in the blue list, namely, that the process should be "handy and direct." By the first requirement I understand that it should be performed with such ordinary apparatus as may usually be found in a chemist's shop, that the manipulation should be easy and simple, and that the time should not be very long. The second requirement, strictly construed, is that the water should be weighed, and, so far, I cannot claim to have complied with it. All attempts to retain the iodine whilst the water passed on into an absorption tube were failures. The best was to volatilize the iodine in a current of carbon dioxide over clean iron filings gently heated. The apparatus was troublesome to put together, and practically it was impossible to heat the iron sufficiently to make it absorb the iodine without decomposing some of the water.

I was therefore driven to adopt an indirect method and I think that the following process will answer the purpose satisfactorily:—

It consists in combining the iodine with mercury and weighing the resulting iodide. A small thin porcelain dish, about 2½ inches in diameter and weighing about 250 grains, is fitted with a small glass pestle, made from a piece of solid glass rod, 3 inches long and about $\frac{3}{16}$ thick, by heating one end in the blowpipe flame until soft, and then pressing it on the bottom of the dish so that it may have the same curvature. About 60 grains of dry mercury are put in the dish with the pestle, and the whole accurately weighed. Twenty grains of the iodine are then added and a few drops of absolute alcohol to moisten it. The iodine and mercury are rubbed together until complete combination takes place, which is shown by adding a few more drops of alcohol, and allowing them to flow upon the side of the dish. If there is no free iodine the alcohol remains colourless. The rubbing requires about five or six minutes if much water is present, but only about one minute with dry iodine. The dish and its contents are now dried in a desiccator over sulphuric acid for twelve hours and weighed. The loss of weight of the dish, mercury and iodine, represents the amount of water contained in the iodine.

The residue must be dried at ordinary temperature of the air, as mercury is far too volatile for a temperature of 212° F. to be used.

The iodine used in these experiments was resublimed and dried over sulphuric acid *in vacuo*. The mercury used was the commercial article not quite pure. The following are some of the results obtained, from 60 to 80 grains of mercury being used in each case:—

	1.	2.	3.	4.	5.
Mercury, pestle and dish ..	494·23	509·35	493·21	532·35	522·03
Resublimed Iodine........	20·00	20·00	20·00	30·00	30·00
Water added	5·87	6·86	6·59	7·77	6·29
Total	520·10	536·21	519·80	570·12	558·32
Residue after drying......	514·10	529·20	513·10	562·20	551·90
Water found	6·00	7·01	6·70	7·92	6·42
Excess	·13	·15	·11	·15	·13

As these results showed a constant excess of about ·13 grain, the iodine was examined with a view to ascertain if it contained water which was retained on drying *in vacuo* over sulphuric acid. Two results gave:—

Mercury, pestle and dish .	513·42	509·92
Iodine	20·00	20·00
Total	533·42	529·92
Residue after drying . . .	533·42	529·92

The iodine being thus found to be free from moisture and the mercury also by the same experiment, the only explanation of the excess of loss which I can suggest is, that as five or six times as long is required to bring about the combination when water equal to about 20 per cent. is present, some of the iodine escapes with the alcohol vapour.

The drying was continued for twenty-four hours and in some cases for forty-eight hours, but no perceptible loss was experienced after the first twelve hours.

The trifling excess which would amount at the outside to ½ per cent. in an excessively wet sample, and is absolutely nothing in dry iodine, cannot be considered a great objection to the process. A sample of resublimed iodine purchased in Liverpool contained 0·60 per cent. of moisture. A sample of commercial iodine contained 0·70 per cent.

Professor ATTFIELD remarked that he had made some experiments on the best means of estimating water in iodine, but he had not come to a very satisfactory conclusion. He believed the method adopted by those who used iodine tolerably largely was to expose a given weight of the iodine over sulphuric acid under a small bell-jar at as low a temperature as possible. No great amount of iodine escaped, and the loss suffered by the substance represented the amount of water present. That was a crude method, and he hoped they would arrive at a more exact one on the lines followed by Mr. Davies, namely, to endeavour to find some metal which would at, if necessary, a high temperature, and in large excess, absorb all the iodine, allowing the moisture to pass off in some way or other, and be collected and weighed. Hitherto he had found, that however large the excess of the metal might be, and whatever the amount of affinity of that metal for iodine, a little iodine did escape along with the moisture and gave an inaccurate result. With regard to Mr. Davies's suggested defect in the process followed, namely, that a little of the iodine itself escaped, and caused the percentage of water to appear too high, he thought many samples of iodine would give a loss due to another cause, namely, the presence of sulphuric acid in iodine. This would probably decompose iodide of mercury and form sulphate of mercury, an equivalent amount of iodine previously combined with the mercury passing off.

Mr. E. C. C. STANFORD was surprised to hear this spoken of as a new process. It was one he had adopted for several years; it was first suggested by Bolley, and would be found in Slater's 'Commercial Analysis.' His method was to use eight times the quantity of mercury and to use it dry; they used five times the quantity, and found the process correct to 0·1 per cent. It was also rapid and convenient. Mr. R. R. Talloch, of Glasgow, used zinc, and had kindly sent him the details of the process employed:—Place a weighed quantity of the iodine in a weighed platinum capsule or small basin, in which has been placed a weighed quantity (say twice that of the iodine) of zinc sheet clippings in size about one-eighth of an inch square, add a little water and move the capsule and contents gently about. Immediately the iodine acts upon the zinc, the first small portion of iodide of zinc produced dissolving the free iodine, which is thus presented to the zinc in a dissolved state. The fluid by-and-by becomes colourless, after which the contents are carefully evaporated to dryness, and the dry residue heated till it ceases to lose weight, taking care that no iodide of zinc is volatilized, which, however, is not easy. With the clippings the temperature does not rise beyond control. The dry residue which remains in the capsule is that of the zinc originally added, *plus* that of the dry iodine which has combined with a portion of it.

Professor TICHBORNE had used the process for many years, and he preferred that of drying over sulphuric acid. If a small bell jar was used practically the process became correct, or nearly so; the error in the loss of the iodine would depend in a great measure on the size of the vessel in which the iodine was dried. As regarded the old process in connection with mercury he might suggest that perhaps the best means of performing that would be to use a large excess of mercury, and to do it with a stopper bottle, shaking it up with the addition of alcohol. In that case there would be no loss from the volatilization of the iodine. In such a process as that detailed in the experiment they must make every allowance, and determine separately the presence of bromine, cyanogen, etc.

Mr. FOSTER observed that he had had some little experience in the estimation of iodine, and he had adopted the usual method, that was to expose a weighed quantity of iodine over sulphuric acid to which some iodine had been previously added, observing the precaution of having a very limited atmosphere in the way Professor Tichborne had pointed out. With these precautions he thought the ordinary process met the requirements of manufacturers, buyers and sellers. The other processes, ingenious as they were, scarcely met the requirements of the case.

Mr. DRAPER asked what was the objection to the use of hyposulphite of soda.

Professor ATTFIELD explained that the use of hyposulphite of soda was a very good process when there were no other substances to be estimated.

A vote of thanks was passed to Mr. Davies for his paper.

The next paper read was on—

THE PRESENCE OF TANNIN IN GENTIAN ROOT.

BY EDWARD DAVIES, F.C.S., F.I.C.

The paper on this subject by Professor J. M. Maisch, in the *American Journal of Pharmacy*, 1876, p. 117, would seem to have settled the question of the presence of tannin in gentian root in the negative. The researches of M. Ville, reported in the 'Year-Book of Pharmacy,' 1877, p. 217, on the other hand, are directly contradictory in their result. The subject thus presents some interest, both with regard to the fact itself, and to the reason of the discordant results obtained in such an apparently simple matter. My first experiments were made on a sample of ground gentian root. A hot infusion was first made, but as it was impossible to get this perfectly clear, an infusion was made with cold water. This solution gave negative results; gelatine gave a very faint precipitate after long standing, tartar emetic with chloride of ammonium gave no precipitate, and ferric chloride only produced a slight darkening of the colour.

This appeared decisive, but I thought it better to test some of the unground root. A piece, which probably had been kept some time, was thinly sliced and digested with cold water for two or three days. The solution had a bright yellow colour, and although considerably less material had been used than in the previous one, it gave a decided precipitate with gelatine. I then obtained a quantity of roots as fresh as possible, for which I am indebted to Messrs. Evans, Sons and Co., and made a cold infusion of the sliced root. In the liquid obtained gelatine gave a decided precipitate, acetate of chinchonine a strong precipitate, tartar emetic small precipitate, ferric chloride distinct darkening of colour.

This result was so decided that I made an attempt to obtain an approximate determination of the amount of tannin. Making use of an improvement in volumetric analysis made by Mr. A. Haddock (*Chemical News*, 1879, April 10), consisting in the use of a mirror instead of the usual black glass plate, by means of which the faintest turbidity is shown whilst the effect of colour is eliminated, a drop of the clear solution of the gentian root, 300 grains in 3000 of water, was put on a mirror, a drop of perfectly clear gelatine solution added, and a strong turbidity was produced. By the side of this a drop of a dilute solution of tannin was placed, and gelatine added to it. The tannin solution was diluted until the turbidity in the two drops was apparently identical. In this way the amount of tannin was estimated at 0·08 per cent, two tests agreeing very closely.

It is possible that this trace of tannin is liable to decomposition when the root is powdered and so exposed to oxidation; or that it is not a constant constituent of gentian root. Either of these suggestions, if correct, will explain the discrepancy in the results obtained by competent observers.

The small quantity contained in the root renders its isolation a matter of great difficulty, and until it can be so separated the proof that the tannin in the root is gallotannic acid is only partial. So far as the tests show, they indicate gallotannic acid.

A vote of thanks was accorded to the author.

The next paper was a note on—

Amylic Alcohol and Amylic Nitrite.

BY D. B. DOTT.

It was not my intention to write anything further on the subject of amylic nitrite, but a paper which has appeared in the *American Journal of Pharmacy*, by Dr. W. H. Greene, containing an adverse criticism of my contribution to the work of last year's Conference, almost necessitates some notice on my part. I think I ought to say at the outset that Dr. Greene seems somewhat to have mistaken the nature and scope of my paper. It was intended more as a contribution to pharmacy than as a research in pure chemistry. Be that as it may, however, I have carefully gone over the same ground as last year, with the general result of substantiating what was then said. Dr. Greene's vague allegation of inaccuracy resolves itself on examination into three points, that is to say, I stated erroneously:—

1st. That amylic alcohol may be obtained boiling at 128°—129°.

2nd. That nitrite of amyl does not distil at a constant temperature.

3rd. That nitrite of amyl decomposes when distilled.

As regards the first of these assertions I have now proved its accuracy by more rigorous experiment than was formerly applied. Fusel oil from a large Scotch distillery was rectified at first roughly in a capacious flask, the portion passing over at 125°—135° being retained. This was then distilled from chloride of calcium and repeatedly rectified. No distillate was obtained at so high a temperature as 132°. If any small quantity of that boiling point existed it must have been left behind in the syrupy solution of calcic chloride. It was soon found that the greater part of the above-mentioned fraction distilled at 128°—129°. The portion obtained at these temperatures was rectified at 129°, but even after many distillations it still yielded 2 or 3 per cent., passing over at 128°. This liquid was mixed with caustic baryta and agitated therewith from time to time. After forty-eight hours the alcohol was distilled from fresh portions of baryta, but without any alteration in the boiling point, the calcic chloride having doubtless completely removed the water originally present. The liquid obtained in this way had the characteristic odour of amylic alcohol and possessed the specific gravity of ·814 at 60° F. A quantity of it was oxidized by means of potassic dichromate and sulphuric acid, the alcohol being mixed with the acid and the mixture dropped into the strong aqueous solution of the dichromate. The flask containing the solution was attached to a reversed condenser and the solution gently boiled for two hours, after which the acid was distilled off. The distillate was neutralized with sodic carbonate and evaporated to dryness; the residue mixed with sulphuric acid and distilled. The valeric acid obtained was equal to about 20 per cent. of the alcohol used. The acid was converted into sodium salt, and the solution of the latter mixed with solution of argentic nitrate. The resulting valerate of silver was washed with cold water and dried in exsiccator. By ignition—

6·170 grs. gave	3·195 Ag.	= 51·78	per cent.	
9·035 „ „	4·685 „	= 51·85	„	
	$C_5H_9AgO_2$	= 51·67	„	Ag.

When we consider this result along with the circumstance that the alcohol in question yielded a product by the action of nitrous acid having the well-known properties of amylic nitrite, I think there can be no doubt that the liquid obtained from fusel oil at 129° was amylic alcohol. This is said with all the more confidence that my results agree exactly with those of Alexander Pedler, mentioned in his memoir on the valerianic acids (*Chem. Soc. Journ.* [2], vi., 74). It may be here mentioned that the apparatus used, both in distilling the alcohol and nitrite, was essentially the same as that of Le Bel and Henninger, described and figured in the *Comptes Rendus* (vol. lxxiv., p. 480). It consisted of an ordinary three-bulb condensing tube, with a contraction under each bulb, so that the ascending vapours had to pass through portions of liquid before reaching the condenser.

We come now to the second statement previously referred to, viz.: "That nitrite of amyl does not distil at a constant temperature." I never affirmed that it is impossible to prepare a nitrite of constant boiling point, but simply that I had found it impracticable to purify the medicinal nitrite to such an extent, and that therefore the Pharmacopœia test of a liquid boiling at 96° was one which the commercial nitrite could not reasonably be expected to answer. However, I think I am now in a position to state that even pure amylic nitrite does not distil at a constant temperature, in case it has been prepared from the 128°—129° alcohol. A quantity of the nitrite was prepared by passing the vapours obtained by the action of nitric acid on starch through amylic alcohol (B.P. 128°—129°). After saturation with the gas the liquid was of a bright green colour. It was agitated with water and after being separated therefrom was shaken up with anhydrous sodic carbonate. The product was now quite neutral to test paper and had a specific gravity of ·881. On being distilled it evolved dense red fumes and yielded 78 per cent. between 95° and 100°. This fraction was retained and shaken up thrice with solution of sodic carbonate in successive portions and then with dry carbonate before being rectified. At the commencement of the distillation red vapours were given off and the first portions of distillate were strongly acid. The fraction 95°—98° was retained and re-distilled, the portion coming over at 96°—97° being collected apart. Very little was obtained at 96°, the greater part distilling between 96° and 97°. Can it be that the nitrites corresponding to the 128° and 129° alcohols boil at 96° and at 97°? After twelve rectifications the nitrite had diminished to 20 per cent. of the original product and even then did not distil entirely at 96°—97°, the last three rectifications showing no increase in the percentage of the correct fraction. When this result is considered along with the fact that the amylic alcohol had been rectified sixteen times, it will surely be admitted that it is not easy to obtain an amylic nitrite of nearly constant boiling point, and that such a process is out of the question for a pharmaceutical preparation.

Regarding the third statement, "That nitrite of amyl decomposes when distilled," I certainly think that a very fair inference from the phenomena observed. If a liquid which has been washed with an alkaline solution until quite neutral to litmus be distilled, and the distillate is strongly acid, it is manifest that decomposition has occurred; and this is just what takes place with amylic nitrite, at least with as pure a preparation as I have examined. In the twelfth rectification red fumes were evolved as at first. Of course it is open to anyone to say that some impurity may persistently adhere to the nitrite, which former, by its decomposition under the influence of heat, may evolve nitrous vapours. That may be quite within the bounds of possibility, though I do not think it is probable; but even supposing it to be the case, it only confirms my original assertion, which obviously referred to medicinal nitrite of amyl obtained at 90°—100°, and not to a compound which (as then stated) I had never seen.

The President said the paper was a refutation of the charges brought against the author, and it struck him that Mr. Dott had succeeded in perfectly establishing his case.

Mr. Williams said he could to a great extent confirm the statements in the paper. In making nitrite of amy he had had considerable experience in one or two of the points, and the fact of its decomposition by constant distillation he could quite confirm. With respect, however, to the statement concerning amyl alcohol, he thought there could be no question that it had a constant boiling point. A paper read a year ago contained another point which he should like to refer to, and that was that nitrite of amyl might have a higher boiling point than that given in the Pharmacopœia and still be a justifiable and good pharmaceutical product for use; but he did not agree with that, and thought that as the higher boiling point might be due to the presence of other bodies like nitrite of caproyl, the nitrite of amyl used in medicine ought not to have a higher boiling point than that indicated in the Pharmacopœia.

Professor TICHBORNE also bore testimony to decomposition of nitrite of amyl in distillation.

Mr. ABRAHAM said in these experiments one or two degrees of boiling point were matter of considerable importance. Did the experimentalists take cognizance of the variation in barometric pressure, for half an inch would make about one degree variation in the boiling point?

Mr. MACKENZIE asked if nitrite of amyl became decomposed with keeping.

Mr. WILLIAMS thought perhaps it would keep any length of time if properly preserved; still it was questionable whether it was as good at the end of twelve months as at the end of one.

Mr. NAYLOR maintained that it could not be kept for any great length of time, and that he had known it turn acid when kept at a low temperature.

In reply to Mr. Williams, it was admitted by Mr. Naylor that the specimen spoken of had not been redistilled.

A vote of thanks was passed to Mr. Dott for his paper.

The following paper was then read on:—

THE GELATINIZATION OF TINCTURE OF KINO WITH A POSSIBLE REMEDY FOR ITS PREVENTION.

BY THOS. H. BAMFORD.

One of the very first subjects discussed at the evening meetings of the Pharmaceutical Society on its institution, was the gelatinization of tincture of kino, introduced by Dr. Redwood, and the general opinion expressed was, that this tincture kept best in small corked bottles in preference to large stoppered and partially filled bottles. However this may be, it has always been a source of trouble to the dispenser, which would be greatly aggravated if the tincture were a more popular one with prescribers.

In the majority of establishments, along with other seldom used preparations, it lies on a shelf in some out of the way place, and on the second or third occasion of its being required, it is usually found to have become consolidated into a stiffish, translucent, pinkish jelly, very elegant in appearance, bearing as it does a tolerable resemblance to red currant jelly, but altogether useless as a medicine. Then, if the dispenser be inexperienced and unaccustomed to this phenomenon, he begins a series of experiments in the hope of inducing the fickle tincture to resume its normal condition; the agency of heat and the addition of more spirit will sometimes induce it to leave the bottle, but hardly in a state of solution, and in this condition it should never be used by the conscientious pharmacist, since it would altogether fail in its action on the patient, as in passing into the gelatinous condition it likewise loses its astringency.

Pereira, in the article on kino in his 'Materia Medica,' dismisses the fact in a brief sentence, and accounts for it as follows:—"It is said that by keeping this tincture has, in some instances, become gelatinous and lost its astringency. Where this occurred, probably the Botany Bay kino (the inspissated juice of the *Eucalyptus resinfera*) had been employed."

It is doubtful whether the use of inferior specimens of kino will account for the deterioration of the tincture, as I have seen samples of all kinds, made expressly and kept under what were supposed to be the most auspicious circumstances, fail entirely as regards their keeping qualities, and the experience of any practical dispenser will bear out the statement that nine out of ten tinctures of this gum will pass into the gelatinous condition with more or less rapidity.

In the *Pharmaceutical Journal* for 1842, is the above named paper, entitled, "The Gelatinization of Tincture of Kino," and in this Dr. Redwood states as his opinion that the change is dependent on the conversion of the tannin into a partially insoluble substance, ulmic acid, and in the discussion which took place after the reading of the paper, a general opinion was expressed that this change was expedited by the contact of atmospheric air in partially filled bottles. Messrs. Bell, Morson, Ince, and other well-known pharmacists took part in the discussion, and the general opinion seemed to be that to its storage rather than preparation were we to look for the means of combating its unfortunate peculiarity. A somewhat protracted acquaintance with a sample kept in an unusual manner convinced me that I had at last seen a perfect panacea for this failing. The sample in question has now been kept in its present position (this is written from notes made in 1876), about twelve or fourteen years, and is to all appearances as good as on the day it was received into stock. It was placed in an ordinary quart stoppered round, in such a position that it was necessarily taken up and dusted every morning, and consequently was well shaken every twenty-four hours; the bottle was likewise covered with blue paper so as to perfectly exclude the light. The bottle was never full (possibly now there are 8 ounces in a 40 ounce bottle), so that it has always been in contact with air. When it is stated that it was procured from a London drug house, some time between 1862 and 1864, and has been in its present position since that time, all that is known of its history has been told. My advice to any druggist who has been troubled with this tincture is to remove his stock of it into a position where it must necessarily get a daily shaking (that is amongst the bottles which are dusted daily), and also coat the bottle with blue paper.

As during fifteen years' experience this is the only tincture of kino I have seen keep for twelve months, I am convinced that I have brought a remedy to the notice of the British pharmacist.

P.S. (1879).—The experience above recorded has received strong confirmation from the fact that a fresh supply was obtained three years ago from a local (Liverpool) house and turned into the same bottle, and remains to this present day in as good a condition as on the day of its reception into stock.

Mr. UMNEY thought before this question could be finally settled, experimenters must operate upon authentic specimens of kino. They had three distinct varieties that occasionally appeared in commerce. The official kino, the product of *Pterocarpus marsupium*, of the East Indies, the kino from *Pterocarpus erinaceus*, and the Australian or eucalyptus kino, from the *Eucalyptus resinifera*. (See Hanbury's 'Pharmacographia.') Anyone in the habit of visiting the drug warehouses of London where these imports were shown previous to sale was able, after a little practice, to distinguish one kino from another by tasting and observing the effect upon the palate and saliva.

Mr. MACKENZIE said he had had great experience in the use of kino, and he had no faith whatever in shaking it.

Mr. MARTINDALE was of opinion that much depended upon the age of the kino as to whether it was astringent or not.

Mr. COTTRELL paid the London houses a high compliment for great intelligence and probity, but expressed the opinion that some of the samples of kino sent out were not perfectly pure.

Mr. Benger referred to a paper read by Mr. George Ellinor at the Bradford meeting of the Conference in 1873, in which a liquor was recommended as a substitute for tincture of kino. If he remembered rightly Mr. Groves on that occasion expressed the opinion that old kino yielded a tincture liable to pectization, whilst that which was fresh did not.

Mr. Long thought the subject of tincture of kino a very interesting one. From the immense range of remedies they had to contend with, there were difficulties in keeping all their preparations in a proper state unless they had a very large practice, and he thought as new remedies were introduced that old and useless remedies should be knocked out.

Mr. Hasselby said he had been familiar with kino for twenty-five years and only recently had he seen a specimen of it gelatinized.

Mr. Greenish said in a paper on this subject introduced nearly forty years ago by Professor Redwood the same difficulties presented themselves as now had to be contended with. He hoped it would occupy a place upon the blue paper of the Conference, and that some pharmacist capable of undertaking the subject would ascertain whether gelatinization depended upon a particular kino or upon the age of the kino.

Mr. Chipperfield said he had never known any tincture of kino that had not gelatinized sooner or later, from the fact he supposed that it had been kept a somewhat unusually long time.

Mr. T. F. Abraham stated that he had known tincture of kino for fifteen years, and he had never seen it gelatinize. The only difficulty he had had with it was that it wedged the stoppers of the bottles. To provide for this in their establishment there were two bottles, one a standard bottle which was placed on the ordinary shelves and with the other bottles, dusted and consequently shaken once a week, and another a bottle which was kept in the back part of the shop and which was shaken perhaps not once in two months. The contents of both bottles were made at the same time from the same variety of kino and both kept equally well. The gentleman whose paper they had listened to, before he sugested remedies should have been quite sure that what he used was really B.P. tincture of kino.

Mr. Preston stated that their tincture of kino had gelatinized once in seventeen years, and he believed that was caused by the stopper of the bottle having become a little loose.

Mr. Robbins had known tincture of kino for some time and only once had he known it gelatinize.

Mr. Savage gave his experience with the tincture, which was to the effect that at one establishment it had gelatinized, and at the other it had not, but had kept exceedingly well. The little that had gelatinized had been put carefully away in a cupboard; the one that had kept well had been exposed to the light and dusted every day.

Mr. Ellinor said he had ordered kino from different houses and the tincture made from some of them would gelatinize, and that made from others would not. That which tinged saliva was the best kind and it never gelatinized as far as his experience went. He had, in a paper read at Bradford, recommended the substitution of a liquor containing glycerine in the place of the tincture, the object of which was, as far as possible, to avoid the use of spirit, but he had somewhat modified his opinion in consequence of Mr. Brady having then pointed out the extraordinary extent to which glycerine sometimes affected the characteristic property of astringents. He had observed in the Journal two recommendations for the use of glycerine in preparing the tincture, one preferring double the quantity of glycerine to be added to the other, but he thought they should be careful before altering a Pharmacopœia formula. If necessary at all to add glycerine the smallest possible quantity to effect the object should be ascertained.

Dr. Symes remarked that he had only met with tincture of kino that had gelatinized once, and he did not believe its gelatinization was so common as was generally supposed. Mr. Bamford had suggested a remedy in the keeping rather than in the preparation, but his own opinion was that the real remedy was in the preparation itself. The addition of a small quantity of glycerine appeared to be effectual, but it remained to be proved whether it affected prejudicially the astringency of the tincture.

Mr. Lee said he had known tincture of kino to keep for years in a fluid transparent condition when exposed to a strong light and frequently removed.

The President, in presenting the thanks of the Conference to Mr. Bamford for his paper, said it was his opinion that the remedy lay not so much in the management of the preparation as in the selection of the material of which it was composed.

The Conference then adjourned for luncheon and upon resuming the first paper read was—

Anhydrous Air as a Therapeutic Agent.

BY G. A. KEYWORTH, F.C.S.

Some time since my attention was drawn to the great pain and inconvenience caused by tension in various morbid conditions. It occurred to me that air artificially dried and heated and so made an energetic absorbent of moisture would give relief by causing shrinking of the parts. This I found to be the case. Frequent opportunities were presented of observing this effect upon a cancerous growth affecting the hand, with moist fetid surface. The jet was applied for an hour in the evening and caused cessation of pain for some eight hours, ensuring a good night's rest. After the application the surface presented a dried, shrivelled appearance. The loss of pain and stiffness was well marked and repeatedly verified. Anhydrous air as a mechanical anodyne may therefore prove a useful addition to the therapeutic armoury. The medical practitioner may see fit to apply it to gouty and edematous swellings, to inflamed surfaces, to indolent ulcers and intractable wounds with a view to promote healing by desiccation, and to various tumours and cancerous growths to relieve the pain and if possible check their increase. The apparatus I employed consisted of an eprouvette of glass, containing fragments of calcic chloride, through which large volumes of air were driven by means of a foot bellows of the Fletcher type. The exit end of the eprouvette was connected by india-rubber tubing with an iron tube 3 feet in length, with a diameter of ½ an inch, having a spirit lamp burning beneath the centre, and a piece of india-rubber tubing attached to the extremity for the purpose of applying the current. In this manner a stream of dried air heated to 100° F. could be maintained. A plug of cotton wool inserted within the entrance tube to the eprouvette acts as a filter when the jet is applied to unsound skin. The air might (if desirable) be impregnated with carbolic acid or other volatile substance by introducing a portion with the wool. Large volumes of air must be used and for a considerable time (sometimes several hours) in order to produce sensible effects. If the process should be found useful in medical practice dispensing chemists will probably be called upon to supply the apparatus on hire. An economical form of it will be supplied by the usual dealers in pharmaceutical apparatus. If used in hospitals on a large scale, a small gas engine or hydraulic motor could be adjusted in order to drive large bellows or a fan wheel, the eprouvette being of increased dimensions and the spirit lamp replaced by a Bunsen flame. The addition of india-rubber gas bags and pressure boards or other methods of compression can be made if increased force to the jet is required. It may be remembered that warm dry air has long been observed to promote, and cold air o retard the healing of wounds. Anhydrous air, though not a caustic in the usual sense, shares with such substances a certain power of disintegration by its affinity for moisture. The Michel process, introduced in Paris for removing tumours, consisted in the application of a paste of asbestos and sulphuric acid, the latter effecting destruction by absorbing moisture. Caustic potash, soda and lime act in the same manner.

The effect of nitric acid is due partly to this and to its power of oxidation. Anhydrous air is, however, free from the dangers and objections which attach to the use of these energetic chemical agents.

Mr. Keyworth's paper was read by Mr. Benger.

There was no discussion on this paper, and a vote of thanks was awarded to the writer.

The next paper was on—

Saponine from the Bark of Quillaia Saponaria.

BY H. COLLIER,

Teacher of Pharmacy at Guy's Hospital.

One of the subjects on the list of the Pharmaceutical Conference for investigation is Quillaia bark, its chemical composition, properties and uses. This bark had been under my notice for some time before the issue of this list, but as my chief aim has been to determine more precisely the nature of the saponaceous principle which it contains, I have adopted the above title for my paper. I have been assisted in my endeavours by my friend, Mr. Scard, F.C.S., chemical assistant to Dr. Pavy, F.R.S., Guy's Hospital, to whose practical chemical knowledge I am indebted for the various analyses of saponine which I am able to lay before you. I have by no means exhausted the subject; in fact, what I have to say must not be regarded as a complete investigation of saponine. I have obtained some results which may be looked upon as so many steps of progress towards the goal, but nevertheless there remain many points which are still obscure.

A principle which makes a froth with water, similar to that formed by ordinary soap, is very widely diffused throughout the vegetable kingdom. Although generally known as saponine, from its original source, *Saponaria officinalis*, it has other names according to the plant from which it is obtained. All these saponaceous principles may be one and the same substance modified perhaps by the impurities belonging to its extraction. Saponine has been the object of numerous investigations, but most discordant results have been published respecting it by different experimenters. Thus Bussy, Henry, Plisson and Overbeck state it to be a white non-crystalline friable powder. Rochleder and Schwartz that it is colourless, and Quevenne that it is yellowish white. Again, according to Henry and Plisson it is inodorous, whilst Quevenne asserts that it has a peculiar aromatic odour, and Sharling that the aqueous solution has a repulsive odour. There is also a great difference in the formulas assigned to saponine. According to Rochleder and Schwartz it is $C_{24}H_{40}O_{14}$, Overbeck $C_{42}H_{76}O_{30}$, and Bolley $C_{36}H_{56}O_{24}$. Before proceeding any further with the consideration of saponine, I think it will be well to say a few words respecting the source, character and microscopic appearance of quillaia bark. The following description is from the 'Treasury of Botany,' part ii., 952:—"Quillaia saponaria, quillaia or cullay of the Chilians, is a tree from 50 to 60 feet high, with smooth, shining, short stalked, oval leaves and usually terminal white flowers. Its bark, called quillaia or soap bark, is rough or dark coloured externally, but consisting of numerous regular whitish or yellowish layers, and contains a large quantity of carbonate of lime and other mineral matters. It is rich in saponine, a vegetable soap principle, and on this account it is commonly used as a substitute for washing clothes, two ounces of the bark being sufficient to wash a dress. It is also said to remove all spots or stains, and to impart a remarkable lustre to wool, and it is used to wash the hair, for which purpose it is powdered between stones, then rubbed with the hands in water, making a foam like soap." The cortex quillaiæ which I have examined consisted of heavy flat or slightly curved pieces varying in size from 1 to 4 feet in length, 4 to 8 inches in breadth, and from a ¼ to ½ an inch in thickness. The outer bark had been removed; there were, however, a few scattered pieces still remaining. Le Bœuf, who described the colour of the tincture he obtained as "d'une couleur orangée foncée," no doubt employed the bark without removing the remaining outside portions. Now this is an important matter, as this outer bark contains a colouring principle which contaminates the saponine. In all my experiments I have operated upon a bark from which every portion of outside layer had been removed by planing and the use of the chisel. The tincture from this is of a pale yellow colour. It is not difficult to reduce the bark to coarse powder, if it is thoroughly dry, but if exposed to the air it absorbs moisture, and although it may easily be separated into layers, it is not friable. It is rather an unpleasant substance to powder, the fine dust which arises causing a great amount of coughing and sneezing. Examined by the microscope an opaque longitudinal section of the bark with one inch object glass and oblique light gives a general view of the woody tissue, upon and among which lie large crystals of what are undoubtedly oxalate of calcium, as they are unaffected by acetic acid, but are dissolved without any effervescence by hydrochloric. A longitudinal transparent section, part of which is stained with aniline, shows principally the woody fibre with crystals lying about. In the coloured section some cellular tissue may be observed, and a few resinoid looking bodies of a brown colour. I have one section here which is made in a part where the resinoid bodies are chiefly deposited. These are somewhat of an oval form, and I have every reason to believe they consist of saponine with impurities, giving them a brown colour. The bark ignites very readily, and during combustion gives off an aromatic odour somewhat resembling cedar wood. It yields 11·8 per cent. of ash which consists chiefly of calcium carbonate; there is also a trace of iron.

Henry and Boutron-Charland were, I believe, the first who investigated quillaia bark and separated its saponaceous matter, which they described as an acrid principle. The method they adopted was to boil the aqueous extract with water, filter at the boiling heat, and the saponine which fell down on cooling and concentration was purified by solution in alcohol with aid of animal charcoal. I have prepared saponine by this method, but I was unable to obtain it pure; it would persistently remain brown after all treatment. The best process is that of Le Bœuf, which consists in boiling the bark with 84 per cent. alcohol, filtering at the boiling point, and upon cooling the saponine deposits. It is purified by washing with alcohol and ether. The principle of the above process is that saponine is more soluble in boiling rectified spirit than in cold, so that the excess deposits upon cooling, leaving above a saturated solution of saponine with colouring and other matters. This tincture upon evaporation yields 2·24 per cent. of solid residue. The first saponine I obtained by this process, after thorough washing with alcohol and ether and drying over a water-bath, was a white friable amorphous mass. There were some portions however which were not white but of a decided brown colour, and there appeared an oily stain upon the filter paper round the edge of the saponine. I found it to be very soluble in water, but ether, chloroform, benzol, carbon bisulphide appeared to have no effect in dissolving it. A portion heated on platinum foil burnt very easily, and a white ash remained. This was insoluble in water, but dissolved at once with considerable effervescence in hydrochloric acid. A platinum wire dipped into this solution and held in the flame of a Bunsen burner produced a very well marked red colour. The acid solution neutralized with liq. ammoniæ gave on the addition of ammonium oxalate a white precipitate insoluble in acetic but dissolved by hydrochloric acid. An examination for other bodies gave negative results so, that the ash of saponine is composed entirely of calcium carbonate. Now Bolley's saponine contained 1 per cent. of ash, and one sample examined by Rochleder and Schwartz contained 4·3 per cent. These investigators are I believe the only persons who mention anything about an ash. This discovery of the fact that my saponine contained an ash was the result of a preliminary examination before submitting it to analysis; it was therefore necessary to obtain the amount before proceeding. The plan adopted was to ignite the saponine in a platinum dish; when the carbonaceous residue had become quite white it was cooled and moistened with solution of ammonium carbonate, evaporated to dryness and again heated gently to expel excess of ammonia. The ash was thus weighed as carbonate: ·49 of saponine yielded ·0195 of ash carbonated as described, which gave 3·979 per cent. I could not regard this saponine as a pure substance. It had been most carefully prepared according to the process given by Le Bœuf, but the oily stain on the filter paper upon which the saponine had been dried, and the brownish tinge of some of it were so many indications of impurities. It was necessary for me, therefore, to endeavour to ascertain what was the nature of the impurities associated with saponine, and if possible to obtain a pure specimen in order to determine the formula of it.

I have worked upon three different lots of bark obtained at various periods, and the saponine prepared from all of them upon ignition left an ash consisting of calcium carbonate:—

Saponine from	1st bark	3·979	per cent.	of ash.
„	2nd „	3·904	„	„
„	3rd „	3·843	„	„

The saponine prepared by boiling watery extract of bark with rectified spirit and deposition on cooling contained 4·37 per cent. of ash.

It is a question in what state the calcium exists in saponine; from its mode of extraction and after treatment it is hardly possible to suppose that the calcium oxalate existing in the bark had been dissolved out with the saponine, and then appeared in the ash as carbonate. The fact that the saponine from different specimens of bark should yield such nearly equal amounts of ash is very strong evidence that saponine from quillaia bark is a calcium salt. I have endeavoured to obtain saponine free from calcium, but up to the present time I have failed to do so. It is stated by Rochleder and V. Payr that baryta water added to a strong watery solution of saponine precipitates saponine-baryta, and that the white precipitate washed with baryta water, dissolved in water and then CO_2 passed through the solution gives carbonate of baryta which separates out, and after its removal the saponine may be precipitated by ether-alcohol. My saponine threw down a brown gelatinous precipitate with the baryta; which did not appear to dissolve in water, and CO_2 produced no effect in the filtrate from the digestion of the barium precipitate. I next tried precipitating a watery solution of saponine with neutral acetate of lead; the precipitate, which was a very gelatinous one, after washing was dissolved in water and a current of sulphuretted hydrogen passed through the solution for several hours. No precipitate was produced but simply a black coloured liquid which upon dilution with water formed a clear dark brown solution. Afterwards to a similar solution of saponine in water I added oxalic acid until the liquid was distinctly acid. It was then laid aside for several days by which time the bottom of the beaker was covered with a white precipitate of calcium oxalate. The clear supernatant liquid was decanted and then neutralized with barium carbonate. It was impossible to filter quite bright and so it was allowed to remain for a week. At the end of that time the clear upper liquid, which I hoped was nothing but saponine in solution, was drawn off and carefully evaporated to dryness; the result was a brown amorphous mass, which upon ignition left some amount of ash in which barium was present. I next turned my attention to an examination of the tincture from which the saponine had been deposited upon cooling. I considered, that as this tincture was only a solution of impure saponine, a knowledge of its composition might suggest the purification of the saponine. The tincture evaporated over a water-bath left a soft reddish-brown sticky extract. This was digested with washed ether for some days; by this treatment it lost much of its colour but still retained its tenacious character. The ethereal solution was of a yellow colour, and when mixed with water became opaque, and after a short time a fatty matter appeared adhering to the sides of the tube. If hydrochloric acid instead of water were employed, the fatty substance at once separated in the form of distinct lumps floating on the surface of the liquid. These were not dissolved on the addition of alcohol, and no change of colour was produced by the application of heat to the alcoholic mixture. Upon evaporating the ethereal solution a soft oily substance remained, which imparted a permanent greasy stain to white paper; it was insoluble in water and alcohol, but readily dissolved by benzol. It was unaffected by alkalies or diluted acids. A similar oily matter may be obtained by adding tincture quillaia to water acidulated with hydrochloric acid. After standing for some time a yellowish precipitate separates which collected upon a filter and well washed with water dissolves entirely in ether and this solution upon evaporation gives this oily residue. If washed ether be added to the tincture this oily principle is also precipitated together with saponine. In this case the precipitate after being well washed with rectified spirit and then dried over a water-bath is resolved into an oily fluid which soaks through the filter. The extract after being treated with ether as above was then digested with absolute alcohol for a week; at the end of this time the alcohol had acquired a reddish-brown tint and the extract had become a grey amorphous powder entirely devoid of stickiness. The alcoholic solution acidified with hydrochloric acid and then heated became of a cherry-red colour, which was changed to a dark olive green by alkalies and restored again upon the addition of acid. The residual extract treated with water dissolved entirely and appeared to be only impure saponine. I had thus acquired two facts, that the impurities present in precipitated saponine were an oily matter soluble in ether, and a colouring principle soluble in alcohol. It would be necessary therefore only to treat with alcohol and ether in order to obtain pure saponine. But this had been the method of purification always adopted and I have never obtained saponine without a marked oily stain upon the filter paper and more or less brown colour. I tried digestion with alcohol and ether for several days, but the product was still impure. At last after numerous experiments I found that by boiling the saponine in rectified spirit, filtering at a boiling heat, allowing the precipitate to settle by cooling, and digesting this in absolute alcohol and ether, that a very much whiter product was the result: it still, however, gave a red colour when heated with rectified spirit and hydrochloric acid. The saponine of which the analysis is given was purified as above, but the solution, deposition, and digestion were repeated a second time. It was a white amorphous substance, and the filter upon which it had been dried presented no appearance of any oily stain, and dissolved in rectified spirit, and acidified with hydrochloric acid, upon heating no red colour was produced. I thus believed it to be a perfectly pure specimen of quillaia bark saponine. It contained 4·13 per cent. of ash, which is higher than that yielded by the other saponines prepared in a similar manner, but not subjected to so thorough a process of purification. Now the saponine obtained from the watery extract gave 4·37 per cent. of ash which corresponds more closely to the amount obtained from purified saponine. I can say in explanation of this that the last sample being free from oily matter would yield a higher percentage of ash, and that the product from the watery extract probably contained no oil, as this is not soluble in water, so that its ash approaches more closely that of pure saponine.

The absence of this oily impurity made a perceptible difference in the amount of carbon contained in the last sample of saponine compared with the first in which it was present. Now this has an important bearing, for the amount of carbon contained in the first saponine I prepared and submitted to analysis was 49·31 per cent. and this corresponds closely to the amount given in the published analyses: thus—

Rochleder and Schwartz . . .	52·17 per cent.
Overbeck	47·54 ,,
Bolley	49·54 ,,
Rochleder and V. Payr . . .	52·97 ,,
Bussy	50·00 ,,

It is therefore very probable that these saponines containing such a high amount of carbon were not pure and that the different results are owing to various degrees of purity of the sample examined.

The following is the result of the analysis of purified saponine.

	Calculated from formula $(C_9H_{22}O_7)_{10}CaO$.	Found.
C	43·63	43·51
H	8·88	8·88
O	45·23	45·30
CaO	2·26	2·31
	100·00	100·00

Deducting the CaO the percentage composition runs as follows:—

C	44·53
H	9·09
O	46·38
	100·00

Corresponding to the formula $C_9H_{22}O_7$ which requires—

C	44·62
H	9·09
O	46·29
	100·00

Considering the large number of atoms in combination with one of lime it may be inferred that the lime is simply united with the saponine and that it does not displace any hydrogen or compound radical, therefore, we should be justified in calculating the formula for saponine in deducting the lime found, and recalculating the percentage proportion. In fact, it may be assumed that saponine has a similar structure to that of arabine, which is said to be a calcium salt.

Another paper read by the same author was—

Tincture of Quillaia as an Emulsifying Agent.

BY HENRY COLLIER,

Teacher of Pharmacy at Guy's Hospital.

I now pass on to a consideration of the use of a tincture of the bark of *Quillaia saponaria* for the preparation of emulsions. The tincture which has been employed in the preparation of the various mixtures upon the table has been made according to the following formula, which is taken from Guy's Hospital Pharmacopœia:—

Quillaia Bark, in coarse powder .	4 oz.
Rectified Spirit of Wine	1 pint.

Digest for three days and then strain.

The bark before powdering is carefully freed from all remains of outside layer, and the tincture produced is of a pale yellow colour.

Into this bottle I have put some mercury and shaken it up with tincture of quillaia, the result is that the mercury has been reduced to a very fine state of division. It has very much the appearance of hyd. c. creta, and examined with a lens it is seen to be composed of distinct globules of mercury. So long as there is some tincture present this division of the metal remains; if it be dried, it at once runs together and appears in its ordinary liquid state. This is a remarkable power which tinct. quillaiæ possesses of destroying the cohesion between the globules of mercury, breaking them up and preventing them from uniting together, and it is this property which renders it so valuable an emulsifying agent.

A true emulsion consists, as is well known, of a number of oily or resinous particles floating about in a watery liquid by means of some agent which prevents them from cohering. To be perfect the emulsion should have a milky appearance, and the suspended particles should not subside or rise too rapidly. In the British Pharmacopœia there is a preparation containing mercury in a very fine state of division, and which is in fact an emulsion containing mercury finely divided. The preparation I mean is the *Linimentum Hydrargyri*, which Squire says "should be a lead-coloured cream, but is curds and whey." By using tinct. quillaiæ a lead-coloured cream may be formed which does not turn to curds and whey. The preparation here contains the same proportion of active ingredients as is ordered in the Pharmacopœia; if left undisturbed for some time the ung. hydrargyri settles to the bottom, but a vigorous shaking blends it again perfectly. The following is the formula:—

Lin. Camph.	℥j.
Tinct. Quillaiæ	℥iij.
(Liq. Amm. Fort. ℥ij, ♏ 40 Aq. ad).	℥v.
Ung. Hydrarg.	1 oz.

M.

Chloroform is made into an excellent emulsion by means of this tincture.

Chloroform	♏x.
Tinct. Quillaiæ	ʒj.
Aq. Destil. . . . . ad	ʒj.

Misce.

Although chloroform is such a heavy liquid, yet it remains suspended for some minutes after shaking. It finally settles as a creamy layer at the bottom of the bottle. A solution of saponine in water shaken with chloroform converts it into a thick creamy fluid; the water separates, but the chloroform permanently retains its creamy character.

Here is a mixture of castor oil made according to the following formula:—

Ol. Ricini	℥ss.
Tinct. Quillaiæ	ʒss.
Aq. . . . . ad	ʒj.

The tincture is first put into the bottle, afterwards the oil, and shaken together, then the water is added and again shaken. The emulsion thus formed resembles its prototype milk in appearance and like it separates after the lapse of some time into a cream at the top, which mixes again upon agitation. Emulsions prepared in a similar manner of oleum morrhuæ and oleum olivæ are of as perfect a character.

Ext. Filicis Liquid.	ʒj.
Tinct. Quillaiæ	ʒss.
Aq. Destil. . . . . ad	ʒj.

Misce.

This forms an excellent emulsion, and with the addition of syrup zingiberis ʒss constitutes the Mistura Filicis Maris of Guy's Hospital.

Copaibæ	ʒss.
Tinct. Quillaiæ	ʒss.
Aq. Destil. . . . . ad	ʒj.

Misce.

The copaiba in this mixture is perfectly emulsified.

Here is an example of an essential oil.

Ol. Terebinth.		♏xx.
Tinct. Quillaiæ		♏xx.
Aq. Destil.	ad	℥j.

Misce.

This formula, with the addition of tinct. limonis, is the mistura terebinthinæ (Guy's).

I have found that resinous tinctures require more than their bulk of tinct. quillaiæ to prevent any separation of resin.

Tinct. Tolut.		♏40.
Tinct. Quillaiæ		ʒj.
Aq. Destil.	ad	℥j.

Misce.

The resin deposits after some time, but upon shaking it is easily diffused.

This mixture contains the soluble matter of 12 grains of guaiacum resin in every fluid ounce, so that it is about the same strength as mist. guaiaci, B.P. The following is the formula:—

Resin Guaiaci		gr. xij.
Tinct. Quillaiæ		ʒj.
Aq. Destil.	ad	℥j.

Dissolve the guaiacum in the tincture, filter, and then mix with the water.

Resin of copaiba is largely used at Guy's Hospital where it is considered a valuable diuretic. It does not appear to me to make so perfect a mixture with tinct. quillaiæ as the hospital formula with pulv. tragacanth co. The liquid is not thick enough to prevent the resin separating too rapidly. Here are mixtures of copaiba resin made after the following formulas:—

Mist. Resinæ Copaibæ (*Guy's*).

Resin of Copaiba	15 grains
Rectified Spt. of Wine	20 minims
Compound Powder of Traganth.	15 grains.
Syrup of Ginger	1 fl. dr.
Distilled Water to	1 fl. oz.

Misce.

The resin and spirit are put into an evaporating dish and blended together by heating over a water-bath; then poured into a mortar containing the pulv. tragacanth co. previously made into a thick mucilage with a little of the water and well rubbed together, the syrup and the remainder of the water being gradually added.

Resinæ Copaibæ		gr. xv.
Tinct. Quillaiæ		ʒj.
Aq. Destilat.	ad	℥j.

The resin is dissolved in the tincture and the water gradually added with agitation.

Bals. Peru.		♏ xv.
Tinct. Quillaiæ		ʒj.
Aq. Distil.	ad	℥j.

This mixture is open to the same objection—the balsam subsides too rapidly. The above quantity of balsam with gr. xv. of pulv. tragacanth co. gives an excellent result.

I have now placed before you examples of emulsions of the various substances which are administered in that form, and I have no doubt but that you will agree with me that tincture of quillaia is worthy of a place in pharmacy for the preparation of this class of medicines.

Mr. Benger asked Mr. Collier if the taste of the tincture of quillaia was not sometimes objectionable.

Mr. Reynolds said he should like to extend the question put by Mr. Benger. The use of quillaia bark for these necessary purposes of pharmacy would divide itself into two sections:—Its use for external and its use for internal purposes. The question of physiological action and questionable taste might be taken as parts of the same subject. He would like to inquire if there were any other instances than the use of the male fern oil emulsion for which Guy's Hospital would reccommend the use of quillaia in an internal application, and if they were to understand that the half drachm dose containing 6 grains of bark was the maximum. Dr. Soullé had recommended an emulsion so as to bring carbolic acid into the form of a lotion and had written very highly of its effects in the treatment of wounds after certain operations.

Mr. Greenish observed that tincture of quillaia had been highly recommended by the Paris Pharmaceutical Society as an emulsifying agent. He had tried it in many instances, and had found it exceedingly useful. Dr. Vogl, of Vienna, had written most exhaustively on this bark; not only on its chemical composition, but its microscopical structure. There was also a valuable paper on its microscopical structure by Schlesinger in Wiesner's 'Untersuchungen.' He believed that tinct. quillaia would occupy a place in pharmacy.

Mr. A. H. Mason (Liverpool) remarked that the author spoke of quillaia bark in the natural state; his experience was that only the inner bark was offered for sale in this country; this was frequently stained, and he would like to ask if this was caused by exposure or if any decomposition took place likely to deteriorate the bark. He would like to know, moreover, if the frothing power of quillaia bark was due to the presence of saponine, and if so whether saponine obtained from other sources had the same properties. He would also ask whether the watery or the alcoholic extract yielded the greater percentage of frothing power and what the yield of extracts was.

Mr. Lee asked what strength of spirit was required to extract saponine from quillaia bark, and what temperature should be used.

Mr. Umney said he knew this bark was occasionally used medicinally, also that it was a most powerful drug applied externally. It entered into the composition of one well-known patent medicine, which had been before the public for years, and it was well known as a stimulant in certain skin diseases. Before it was recommended broadcast as an emulsifying body for all kinds of mixtures they ought really to ascertain if it was harmless in its nature when administered internally.

Dr. Symes referred to the use of quillaia bark in tooth powders and mouth washes as objectionable on account of its nauseous acrid taste, and asked if saponine in the purest form in which Mr. Collier had been able to obtain it still possessed this objectionable character.

Mr. Fletcher asked if the saponifying property was peculiar to the lime compound.

Mr. Hasselby asked how the author broke up the mercury, and said the process seemed so simple and effective that it might be used with advantage in sheep ointment.

Mr. Collier said as regarded the physiological action of quillaia bark he could only refer to Husemann's 'Pflanzenstoffe,' in which saponin was mentioned as being poisonous to the lower animals; but the fact of its being adopted by the Paris Society of Pharmacy induced him to think there could not be any harm in the substance. He had made a considerable quantity of emulsions with it, but more particularly of cod liver oil. The tincture of quillaia added to cod liver oil, and flavoured with cinnamon, made really a very palatable mixture, and he knew one person, who having an objection to oil, even liked it in this way. He explained the process of breaking up mercury, and showed that it would do well to make sheep ointment.

The thanks of the Conference were given to Mr. Collier for his paper.

(*To be continued.*)

Obituary.

Notice has been received of the death of the following:—

On the 10th of August, 1879, Mr. William Rowland, Chemist and Druggist, East Street, Chichester.

On the 15th of August, 1879, at Chelsea, Mr. William

Bartlett. Aged 75 years. Mr. Bartlett was one of the Founders of the Pharmaceutical Society, and served as a Member of the Council in the years 1845–46 and 1846–47.

On the 16th of August, 1879, Mr. Joseph Barnett, Chemist and Druggist, New Street, Burton-on-Trent. Aged 35 years.

On the 22nd of August, 1879, Mr. Thomas Rushworth, Chemist and Druggist, Wellington Street, Leeds. Aged 63 years.

On the 22nd of August, 1879, Mr. Joseph Pearce, Chemist and Druggist, Sheep Market Street, Crewkerne. Aged 67 years. Mr. Pearce had been a Member of the Pharmaceutical Society since 1869.

On the 22nd of August, 1879, Mr. Clement Dallas, Chemist and Druggist, Lavender Hill, Clapham, S.W. Aged 42 years.

On the 31st of August, 1879, Mr. Thomas Pass, Chemist and Druggist, Melbourne. Aged 72 years.

On the 1st of September, 1879, Mr. James Holiday, Chemist and Druggist, St. Dunstan's Street, Canterbury. Aged 76 years.

On the 6th of September, 1879, Mr. John Joseph Nicholson, Pharmaceutical Chemist, High Street West, Sunderland. Aged 42 years. Mr. Nicholson had been a Member of the Pharmaceutical Society since 1861.

On the 13th of September, 1879, Mr. Richard Flower Ellis Wilton, Chemist and Druggist, Bridgwater. Aged 33 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Registered Dental Practitioners.

Sir,—I was utterly astonished upon reading Mr. J. J. Musgrave's letter in your last issue. Could anything be wider of the mark? The Act states "dentistry" or "dental surgery." That is "dentistry" (mechanical) or "dentistry" (surgical), either the one or the other, "separately" or in connection with medicine or pharmacy.

Our friend's lucid description of a dentist fails the further deduction, that "a dentist" (though eminently qualified or otherwise) shall not be compelled to do both if he chooses otherwise. If words mean anything at all, in the sentence dentistry or dental surgery, in the eyes of the law, common sense, or a dental surgeon, I think it must mean either the one or the other, or both. If it is not optional I am in the dark. A medical man may be a M.D., M.R.C.S., and L.S.A., I am not aware the eye of the law compels him to practise any one branch for which he is "registered" at the instigation of any person, whether he chooses or not.

Does not Mr. Musgrave's letter savour too much of what we call in Sheffield Broadheadism? By what authority can the British Dental Association or any other association, "demand legal evidence of fitness"? Who gave them that authority? The Dental Act does not. Intimidation, based upon such a foundation, can only find its reward in the treatment which doubtless such a communication will receive.

G. Ellinor, Ph.C., *Dental Surgeon, etc.*

Sheffield, Sept. 16, 1879.

Sir,—It is refreshing but not particularly instructive to read the letter of Mr. J. J. Musgrave under the above heading in your last issue. Mr. Musgrave evidently views with a jaundiced eye that portion of the Dentists' Act which permits chemists who were engaged in dentistry to register as such. Perhaps it may be well, however, to remind Mr. Musgrave that, however powerful a brief he may hold from his "numerous friends in both the dental and medical profession," it is—happily for those to whom he offers such disinterested advice—only a brief, and not the dictum of either judge or jury in the matter.

The new dental associations have a broad field of usefulness before them, and it will be to be regretted if they initiate their existence by stirring up strife between themselves as representing the dentist *pur et simple* and those associations who would represent the dentist "in conjunction with the practice of pharmacy."

Imperturbed.

Sir,—In your last issue there appeared a letter on this subject by Mr. J. J. Musgrave in which he states that a dentist in the eye of the law must have been a person engaged in every branch of the dental art, *i.e.*, able to undertake any operation and do any mechanical work that may be required for the mouth by the public.

He then goes on to say that any chemists who cannot show legal evidence of such qualification and fitness had better apply to Mr. Miller, to have their names erased from the register to prevent sect. xxxv. of the Act being carried into effect, as it provides for such fraudulent registrations by fine and imprisonment.

About the 27th of last December I wrote to Mr. Miller asking him if it was necessary for any person engaged in extracting teeth to be registered. I expected a plain answer to a plain question. On the 30th of December I received a letter containing a form of declaration and an intimation that December 31 was the last day on which I could be registered for the sum of £2. I sent the money and was registered as a dentist, as I concluded it was necessary to do so in order to continue to extract teeth. Now I wish to know if on applying to Mr. Miller to erase my name from the register, he will return the £2; if not, could an action stand for obtaining money under false pretences? Perhaps Mr. Musgrave can inform me; if not, I shall set the whole affair down as a big swindle.

September 16, 1879. Lower Molar.

Sir,—What is the object of your correspondent J. J. Musgrave in writing the letter which appeared in last week's Journal? Does he wish to prevent chemists' assistants from registering as dentists?

It is a well-known and indubitable fact, that there are hundreds of chemists, their managers and assistants, who practise dentistry, that is, who extract, scale, stop, etc., as ably as any professional dentist can do, who under the late state of the law could not be hindered or prevented from so practising; and I take it that the new Act has been passed to give such practitioners a legal status, and to prevent from so practising unqualified men, mere empirics and charlatans.

Another fact equally well known with the above, is that in country places throughout the length and breadth of the land, there are uneducated and vulgar men who take first to "cow-doctoring" and farriery, but who are equally ready at any time to bleed a horse or cow, or to cut a whitlow or extract a tooth for a human patient; and these are the men, I apprehend, who were intended to be, and who will be prevented by the new Registration Act from practising dentistry.

If a chemist's assistant were able to perform, in a proper manner, all the operations of dental surgery, he would not need a new Act of Parliament to enable him to register, and so give him a legal position; nor would he long stand, behind a chemist's counter. He would be, or soon could be, in a position to have his abilities fully recognized by the College of Dental Surgeons and to practise as a full-blown dentist.

Manager.

How can a Chemists' Assistant register Himself as a Dentist in bona fide Practice?

Sir,—Under the above heading, in your last week's issue, Mr. Musgrave says, "I have also had chemists pointed out to me who have never done any dental operation beyond extracting a tooth, etc., who have registered as being in *bonâ fide* practice as dentists." Now, sir, if extracting a tooth is not practising as a dentist, I should like to know what it is? Probably a great many chemists have registered whose business engagements will not permit them to do anything more than simple tooth extraction, and have thereby registered, as a precaution, against a possible prosecution for breaking the law. The registration of assistants, I should imagine, was illegal, because they are not actually practising surgery and pharmacy, only acting as assistants.

The Dental Act is like the Pharmacy Act; it must of necessity recognize a certain class of men, who have no right, so far as their qualifications are concerned, to be registered. As a natural consequence, it will be some years hence before these Acts have the beneficial effect intended.

Walworth, Sept. 15, 1879. F. W. S.

The Health of the Drug Trade.

Sir,—The subject which Mr. Nicol, of Edinburgh, has broached in a recent Journal is certainly of sufficient importance to claim discussion, and if some of our thoughtful members would give us the benefit of their opinions, it would prove instructive and interesting, for in these days of competition and restless anxiety to get our trade prices and honest due, this all important subject is, I fear, lost sight of.

Dr. Richardson, in his manual of 'Health and Life,' gives very interesting facts respecting the conditions and mortalities of all workers. He has collected tables of the death rate of males engaged in seventy occupations during three years, and perhaps it would surprise some of your readers, as it did me, that the lives of bakers, millers, tobacco manufacturers, and workers in metals, etc., stand higher in point of vitality than those of our own trade.

Dr. Richardson comments on the causes in a great number of cases, but with reference to chemists he says nothing. I suppose he thinks we are sufficiently competent to examine and trace the cause ourselves; but there is one circumstance he names with reference to grocers and drapers (both of which are better lives than chemists). He says, "that seventy-six grocers die to one hundred and eight drapers," and the explanation of the mortality given is that the grocer lives and works in an open shop, with doors rarely closed from morning to night. He deals in goods which give off little dust. He is rapid in his movements, and keeps himself warm by exercise without the aid of hot stoves. The draper, on the other hand, works in a close atmosphere. His shop door is on swing hinges. He is engaged handling goods which fill the air with dust and fluff, and the temperature is kept up by artificial means.

It has occurred to me this might be fitly applied to ourselves, for I have often noticed that chemists are very fond of keeping their doors closed, thereby retaining the vitiating gases the atmosphere of the shop is laden with, thus exerting their baneful influence on those employed in it.

Is it because it gives a mysterious air or professional appearance to the business? The most startling fact named by Dr. Richardson is that the lowest class in the vital scale are innkeepers and publicans.

His favourite theory then comes in to explain the reason, for he says, "the occupation is one that is most nearly allied to alcohol, for it tempts most rapidly into destruction those who are the dispensers of it."

Are we as chemists fond of the alcohol which kills, or is it the physic which kills too?

Sandford.

Sir,—Mr. Nicol has raised a very important question, and it is one to which I have given a great deal of attention during the last twenty years.

I believe I can supply him with the information which he requires. The obituary column of this Journal has for a long time had a horrible attraction for me. I should like to ask the contributors to it to endeavour in future to supply the name of the disease of which the person died.

There is no need to dwell upon this sad subject, but I will proceed to say that the result of my investigations goes to prove that if a pharmacist can avoid the practice of manufacturing chemistry, and confine himself to the ordinary retail or wholesale branches of our business, and conduct this business with ordinary prudence, and with a knowledge of the laws of health, he will live to a good old age, and enjoy his life as well or better than the tradesmen who live around him, and who are not possessed of the knowledge which I think he ought to have, and which I am not surprised to find that his neighbours are deficient of.

There are probably exceptional cases where the victim is placed in a very unhealthy part of a very large city, and where he is left with no assistance of any kind; my remarks do not apply to a slave like this, for I would say that his occupation is simply a living death, and that the sooner he is translated to another sphero, the better it will be for him.

Should this letter be read by any assistants in search of a business, let me implore them to shun "a snug little concern where the coming in is very low." The unlucky keeper of these shops is the most complete slave in the world; the negroes in America are quite happy people in comparison, for they work very little, eat a great deal, and find lying in the sun "berry pleasant."

I am much tempted to encroach upon your space in explaining the mode of life which a pharmacist should lead to enable him to be healthier than his neighbours, but I am also deeply impressed with the idea that very little will come of this discussion, for most of our brethren have drifted into a series of habits which have become part of themselves, and I fear that nothing can be said to warn them from the way which "seemeth good unto a man, and the end of these things is death." Upon the other hand, should any reader feel sufficient interest in this subject to challenge me in public, or to write to me in private, I shall be pleased to show how it is done.

Rochester. H. Barnaby.

Sir,—In taking up the subject of Mr. Nicol's letter o Saturday last, I would preface my remarks by saying that I do not write with the intention of trying to explain or give reasons for the alleged high percentage of mortality among chemists. Is it a fact proved and undisputed that our business is less healthy than any other indoor occupation of the shopkeeping species, even allowing for the few extra hours we are occupied, or that "nearly 80 per cent. of chemists and druggists die at an age when men are supposed to be in their prime?" I do not think it is possible to gather from the obituary notices of a scientific journal or two (which, it is unnecessary to say, do not obtain reports of all the deaths) a correct estimate of the average age at which chemists die, and for this reason, and looking to the source from which Mr. Nicol presumably draws his statement, I think he has been a little premature in his speculations. It has been said, not unfrequently, "How is it that chemists, as a rule, die young?" but has it occurred to one in a hundred to inquire if this assertion is really fact—that there is a greater mortality, and at an earlier age, among our class than among drapers, clerks, grocers, etc.?

I grant that in some large towns, where the system of keeping indoor assistants is for the most part the rule, and from the consequent night and day labour in the smaller establishments, where there are no relieving hands, many young men unconsciously, though slowly and surely, lay up the embryo seeds of future disease. In such cases the cause of the evil is obvious, and the remedy lies with themselves. It will be asked, of course, how the requirements of the trade and the medical profession are to be met in doing away with night attendance. I would ask too, "Is it not in the power of medical men to obviate, at least in a great measure, the necessity of night work by chemists, more especially in the case of those chemists and doctors who have almost exclusive dealings with each other?" By having at hand a few such remedies as chloroform, laudanum, etc., the majority of "emergency cases" could be dealt with by physicians with greater despatch, and therefore with gain both to themselves and their patients. And the loss to the chemist would be more than balanced by a well earned night's repose. This most desirable boon for the hard-worked assistant is certainly within the bounds of possibility, and for its acquisition it would only require a little friendly co-operation. Our sympathies in this respect with our English brother-assistants are genuine and sincere, but the hopes of better days in store for one and all of us will help to sustain us until we are eventually in possession of many such privileges, which we are at present deprived of. Although the gist of these remarks may appear in some measure to bear out Mr. Nicol's statements, yet with all respect to that gentleman, I hope that the publication of authentic statistics will refute the melancholy rate of mortality which, he alleges, exists in our midst.

Edinburgh. Alexander G. Laing.

Nitrate of Pilocarpine.

Sir,—My inability to be present at the Pharmaceutical Conference this year prevented me from replying to some remarks made upon my paper in discussion, I therefore ask you the favour of inserting the following reply.

The difference Mr. Martindale alludes to between the action of an extract of jaborandi and its alkaloid pilocarpine is a fact well known to me, as established by the physiological experiments of Professors Michael Foster and Sydney Ringer, and I intend shortly to commence some experiments on the secondary products of the manufacture of pilocarpine with the view, if possible, of settling the matter.

As to Mr. Martindale's discovery of the insolubility of nitrate of pilocarpine in cold alcohol, and its use for purifying the nitrate, I may say to such a trifle he is welcome; but he fails to point out what is of much more importance, viz., the solubility of the nitrate in boiling alcohol, from which it is deposited on cooling in colourless transparent crystals, much purer than can be obtained by any length of washing with cold alcohol.

University College Hospital, A. W. Gerrard.
September 16, 1879.

Soluble Essence of Ginger.

Sir,—We have failed to obtain a satisfactory result by Mr. Thresh's formula. Although cooled down to the freezing point the solution was quite opaque when filtered. Perhaps Mr. Thresh can explain this?

There is surely a misprint in the third paragraph ordering the tincture to be shaken with slacked lime "until it ceases to *lose* colour. . . Now add drop by drop dil. sulph. acid until the *rich yellow colour* of the tincture suddenly disappears." Shaking with the slacked lime *deepens* the colour.

Edinburgh. H. C. Baildon.

New and Improved Pharmaceutical Processes.

Sir,—In the "New Method for Making Tincture of Iodine," by Mr. E. F. Cherry, appearing in your issue of the 6th inst,, I fail to see improvement; there may be novelty, but it is of questionable advantage.

He must be a very clumsy manipulator who could not make a pint of tinct. iodi without "dirtying several measures" and "staining his skin."

The method of placing the ingredients in a bottle and occasionally agitating leaves nothing to be desired, and to say the least, avoids dirtying a measure and funnel, which unimportant consideration should not be thought of in compiling a pharmaceutical process.

Mr. Cherry's improved method for phosphorus pills differs only from one which has been long in use in the substitution of chloroform for carbon bisulphide as the phosphorus solvent.

On account of the extremely divided state of the phosphorus, I think it highly probable that considerable oxidation takes place in this method, the vapour of the $CHCl_3$ or CS_2 may retard it while the mass is in the mortar (the motion of the pestle, however, and atmospheric currents would, most likely, displace it), but during rolling and dividing oxidation would proceed rapidly (as instanced by "Greek Fire"). Finally, Mr. Cherry says nothing about coating or varnishing the pills, without which they would be valueless after having been kept a short time.

R. H. Parker.

Sir,—The only innovation in the paper entitled, "An Improved Method of Making Phosphorus Pills," seems to be the substitution of chloroform for bisulphide of carbon, and as no mention is made of the fact that this prevents the pill mass smoking, the only advantage of so doing is overlooked.

Of course no one likes the mephitic smell of bisulphide of carbon, but the mortar used can surely be placed in the open air for a couple of minutes.

Carbon bisulphide is preferable to chloroform for three reasons:—It costs much less; it is a better solvent, and it is much more volatile.

I am aware that on the last point I differ from Mr. Cherry. An experiment will at once settle the matter.

As to "The New Method of Making Tincture of Iodine," I fail to see how it improves on the old, in which the iodine and iodide of potassium were placed in a bottle, the spirit added, and the bottle gently shaken at intervals till complete solution had taken place, so rendering it unnecessary to dirty a funnel, and filter and waste a plug of cotton wool and a certain quantity of spirit by evaporation, as must be the case if the new method be adopted.

Greek Fire.

The Prosecutions by the Pharmaceutical Society of Ireland.

Sir,—Referring to your report of the proceedings in the case of the Pharmaceutical Society of Ireland *v.* Beater and Hardy, and the same *v.* Brownrigg, we beg to inform you that the rule of our establishments is to enter and number all prescriptions dispensed by us, and that this practice is invariably followed.

We may remark, at the same time, that we have frequently compounded prescriptions for Messrs. Beater and Hardy.

Dublin. Hamilton, Long and Co., Limited.

A. B.—The regulations respecting the appointment of Navy dispensers will be found in the 'Calendar of the Pharmaceutical Society.'

J. T. Fox.—(1) *Ranunculus arvensis.* (2) *Lamium purpureum.* (3) *Sanicula europœa.* (4) *Crepis virens,* probably; materials too meagre to determine. (5) *Vicia Sativa, β angustifolia.* (6) *Galium Aparine.* (7) *Vicia sepium.* (8) *Knautia arvensis.* (9 and 10) send better specimens. (11) *Lactuca muralis.* (12) *Carex glauca,* probably. Please limit the number of specimens to six in future.

A. B. C.—*Saponaria vaccaria.*

J. Shadwick.—Species of *Juniperus*; impossible to determine which in the absence of fruit.

J. H. Williams.—Garrod's 'Essentials of Materia Medica,' published by Longmans.

"*Aloe.*"—Snively's 'Manufacture of Perfumes and Toilet Articles,' published by Trübner.

J. Johnson.—The provisions of the 17th section as to the regulations to be observed in the sale of poisons do not apply to any medicine supplied by a legally qualified apothecary to his patient, nor apply to any article when forming part of the ingredients of any medicine dispensed by a person registered under the Pharmacy Act, provided such medicine be labelled with the name and address of the seller, and the ingredients thereof be entered, with the name of the person to whom it is sold or delivered, in a book to be kept by a seller for that purpose. But the regulations apply to all retail sales of scheduled poisons.

"*Rosicrucian.*"—A process for the deodorization of petroleum was described in the Journal for January 26, 1878, p. 582.

"*Associate.*"—Persons registered under the Dental Act are exempt from jury service.

"*Junior.*"—We do not possess sufficient information on the subject to warrant the expression of an opinion.

J. Gosling.—See the Journal for March 1 in the present year, p. 718; other recipes have also been given.

E. Robinson.—You will find an explanation in any good work on Physics. The action is primarily due to atmospheric pressure.

"*Wednesbury*" (who should have sent his name and address) will find several papers on pill coating by reference to the indexes of recent volumes of this Journal.

"*Eupatorium perfoliatum.*"—With reference to the paper on this subject that recently appeared in this Journal, before, p. 50, we are requested to add the following paragraph, which appeared in the original communication in the *American Journal of Pharmacy*:—"The analysis was made by Mr. Parsons [Department of Agriculture, Washington], who also submits this report."

R. W.—Sneezewort and evening primrose.

Communications, Letters, etc., have been received from Messrs. Attfield, J. H. Williams, Jackson, Wyborn, Davis, Mrs. Clarke, Euryowie, Dispenser, Alterative, Assistant, Quæro, Alchemist, Juvenis, T. S. W.

"THE MONTH."

Unusual seasons generally bring unusual phenomena, and abnormal conditions of plant life may therefore be naturally expected this year. Thus a Manchester correspondent writes that he recently came across a bed of hemlock with stems much above the average height, one of which, on being cut down, was found to measure 8 feet 9 inches in height, while the stem was $3\frac{1}{2}$ inches in circumference. A similar patch of the plant was recently noticed by the writer, near Dartford, quite an effort being required to reach the fruits with an outstretched arm, the plants, which were not measured, being probably close upon 9 feet high and much branched.

Fungi also, which might have been expected from the damp state of the ground and the recent warmth of atmosphere, at all events in the day, to have been abundant, are in fact unusually late and scarce. A recent search for *Amanita muscaria*, in a well known locality for it, near London, proved quite a failure. So great is the scarcity of fungi that it is feared that the fungus foray of the Woolhope Club at Hereford this year will prove less successful than usual, which would be rather an unfortunate occurrence, since several fungological celebrities from France are coming over to attend the meeting.

The unusual abundance of insects this year is another curious circumstance, and it would be interesting to ascertain how far it has affected the crops of medicinal plants. The writer recently observed a patch of peppermint completely stripped of leaves by one of the common garden caterpillars, *Mamestra persicariæ*. Most insects appear to dislike strong odours, but whether the moist weather has diminished the quantity of oil usually present in the leaves, or whether it is possible for insects to become habituated to unusual food, it is not possible to say. At all events, neither the elder nor the peppermint appears to be generally attacked by insects.

In damp meadows, in localities where it occurs, the colchicum may now be seen in full beauty, and almost reminds one of the early spring time when the crocus displays the same delicate hue. Many spring plants often blossom again in the autumn if the weather be damp and mild. This year there may be seen at the Botanical Gardens the bistort, *Actœa spicata*, crosswort, comfrey, and several others. The same thing often happens when flowers which naturally blossom in spring are transplanted at that season. Thus primroses transplanted in spring will sometimes flower in autumn for two or three years in succession.

Among the rarer wild plants to be seen in flower this month are, *Linosyris vulgaris, Artemisia campestris, Urtica pilulifera, Spiranthes autumnalis, Lactuca Scariola, L. saligna*, and *Bupleurum tenuissimum*. The first three may now be seen in blossom in the Herbaceous Ground at Kew, where several families are still well represented by plants in flower. Those which more especially afford abundant material for study are, Chenopodiaceæ, Polygonaceæ, Compositæ, Scrophulariaceæ, Labiatæ, Convolvulaceæ, Dipsacaceæ and Boraginaceæ. The Chenopodiaceæ are, even to advanced botanists, a very troublesome group, but a veritable *bête noir* to the tyro in botany, to whom it may be useful to know that although it is necessary to gather specimens in flower, as well as specimens having the lower leaves, it is best not to attempt to name the species until specimens with ripe fruit can be obtained.

Among medicinal plants at Kew a number which were recorded for last month still remain in blossom, such as lavender, peppermint, borage, camomile, hyssop, tansy, tobacco, melilot, wormwood, alkanet, and *Monarda didyma*.

Another species of *Monarda, M. fistulosa*, with pale pink flowers, presents a much less brilliant appearance than *M. didyma*, but its leaves give off a highly fragrant odour, like bergamot, when bruised. It is a curious coincidence that the odour both of lemon and bergamot should occur in more than one plant of the Labiatæ, while that of the orange does not seem to occur in that natural order.

A solitary flower of the cochineal cactus, *Opuntia vulgaris*, may be seen in the Herbaceous Ground, a sight of apparently rare occurrence in this country. Among the plants in the same ground worth a passing attention, at least, are several species of *Eryngium*, with their curious thistle-like habit. In the Compositæ may be noticed several plants of the genus *Echinops*, of which we have no indigenous representative, and which derive their name of globe thistle from their spherical capitulum, differing from ordinary composite flowers in each floret having an involucre of its own, while a general involucre is absent, or perhaps it would be more correct to say that what is apparently a flower-head consists of an aggregation of capitula, each of which contains only a single flower.

In the Onagraceæ bed may be observed a flower, *Lopezia coronata*, worthy of notice on account of its unusual structure. The parts of the flower in this family are usually four in number, or the stamens are sometimes reduced to two, but in this case there are apparently five petals, which gives an irregular appearance to the flower. This is due to one of the two stamens having no anther at its apex, but the filament developed instead in the form of a petal.

In hedgesides and damp waste places near old towns and villages, the soapwort, *Saponaria officinalis*, may be seen in blossom, its pretty pink flower frequently showing a tendency to become double. This plant has lately been spoken of as likely to be useful in carcinoma. Gerarde in his 'Herball' speaks of it as being used "for greene wounds, to hinder inflammation and speedily to heale them," and quotes from Ludovicus Septalius a remark which would have been doubtless much resented, had it been written in these democratic days. "I have sometimes used it with happy success in the most contumacious (venereal) disease, but it is of a somewhat ungrateful taste and *therefore must be reserved for the poorer sort*." It derives its name from the lather which may be made with water and the bruised leaves, and which is due to saponine, first obtained from this plant.

By the sides of streams may be seen the gipsywort (*Lycopus europæus*), remarkable for having only two stamens, the upper two being imperfect. This plant has the reputation of being one used by the gipsies to dye their skin.

The curious little plant *Samolus Valerandi*, may now be looked for in wet marshy or dripping places. Although the flowers are small and have an unattractive appearance, they are interesting on account of possessing, in the modified form of small scales, the second row of stamens, which is absent in most *Primulaceæ*, and by reason of which absence the stamens in this order are opposite to the petals, instead of alternate with them, as should, if the flowers were normal, be the case.

On damp sandy turfy heaths the Calathian violet, *Gentiana Pneumonanthe*, may now be found in flower. It is one of the prettiest of our native species, but is somewhat local and rare. The flowers differ from those of the commoner species, *G. Amarella*, in the stamens coming to maturity before the stigma, so that the pollen is carried by bees (which can only creep half way down the corolla) from the flowers in which the pollen is ripe to the older in which the anthers are withered and the stigma is viscid. As the stigma is higher up the tube than the stamens, self-fertilization is not possible.

In *Gentiana Amarella*, which is common on chalky hills at this time of year, although the anthers and stigma are mature at the same time, the stigma is above the stamens by reason of the style being longer than the stamens, so that cross-fertilization must also take place in this case. The *G. Amarella* is still sometimes gathered by herbalists under the name of English Gentian.

Most of those who have attended botanical lectures at Regent's Park Gardens are acquainted with the curious leaves of *Bryophyllum calycinum*, which when placed on damp earth in a warm place give rise to young plants from each notch at the margin of the leaves. Dr. W. Berge, of Zurich, has recently been examining the origin of these buds and their development into plants, and has found them to be of exogenous production and entirely developed from a meristem tissue in the base of the notches of the leaves.

Some interesting experiments on the action of anæsthetics on the sensitive plant have been made by M. Arloing. He found that chloral had not the same action on the plant as upon animals, while the contrary was the case with chloroform and ether. The anæsthetics were administered in the form of watery mixture to the roots, and the vessels containing the plants were then covered over so as to arrest evaporation, so that the anæsthetics must of necessity penetrate the plants either by the roots or leaves. The experiments showed that the rate of ascent of liquids in the plant increased from the base of the stem upwards, being one and a half to twice as great in the petioles as in the stem.

In the *Gardeners' Chronicle*, this month, Mr. W. G. Smith points out that a fungus very common at this time of the year possesses poisonous properties. A gentleman observing that it was eaten by slugs or snails most erroneously supposed it was therefore suitable for human beings and suffered severely for his theory. The fungus in question, known to fungologists as *Paxillus involutus*, is remarkable for the rim of the pileus or cap being distinctly curled under. The pileus is pale brownish and the gills run down the rather stout stem. The flesh when broken is dirty white, becoming brown, and the spores are reddish.

At the drug sales in London there has been noticed this month some spurious matico, with an aromatic odour between that of aniseed and sassafras, and another kind with leaves extremely similar to those of matico, but quite inodorous. A bag of the fruits of the doum palm, *Hyphæne thebaica* was also observed, but with what object they were imported it was not possible to ascertain. The fruit is said to be eaten by the lower classes in Egypt and to taste like gingerbread, whence it is sometimes called the gingerbread tree; its dry fibrous fruit, however, look so little like "gingerbread nuts" that there is not much temptation to try them. The seeds which are hard and horny are sometimes made into beads for rosaries. Goa powder of good quality was noticed and Calabar beans appeared to be more plentiful than of late.

Several inquiries concerning Alstonia bark have recently been made, and as some confusion appears to exist between *Alstonia scholaris* and *Alstonia constricta*, some readers may be glad to know that an account of the former may be found in Bentley and Trimen's 'Medicinal Plants,' No. 173. This bark is also called *Echites scholaris* and Dita bark. Attention was called to it so long ago as 1853, by Dr. Gibson. In his paper in the *Pharmaceutical Journal*, series 1, vol. xii., p. 422, a formula for the tincture (3 oz. of the coarsely bruised bark to a pint of proof spirit) is given, and some idea as to the dose and uses.

Alstonia constricta is an Australian bark used in Queensland as a substitute for quinine and is now coming into use in the United States. It is also known under the name of Queensland Fever Bark. It is quite different in appearance from Dita bark, which is used for dysentery rather than for fever.

At the meeting of the International Congress of Medical Science, at Amsterdam, among the papers read was one by Mr. Van Gorkom, on the culture of the different species of cinchona barks in Java. His experience, as superintendent of the quinine plantations in Java, naturally gives great value to his opinions. He considers that regular culture has done much to increase the value of the cinchonas for medical purposes, but that neither by outward nor by anatomical structure is it possible to determine the richness in active principles of any given sample of the bark and that chemical analysis alone can determine this point. He also finds that the properties of each species remain the same, although growing in foreign lands. Their tendency to hybridization, however, renders careful supervision of the plantations necessary, so as to secure seed of the best varieties only, or in other words, such as yield the largest amount of quinine. He believes that the growth of cinchonas in the East Indies is more influenced by the local condition of the climate and the soil than by a difference in the elevation of the land and that it is best not to attempt to grow them above 4500 or 5000 feet.

In the *Gardeners' Chronicle* an interesting extract from the *Colonies and India* is given concerning the collection of kauri gum. It is there stated that the districts in which the gum is found are generally covered with small mounds which indicate its presence. The gum hunter carries a steel-tipped spear with which he probes the mass, a little experience enabling him to ascertain the existence of the gum without further search. It is found in blocks from a few ounces to 50 or 60 pounds. The gum which is dug up is said to be used in this country for dressing calicoes, while the recent resin, or that from the existing tree, is employed principally in varnish making.

In the *Lancet* for September 6th attention is called to the fact that the use of sulphate of duboisine is liable to produce giddiness or even in some cases delirium. The writer says:—"When the supply of pure alkaloid becomes large enough to ensure uniformity of strength in the solution made by different chemists, it may be unsafe to prescribe a four grain solution of sulphate of duboisine, and the use of the drug for rapidly dilating the pupil or paralysing the accommodation in the out-patient or the consulting room may not be free from disadvantage."

On this subject Dr. J. Tweedy remarks in a subsequent paper, in the same journal, that "Duboisine, like many other remedies, has been and still is extravagantly abused. It is of immense power and value and necessary only in special cases, for which it should be reserved. Bulk for bulk, it is much stronger than atropine and should be employed with corresponding caution." From these remarks it is evident that duboisine is an unsafe drug to be used by patients themselves, and it behoves chemists, should they meet with prescriptions containing it, to tell the patient to be extremely careful not to exceed the quantity directed to be used. *Apropos* of the above remarks it is not quite evident in what way uniformity in strength of the solution made by different chemists depends upon the supply of the pure alkaloid. Does the writer mean to imply that chemists do not make solutions of the strength ordered, because duboisine is an expensive article? Solutions of alkaloids, etc., are usually made at the request of medical men, and such solutions naturally differ in strength according to the requirements of the prescriber; therefore it must rest with the prescriber alone to regulate the strength in the absence of a published formula.

This experience of duboisine does not appear to be universal with experimentalists, for in Dr. H. Macnaughten Jones's able summary, in the *British Medical Journal*, no mention is made of giddiness or delirium being induced by its application; on the contrary, he observes, "of the two (atropine and duboisine), so far as my experience teaches me, save for its expense, I prefer the sulphate of duboisine to the sulphate of atropine." The production of these symptoms may therefore be due to a peculiar intolerance of the drug similar to that which is well known to occur in some persons as regards atropine, and which is alluded to by Dr. Jones in the above paper.

Benzoate of sodium is said to be much used in Germany at present. It is stated that it reduces fever less rapidly than quinine and salicylate of sodium, but that the effect lasts longer. The dose given is 5 to 6 grams for children and 10 to 20 grams for adults.

In the *Medical and Surgical Reporter*, Dr. Mary J. Matlack calls attention to the value of asparagin as a diuretic. She considers it to be one of the best remedies in dropsy dependent on disease of the heart, and to be especially valuable in chronic gout. The dose given is 1 grain, three times a day, in conjunction with 12 grains of bromide of potassium.

Many of our readers have probably heard of the singular case of Alexis St. Martin, who had an opening into his stomach from a bullet wound which never closed, and who was the subject of experiments on gastric digestion, by Dr. Beaumont. The *Detroit Lancet*, for August, states that he is still alive and lives at Joliette county, Quebec province, Canada, and although seventy-nine years old, is strong and healthy. The hole in his stomach is an inch in diameter, yet his digestion has never failed. It should be added that he has been a hard worker all his life.

A new use for thymol has been discovered by Dr. Emil Stern, of Breslau, who states in the *Breslaue ärztliche Zeitschrift* (No. 8, 1879), that so far as he has been able to observe a mixture of a one per 1000 aqueous solution of thymol preserves vaccine lymph from decomposition, while it does not destroy its specific action and the mixture is not more irritating than ordinary vaccine matter. It does not appear, however, that thymolized lymph is infallible in its action, it seeming to vary in activity according to its age. The discovery, however, that thymol does not, like carbolic acid, destroy the power of the vaccine lymph is a remarkable one.

From the *Ammi Visnaga*, an umbelliferous plant common in Lower Egypt, and the rigid pedicels of whose umbels are used by the Arabs as toothpicks, Mr. Ibrahim Mustapha has extracted a glucoside to which he has given the name of kelline, from *kell*, the Arabic name of the plant. It is obtained by treating a mixture in equal parts of the powdered seeds of the plant and slacked lime with alcohol, evaporating to dryness in a water-bath, exhausting with ether, filtering and treating with boiling water the yellowish residue and filtering while warm. On cooling crystals are obtained which are purified by recrystallization first from hot acetic and then from boiling water. Kelline is described as a white very bitter substance, very slightly soluble in water, methylic, ethylic and amylic alcohols and chloroform when cold, but much more soluble in them when hot.

Pelletierine, the alkaloid isolated by Tanret from pomegranate root bark, and considered by him to be the active tænicide principle, appears to be making its way into favour on the Continent. The free alkaloid is a volatile oleaginous liquid, and the salts described by Tanret in his original paper (*Pharm. Journ.* [3], ix., 1023),—the sulphate, hydrochlorate and nitrate,—although obtainable in the crystalline form, are very hygroscopic and liable to undergo alteration through atmospheric influences, and are consequently not suitable for dispensing. For this purpose Messrs. Gehe recommend as most convenient the tannate, which forms a dirty white powder, stable when exposed to the air. In bringing the subject before the Paris Society at its August meeting M. Petit said that judging from the composition of the tannate of pelletierine the dose would vary from 1·50 to 2·0 grams, but as he admitted that the results of a polarimetric examination were absolutely different from those reported by M. Tanret it is not quite certain that the substances obtained by these two chemists were identical.

Aspidospermine, the alkaloid of the bark of *Aspidosperma Quebracho*, which has been recently recommended in the treatment of dyspnœa accompanying diseases of the lungs and other organs, has been the subject of a further examination by its discoverer, Herr Fraude (*Ber. d. deutsch. chem. Gesells*, xii., 1561). The author represents it by the formula $C_{22}H_{30}N_2O_2$, and states that at 14° C. one part of it is soluble in 48 parts of 99 per cent. alcohol, in 106 parts of ether free from alcohol and water, and in 6000 parts of water, the aqueous solution having a distinctly bitter taste. In many of its reactions it closely resembles strychnia, but its reaction with hypochlorous acid is characteristic. If a very small quantity be boiled for a few minutes in a few c.c. of aqueous solution of hypochlorous acid, sp. gr. 1·13 to 1·14, the liquid acquires an intense red colour, resembling that of a solution of fuchsin, which is persistent during a week's exposure to air and light. Brucine under similar conditions gives a dark Madeira colour, and strychnine a reddish yellow colour. The cinchona and opium alkaloids, veratrine, caffeine, atropine, nicotine and coniine give no colour reaction with the solution of hypochlorous acid.

Bromide of zinc having come recently into use in medicine M. Yvon recommends its preparation by double decomposition between zinc sulphate and potassium bromide. Upon triturating equivalent quantities of these in a mortar liquefaction quickly takes place, the water being afforded by the zinc sulphate. This product is left in contact about twenty minutes, then suspended in double its weight of perfectly rectified 95 per cent. alcohol and filtered. The solution of zinc bromide, which should pass through colourless, is evaporated to dryness first in a water-bath and then in a sand-bath. The product should be volatile, without residue and entirely soluble in water, alcohol and ether.

In the French Academy of Medicine, M. Vulpian has called attention to the fact that pepsines delivered from different pharmacies vary much in their digestive power, some of them modifying albumen so slowly as to make it doubtful what good effect they can have when administered to dyspeptics. He also confirmed a conclusion arrived at some time ago by Dr. Symes (*Pharm. Journ.* [3], iv., 1), that the action of pepsine is retarded by the presence of alcohol. Wines and elixirs of pepsine are very much used in France, and as M. Vulpian went on to say that some of the most renowned elixirs contained an extremely small quantity of pepsine, the rest intended to have been present having probably been precipitated by the alcohol during the manufacture of the preparations, the statement has caused some little sensation amongst the makers. M. Vulpian also described some experiments made by a pupil, M. Mourrut, which appeared to indicate that sufficient hydrochloric acid to correspond to the acidity of the gastric juice, added to a liquid containing diastase or pancreatine, retards the action of the diastase and stops that of the pancreatine, the former recovering its activity upon the neutralization of the liquid, but the latter remaining inert.

Some interesting experiments on the propagation of sponges, made by Dr. Schmidt, of the University of Gratz (Styria), have just been reported to the Paris Acclimatization Society (*Bulletin*, xxvi., 374). Dr. Schmidt has found that if a sponge be taken early in the spring, cut into small pieces, and immersed in water by attaching the pieces to wooden stakes, growth soon commences and eventually in about three years each piece may become a perfect sponge worth ten centimes. An estimate based upon what appears to be rather slender experience sets the probable profits from the investment of capital in this direction at about 60 per cent.

The disastrous consequences that might result from a person affected with colour blindness being placed in charge of a vessel induced the Board of Trade at the beginning of 1877 to issue instructions that persons presenting themselves for examination for masters' or mates' certificates should undergo a preliminary test as to their ability to distinguish the following colours, which enter largely into the combinations of signals used at sea:—black, white, red, green, yellow and blue. As a result, out of 5967 candidates 26—or rather less than half per cent. —were finally rejected as colour blind, and 13 others were only allowed to proceed to examination after a second trial. Green seems to have been the greatest stumbling block, it having been described wrongly by each of these 39 men, and in 25 cases referred to red. On the other hand, 12 referred red to green.

It may be remarked that some time since it was stated in *La France Médicale* that this infirmity could be overcome by looking through a layer of fuchsine in solution. A M. Javal has made a practical application of this observation by interposing between two glasses a thin layer of gelatine tinted with fuchsine, and it is claimed that by the use of such spectacles the errors caused by colour blindness are corrected. According to the *Medical and Surgical Reporter*, some experiments made in Philadelphia have confirmed this statement.

Still more additions to the "elements," and again the spectroscope has been the principal instrument used in the detection. M. Clève reports to the Academy of Sciences (*Compt. Rend.*, September 1) that he has distinguished in erbia two new elements, making four that have been separated from this substance, which was until recently looked upon as itself being the oxide of a single element, erbium. A writer in the *Chemical News* asks some pertinent questions as to the manner in which these strangers are to be treated in the text-books. Since June, 1877, the following new elements have been named—davyum, neptunium, lavœsium, mosandrum, phillipium, ytterbium, decipium, scandium, norwegium, uralium, and to these are now added, thullium and holmium. Whilst some workers are thus increasing the list of elements, others are steadily seeking to reduce it. In a short note read by Mr. Lockyer before the British Association he makes the following statement, leaving to others apparently to draw their own inferences:—"When carefully distilled metallic sodium was condensed in a capillary tube, placed in a retort, and heated in a Sprengel vacuum, it gave off twenty volumes of hydrogen. Phosphorus, carefully dried, and submitted to the same treatment, gave off seventy volumes of a gas which appeared to consist chiefly of hydrogen." Magnesium is said to have given off two volumes of hydrogen, and from sulphur sulphurous anhydride was always obtained. Iridium always gave off hydrogen *in vacuo* without heating, whilst lithium gave off as much as one hundred volumes.

Corresponding with the advance of science there must necessarily occur in national pharmacopœias successive changes in the names of many of the chemicals employed as therapeutic agents; with the lapse of time some of the earlier names have become quite obsolete. When, therefore, a prescription containing a well-known chemical, but with its more ancient name, is placed before a pharmacist whose acquaintance with drugs and chemicals dates no further back than the advent of the British Pharmacopœia, he is ignorant of the preparation when ordered by a name not found in that volume.

The library of everyone engaged in a business composed of the usual mixture of the retail of drugs and the dispensing of prescriptions may with advantage have on its shelves, in addition to the British Pharmacopœia, subsidiary works of reference, in which category may be named as specially useful Beasley's 'Pocket Formulary,' also Gray's 'Supplement,' a valuable work and one that well merits another edition, together with Jourdain's 'Pharmacopœia Universalis, or a complete encyclopædia of the materia medica contained in the pharmacopœias of London, Edinburgh and Dublin, as well as of all those of Europe and America, and of dispensaries formularies, etc.,' and, as hospital formulæ very frequently find their way into private practice, to the above may with advantage be added that valuable little work, Squire's 'Pharmacopœias of the London Hospitals.'

It must be obvious that the number can be greatly increased, but the few above named may be considered almost essential as works of reference in a well regulated pharmacy, and these should be so placed as to be readily accessible to the dispenser. Some of the questions asked and repeated in these pages may be taken to indicate that in many establishments no such facilities exist of easy reference when a difficulty occurs in the case of synonyms or formulæ which the British Pharmacopœia does not supply.

Correspondents would materially assist their less favoured brethren by naming works of reference which they have found valuable and could recommend to others similarly situated.

The first formula, No. 338, is evidently intended for a hair dye and the inquiry has been answered by several correspondents the answer of Mr. Staveley is definite. As regards the addition of liq. ammon. fort. to the solution of argent. nit., the ammonia should be added drop by drop with constant stirring and discontinued just before the disappearance of the last trace of precipitate. The addition of ammonia to a solution of argent. nit. precipitates the silver in the state of oxide, which is redissolved in excess of the precipitant, and care should be taken towards the end of the process that no more ammonia be added than is barely sufficient to dissolve the oxide precipitated.

The prescription No. 339 may be dispensed by rubbing the quinine to a fine powder, and then mixing it with one half the water ordered, and the ferri am. cit. being dissolved in the other half, they should be mixed. The result will be a turbid mixture, which will require being shaken before the administration of each dose. Probably the question refers merely as to whether the quinine should be dissolved by the addition of an acid, previously to its mixture with the ferri am. cit. The writer has not added an acid, its addition by the dispenser would consequently not be justifiable. The presence of an acid produces a more elegant result, and may with propriety be suggested to the prescriber, but should not be employed without his sanction, as he may have sufficiently satisfactory reasons of his own for the omission.

No. 340 contains the question whether it would be right in making ung. sulph. iodid. to rub the iodide with a little glycerine before adding the lard, "glycerine being a solvent of iodide of sulphur." In making the ointment it is very desirable that it should be smooth and without grit, and although any addition to a prescription must be adopted with great care, to either a few drops of glycerine or spirit in this case there can be no objection, and more especially as one correspondent says the addition of one of them "ensures the production of a faultless ointment."

Mr. R. H. Parker, in his reply to the question regarding the production of this ointment, states that in the next edition of the British Pharmacopœia the formula may with advantage have the addition of the rectified spirit. This remark points to another direction in which the discussions taking place in these columns may be of value, namely, in improving the formulæ for the next Pharmacopœia. It is well known that the accumulation of small but valuable facts with regard to the make of these and similar preparations, and their general application in practice, constitute that essential difference which is now and then observed in the same prescription dispensed at different establishments.

The prescription No. 341 contains an ingredient well known under its present name, hydrarg. ammon., but it is not so generally known by pharmacists of the present day under its former one, calx hydrargyri alba. It is one that in name has seen many changes, and probably the present one will not be final. A formula for the ointment occurred in the 'Pharmacopœia Londiniensis' of 1788, and is quoted by a correspondent in another column. An ointment of this preparation is frequently used as an external application in eruptions of the skin on the head or face.

No. 342 refers to a change of colour which takes place in ung. plumbi subacet. co. after being kept some time. This subject has been discussed on previous occasions, and it can only be necessary to refer "An Apprentice" to the remarks on this change in prescriptions Nos. 130 and 243, and some observations on the same in "The Month," Feb. 22, 1879, p. 698, and July 7, 1878, p. 65.

MELIA AZEDARACH, LIN.*

BY J. JACOBS, PH.G.

This beautiful tree is highly appreciated in the Southern United States for the beauty of its flowers, the elegance of its foliage and the medicinal uses to which it is applied; as a shade tree its popularity is equal to that of the maple in the North. It appears to be indigenous to Asia, but is planted as an ornamental tree in southern Europe, whence it was introduced into and naturalized in the United States at an early period, after the settlement of Carolina and Georgia. It is not found farther north than Virginia, as the severity of the climate of the more northern districts destroys it. The common names, *pride of China* and *pride of India*, undoubtedly originated from its rare beauty; *Indian lilac* from the resemblance of its flowers to those of the common syringa, and *bead tree* from the use of the nuts in rosaries, to which also, the German name Paternosterbaum (*paternostertree*) alludes. In the southern States it is known as *China-berry*, and to the young as *popgun tree*, in allusion to the use of its green fruit.

The tree attains a height of 30 to 40 feet, and from 15 to 20 inches in diameter; it grows rapidly, reaching the height of 12 or 15 feet in four years. The green fruit is very astringent, but when ripe it is a fleshy-yellow drupe, of a sweet taste, rather larger than a cherry, and containing a five-celled bony nut. The green fruit is used in Texas for making blacking.

The ripe berries were largely used in Georgia during the late war for the purpose of obtaining alcohol, by the usual process of fermentation and distillation; the whisky thus obtained was preferred by many to that produced from corn or rye. By expressing the fleshy part of the fruit, like the olive, a fixed oil is furnished from which a "Poor Man's Soap" is made.

Remarkable qualities are said to reside in the fruit, such as will intoxicate robins, which are particularly fond of and feed upon them during their annual migration southward; the seeds are widely dispersed by these birds, and hence trees are found in secluded places. Instances are known of the fruit being destructive to hogs, by what means it is not yet ascertained. A decoction of the berries sprinkled on plants prevents the depredations of

* From the *American Journal of Pharmacy*, September, 1879.

the grub-worm. The leaves and berries will preserve dried fruit from insects, and when packed with clothing will prevent the attack of moths.

The dried berries in whisky have been employed against ascarides, tape-worm and verminous maladies. The pulp of the berries stewed in lard has been used with success as an ointment in scald head. The decoction of the leaves has been employed in hysteria, and is astringent and stomachic. A decoction of the green bark, 4 ounces to the pint, is administered as an anthelmintic in doses of 1 or 2 fluid ounces, followed by a cathartic. When prepared in March or April, while the sap is ascending, unpleasant effects have been observed, such as stupor, dilation of the pupil, etc., which symptoms, however, pass off without perceptible injury to the system.

For the following experiments the bark of the root was employed, and as the liber is very easily separated, and this portion is the most effective in the Nim Bark (*Melia Azadirachta*, Lin.), this alone was used. The liber is of an extremely bitter taste, devoid of astringency, and its decoction gave no evidence of tannin; the outer portion, on the other hand, is very astringent, and its decoction gave abundant evidence of tannin by gelatin and ferric chloride. I may also mention that the inner bark is the portion used in making the decoction for administering.

After several preliminary experiments made with the view of determining the best course to pursue, one pound of the powdered bark was percolated with diluted alcohol until thoroughly exhausted. Upon distilling off the alcohol the aqueous residue held in suspension a considerable amount of insoluble matter. This residue was divided into two parts, one being filtered (*A*), the other evaporated (*B*).

The aqueous filtrate, *A*, was treated with solution of acetate of lead as long as a precipitate was produced; the precipitate was brought on a filter and washed well with water. The filtrate was treated with subacetate of lead, and this precipitate likewise collected and washed. The filtrate was freed from lead by sulphuretted hydrogen, separated from the sulphide of lead, and the sulphuretted hydrogen expelled by heating.

The sulphide of lead yielded nothing to hot water, but when treated with hot alcohol, a small amount of resinous or extractive matter was obtained. The filtrate from the sulphide of lead was concentrated to a syrupy consistence; alcohol produced a slight precipitate, and on the addition of ether a slight semi-fluid mass separated. Both precipitates occasioned by alcohol and ether redissolved in water and alcohol, respectively, and, evaporated spontaneously, left a dark amorphous residue, which was also obtained from the filtrate after ether and alcohol had been expelled; the ether precipitate proved to be sugar.

The examination of the lead precipitate did not lead to any decided results.

The evaporated portion, *B*, had a peculiar odour and bitter taste; it was treated with hot water, acidulated with hydrochloric acid and filtered from the residue, *C*. The filtrate was treated with magnesia and tested for an alkaloid, but none was found. The residue, *C*, was well washed with water, had a brownish-yellow colour and a strongly bitter taste, was not affected by hot or cold water, was slightly soluble in carbon bisulphide, insoluble in petroleum benzin and oil of turpentine, and soluble in alcohol, ether and chloroform, which solutions, on evaporation, refused to crystallize. The alcoholic solution was acid to test paper, but apparently did not combine with alkalies. On dissolving the substance repeatedly in alcohol, and precipitating it by water most of the colour was removed, the resinous principle remaining as a yellowish-white mass. It was given as an anthelmintic to a child aged four years, in the quantity of 3 grains, followed by a mercurial purgative, and proved to be at least as effectual as other vermifuges which had been previously given.

The results of his observations and experiments lead the author to the following conclusions:—

1. The activity of the bark resides in the liber, and this alone should be employed.
2. The active principle is a yellowish-white resin.
3. The drug is one of the best anthelmintics, and a fluid extract, prepared with diluted alcohol, or a tincture, would be a valuable preparation that would seem to deserve a place in the Pharmacopœia.

CHEMICAL NATURE OF THE ESSENCE OF LAUROCERASUS AND OF BITTER ALMONDS.*

BY M. FILETI.

The great difficulty of separating the whole of the hydrogen cyanide from essence of bitter almonds, and of the laurocerasus, renders it probably that it is present in some form of combination with the benzaldehyde; this compound would be the nitril, $C_6H_5.CH(OH).CN$, corresponding with mandelic acid. In order to test the truth of this supposition, the crude essences were treated with zinc and hydrochloric acid, in presence of alcohol and a platinum plate; twenty-four hours afterwards, the mixture was precipitated with water, and evaporated at 100° to remove alcohol. After filtration from the hydrobenzoïn, the liquid was supersaturated with potash, and agitated with ether, the ethereal solution being subsequently washed with water, and agitated with dilute hydrochloric acid. On evaporating the acid solution, the hydrochloride of a base was obtained, which was converted into the platinochloride and analysed, as was also the hydrochloride. The results correspond with the formula $C_6H_5.CH_2.CH_2NH_2$ for the base. From this it would appear that the nitril $C_6H_5.CH(OH).CN$ is present in the crude essences, and that by the action of nascent hydrogen it is not converted into the amide

$$C_6H_5.CH(OH).CH_2.NH_2,$$

as might have been expected, but that an atom of oxygen is eliminated in the process, so that the final product is the base $C_6H_5CH_2.CH_2.NH_2$. A mixture of *pure* benzaldehyde and hydrogen cyanide, when treated with zinc and hydrochloric acid in a similar manner, yields a base having the composition and properties of methylamine.

In a similar manner, both chlorine and fuming sulphuric acid act differently on the essences to what they do on a mixture of pure benzaldehyde with hydrogen cyanide. With the crude essence, a solid crystalline substance is formed, which Zinin has shown to be benzylideneformobenzamide, Ph.CH(OH).CO.N : CHPh; whilst the author finds that no solid substance is produced by the action of fuming sulphuric acid on the mixture, and with chlorine it yields ammonium chloride and monochlorobenzoic chloride.

The base above described is obtained in much larger quantity by the action of zinc and hydrochloric acid on amygdalin in aqueous solution. The hydrochloride of the base is more soluble in water than in alcohol, crystallizing from the latter in large plates, melting at 217°, and subliming near its fusing point. It would appear to be identical with that obtained by Colombo and Spica, by the action of nascent hydrogen on the compound of benzyl cyanide with hydrogen sulphide (*Gaz.*, 5, 124). On decomposing the solution of the hydrochloride with potash, agitating with ether, and leaving the ethereal solution to evaporate, the free base is obtained as a syrupy liquid, which after a time crystallizes in large plates (m. p. 101—104°). The author proposes to continue his examination of the more obscure reactions of the essences of bitter almonds and laurocerasus.

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* From the *Gazzetta chimica italiana*, 8, 446—452. Reprinted from the *Journal of the Chemical Society*, September, 1879.

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 27, 1879.

QUESTIONABLE PROSECUTION UNDER THE SALE OF FOOD AND DRUGS ACT.

We have not unfrequently had occasion to comment upon the oppressive and vexatious mode in which the provisions of the Food and Drugs Act are brought to bear upon chemists and druggists without in any way serving the purposes for which that Act was passed, though at the same time tending to inflict serious personal inconvenience and injury. We regret especially that it has been necessary to make this complaint against the application of an Act which in its spirit harmonizes so thoroughly with the endeavours of the Pharmaceutical Society to expose and put a stop to the falsification of drugs.

Without going back to past instances we may refer to the case that has just been decided at the Chertsey Petty Sessions as affording a fair illustration of what is meant. According to the report of this case, which will be found at page 257, it will be seen that Police-constable Waters, acting upon the instructions of his superintendent, went to the shop of Mr. Boyce, an old-established pharmaceutical chemist at Chertsey, and purchased sundry articles, namely, quinine wine, citrate of iron and quinine, citric acid and cream of tartar. After having obtained and paid for these articles, he informed Mr. Boyce's assistant that they would be handed over to the county analyst for examination, and he offered to leave a portion of each article under seal. In due course these articles were passed through the hands of Superintendent Bungard to the county analyst, who examined them and reported the results he had obtained.

So far there is absolutely nothing to complain of in the manner of carrying out the provisions of the Act. The subsequent reports of the county analyst represented three out of the four articles in question to be genuine, as they might reasonably be expected to be when obtained from such a source. As regards the cream of tartar, however, the report of the analyst represented that it contained tartrate of lime to the extent of 11·7 per cent., and sulphate of baryta to the extent of 0·6 per cent. Both of these substances were spoken of in the analyst's report as being "foreign ingredients," and hence, we presume, the local authorities inferred that the analyst's report showed the cream of tartar not to be of the nature, substance and quality of the article demanded by the purchaser. It is true the analyst's report also stated that the "foreign ingredients" were insoluble, and not injurious to health, so that on this score, according to him, there was no ground for concluding that their presence would be to the prejudice of the purchaser, or the consumer, and it might have been expected that the vendor's freedom from liability to penalty under the provisions of the Act would have been apparent. But it cannot be expected that the local authorities of a town like Chertsey are always qualified to judge of such matters and they may well be excused for having, as it seems, put such an interpretation upon the analyst's report as to induce them to institute a prosecution under the sixth section of the Act against Mr. Boyce, for selling cream of tartar that was not of the nature, substance and quality, etc., demanded by the purchaser.

It is in this way that Mr. Boyce has found himself arraigned on a charge of having transgressed the law by selling an adulterated article and called upon to defend himself from the most damaging imputations that could be made against him in his business capacity. And now let us consider what are the data upon which this grave charge has been brought against him. Of the two so-called "foreign ingredients" reported to be present in the cream of tartar, the one that was in the largest proportion, and that, according to the analyst's report, would consequently have been chiefly to the prejudice of the purchaser, is the tartrate of lime, the other foreign ingredient, the sulphate of baryta, is of itself too small in amount to justify the inference that it was added as an adulteration. What then is the origin of the tartrate of lime? Is there any reason to suspect that it was added fraudulently to increase the weight of the cream of tartar, for that is the imputation conveyed by the charge preferred?

Upon referring to the British Pharmacopœia for information on this point, we find under the head of Potassæ tartras acida, a description of the substance commonly known as "cream of tartar." It is there stated to be an acid salt obtained from the crude tartar which is deposited during the fermentation of grape juice. Proceeding on this basis for further information from other sources, we find that crude tartar, the raw material from which the Pharmacopœia article, "cream of tartar," is prepared, generally if not invariably contains tartrate of lime; moreover, that grape juice itself contains tartrate of lime as well as tartrate of potash, and that in consequence of this association of these two tartrates in the primary source of crude tartar as well as of "cream of tartar," they continue to be associated in its products, so that tartrate of lime is not, as the analyst for the county of Surrey represents, "foreign" to cream of tartar, but a natural ingredient of it. And if we return now to the British Pharmacopœia we find this fact recognized by that authority. The solution of the charred substance in hydrochloric acid is described as becoming slightly turbid when neutralized with ammonia and mixed with oxalic acid and the presence of lime is thus indicated.

But this indication that acid tartrate of potash, in the sense referred to in the British Pharmacopœia, contains some proportion of tartrate of lime is totally ignored by the analyst for the county of Surrey. He like the peculiar people is above considerations which regulate the proceedings of more ordinary folk, and acting upon the esoteric conception that the term acid tartrate of potash is to be interpreted from an absolute chemical point of view, expects a policeman's request for "cream of tartar" to be responded to by a provincial druggist by the supply of perfectly pure bitartrate of potash. This and this alone is the basis upon which tartrate of lime has been treated as a "foreign ingredient" of cream of tartar, and it is only by allowing such superfine and unauthorized views to regulate his proceedings that the analyst has brought about the prosecution of Mr. BOYCE.

Nor is this the only point in which exception is to be taken to the report now in question. From an analyst it might be expected that in such a document, fraught with possible prejudice to another man's reputation, care would be taken not to state anything contrary to well-established chemical knowledge. Unless, indeed, it be unreasonable to expect a public analyst to respect chemical fact, we protest against the representation that tartrate of lime, as an ingredient of cream of tartar, is "insoluble." The assumption that it is an insoluble substance may induce the belief that it is also a "foreign ingredient," but certainly this belief has no better foundation.

It is scarcely to be wondered at that a very simple statement of facts relating to the presence of tartrate of lime in cream of tartar should have led the magistrates unanimously to dismiss this case. Provision had been made to support the defence of the case in this particular by reference to authorities, and by direction of the Council of the Pharmaceutical Society, Mr. FLUX attended to watch the case and assist the defence in case of need. At the same time, Mr. W. HODGKINSON, appeared on behalf of the firm from which Mr. BOYCE obtained the cream of tartar to testify that they had always been in the habit of supplying him with the very best drugs. While thus loyally supporting his customer he was also able, with the aid of Mr. ALLEN, to prove that the conditions under which cream of tartar passed into his hands and was supplied to retailers precluded the possibility of its being adulterated or in any way tampered with.

In these results there is a reason for satisfaction, but it certainly seems to be a somewhat superfluous thing that with the object of protecting the public against adulteration individuals should thus be put to the severest social torture that can be devised. The mere fact of having to appear before a bench of magistrates charged with an offence of the kind that Mr. BOYCE has been charged with is sufficient to furnish evil-disposed persons with opportunity for damaging a man in his reputation and in his business. In the present instance it has been satisfactorily proved that the charge was unfounded; it has also we think been made evident that the prosecution should never have been undertaken and Mr. BOYCE should never have been exposed to the possibility of being asked as he was on coming out of court how his "little job" had been settled?

This experience is one that may fall to the lot of any member of the trade who happens to become "*corpore vili*" upon which the public analyst chances to operate. Surely some arrangement could be devised by which this kind of human vivisection might be avoided without counteracting any beneficent influence that the Food and Drugs Act is calculated to exercise. While public analysts produce such certificates as that upon which the case in question was based, would it not be well to submit these documents to some competent central authority for decision whether prosecution is requisite or justifiable? At any rate, such proceedings as that above described are calculated to bring the Act into contempt, and to make the public analyst, for some sections of the community, a public nuisance.

THE NEW SESSION.

Two or three more days will bring the summer vacation of 1879 to an end, and during the coming week the medical and pharmaceutical schools of the metropolis will be alive with audiences who have assembled to hear the Introductories. On Wednesday the new session in Bloomsbury Square will as usual be inaugurated by an Evening Meeting of the Pharmaceutical Society, the special business of which will be the reception of the reports of the Professors of the School of Pharmacy, the Distribution of the Prizes awarded to the successful competitors of last session, and an Introductory Address to the Students of the present. The occasion promises to be of special interest, as the Address is to be delivered by a former Bell Scholar, Prizeman and Teacher in the School, Dr. W. A. TILDEN, of Clifton. It will not be out of place to point out that the invitation given to the Students and Friends extends to the ladies, and we hope that on this, as on former similar occasions, the meeting may be graced by the presence of many of the fair sex.

COUNTER PRACTICE IN NEW SOUTH WALES.

THE counter practice controversy appears to have spread to the antipodes, a Dr. BOWKER having introduced into the New South Wales Legislative Assembly a Medical Bill which the chemists and druggists of the colony condemn as ignoring the rights, customs, immunities and privileges secured to them by the Imperial legislation in the Apothecaries Act of 1815. At a recent Annual Meeting of the New South Wales Pharmaceutical Society, held in Sydney, a petition was adopted asking for the erasure of the obnoxious clause and the insertion of one repeating the saving clause of the Apothecaries Act; the construction of which has furnished so much food for argument in this country. It was also decided at the same meeting to take steps to draft a new Pharmacy Bill to be submitted to the Legislature.

Provincial Transactions.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION OF GREAT BRITAIN.

Meeting of the Law and Parliamentary Committee.

A meeting of the Law and Parliamentary Committee of this Association was held at the office of the Association, 23, Burlington Chambers, New Street, Birmingham, on September 19, 1879, at 1 p.m. Mr. Thomas Barclay, President, in the chair. Present—Messrs. Andrews, Churchill, Holdsworth, Jones, Southall and the Solicitor of the Association.

The President said the first question on the agenda paper related to the patent medicine question. The Executive at its last meeting passed a resolution directing the Law and Parliamentary Committee to take any steps which they may deem desirable to obtain information to enable them to bring about modifications in the Pharmacy Act, 1868, to restrict the sale of scheduled poisons under cover of the patent medicine stamp to registered chemists and druggists, and to report to the next meeting of the Executive. The question they had to consider was what steps they should take to obtain information to bring about modifications in the Act. The necessity of dealing with that question was becoming greater every day, and it appeared to him to be the right thing that the Association should endeavour to procure such information as would enable the Executive to grapple with the subject.

Mr. Holdsworth said there were really two sides to the patent medicine question; one, that of prices at which they were sold, and the other the fact of unregistered men selling patent medicines containing scheduled poisons.

Mr. Jones said it was the law in France that all proprietors of patent medicines should make a declaration as to whether they contained poisonous ingredients.

The President said it would be damaging to the patent medicine trade in this country if it were made compulsory on the proprietors to make a declaration of the composition of their goods. On the other hand the Association would probably have the sympathy of medical men in asking the Legislature to pass an Act of that description.

Mr. Holdsworth said it would be necessary in the first instance to prove to the satisfaction of the Legislature that the present system of unregistered persons vending patent medicines containing scheduled poisons was dangerous.

Mr. Andrews concurred with Mr. Holdsworth's remarks. He said they would get very little sympathy from the Government unless they were in a position to show that an evil to the public existed in dangerous poisons being sold by unqualified persons under cover of the patent medicine stamp.

The President said he thought if that was proved they would have the medical men on their side and that the Legislature would be disposed to so modify the Act as to comply with their request. He added that he thought circulars might be issued from the office to influential members of the trade in various parts of the country inquiring for particulars of any serious accidents that had happened from the sale of patent medicines containing scheduled poisons.

After some further discussion it was moved by Mr. Andrews, seconded by Mr. Jones and unanimously resolved, "That a circular should be sent to members of the General Committee and others asking for well authenticated instances in which fatal results have followed from the sale of scheduled poisons under cover of the patent medicine stamp and for suggestions and information on the sale of patent medicines generally."

The President said the next question for the consideration of the committee had reference to jury service. A resolution was passed by the Executive at its last meeting, "That the Law and Parliamentary Committee be and are hereby empowered to take such steps as they deem advisable to obtain the exemption of all registered chemists and druggists from jury service."

The Solicitor said he feared nothing could be done by the Association in that matter at present.

The President said he knew from personal experience that it was a very sore point with the trade and one which they were very anxious should be taken up.

The Solicitor said no active steps could be taken until an amended Pharmacy Act or Jury Bill was before the House.

Mr. Holdsworth said it would be a mere waste of time and money to move in the matter just then.

Mr. Andrews said he was exceedingly anxious that all chemists and druggists should be exempt from jury service, but he thought they must wait for a favourable opportunity to accomplish their object.

The Secretary stated that in compliance with instructions received from the Executive at its last meeting, he had collected evidence in a number of cases of infringements of the Pharmacy Act, 1868, the particulars of which were laid on the table.

After a careful examination of the evidence collected, it was moved by Mr. Andrews, seconded by Mr. Southall and unanimously resolved, "That the Solicitor be instructed to take proceedings under the 17th section of the Pharmacy Act, 1868, against three illegal traders, and that particulars of these cases with the remaining cases of infringements of the Act, collected by the Secretary, be forwarded to the Secretary and Registrar of the Pharmaceutical Society."

The Secretary reported that, in accordance with a resolution passed by the Executive at its last meeting, he proceeded to Sunderland and investigated the case of a member of the Association, against whom proceedings had been taken by the Excise authorities for the sale of methylated spirit without a licence, and that the case was heard by the Sunderland borough magistrates on July 23rd, 1879, when the Solicitor of the Association defended. The defendant was fined a mitigated penalty of £12 10*s.*, with a recommendation from the bench to the Excise authorities to still further reduce the penalty to £5. A letter from the defendant was read, stating that he had received a notice from the Inland Revenue authorities, to pay the reduced penalty of £5, as recommended by the borough bench, and thanking the Executive for the way in which his case had been supported by the Association.

A number of letters were read from members of the Association, and instructions given to the Secretary as to the manner in which he should deal with the same.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Concluded from page 237.*)

The next paper read was—

Note on Aricine.

BY JOHN ELIOT HOWARD, F.R.S.

Aricine was discovered by Pelletier and Corriol* in a cinchona bark coming from Arica to Bordeaux. M. Pelletier thought that he had obtained a characteristic green colour by nitric acid, but as no one has been able (as I think) to verify this observation, it is probable that the colour, which he detected, was owing to the presence of some impurity in the nitric acid which he employed.†

* Pelletier et Corriol, 1829, *Journ. de Pharmacie*, xv., 595.

† Pelletier, *Ann. de Chimie et de Phys.*, li., 185.

Subsequent researches were less successful, and much obscurity was permitted to involve the question, increased by the supposed identification of *cinchovatine*, discovered by M. Manzini, with this alkaloid.

Recently the whole subject has been elucidated by the researches of Dr. Hesse, who has sent over specimens of various alkaloids to the Museum of the Pharmaceutical Society, together with the barks from which they were derived.

My attention has been directed by one of the officials of the Society to the apparent perfect identity of the *aricine* of Dr. Hesse, with a specimen of the same alkaloid which I deposited in the Museum of the Pharmaceutical Society, in December, 1852, attached to a portion of the bark from which it was obtained. In company with some of the authorities of the Society, I have compared the two specimens, and am satisfied they are the same substance.*

The bark of Dr. Hesse and mine are exactly alike. It is the *jaune de Cuzco* of Delondre and Bouchardat (of which I have an example from the collection of these gentlemen), figured in plate xix., and described in pages 38 and 39 of their 'Quinologie.' M. Delondre† met with it in the forests of Sta Ana, in his excursions in 1847 with Dr. Weddell; and I have a botanical specimen gathered in the same year by the latter, which he calls "*Cinchona Pubescens*, Vahl., var. *Pelletierana*, Peru, Province de Carabaya, June 18, 1847." The bark was imported and sought to be introduced as calisaya, with which it was mixed in 1829. This gave rise to the researches of M. Pelletier. The *jaune de Cuzco* I have referred to is perfectly identical with the bark from which both Dr. Hesse and I have obtained aricine; and I doubt much its having been obtained in a crystallized form from any other. I have never said that I had extracted it from the bark of *C. succirubra;* though in the strange medley of substances which the old red bark contains I indicated *aricine* (?) as possibly one of its contents. Probably this material was *paricine*, but it baffled my investigations.

M. A. C. Oudemans, junior, has been good enough to send me his 'Recherches sur la Quinamine,' which contains the analysis of 600 grams of the "mixed alkaloids" or quinetum from the bark of *C. succirubra* grown at Darjeeling.

It is as follows:—

Cinchonine	37·0	per cent.
Quinine	6·1	,,
Cinchonidine	22·9	,,
Quinamine	4·5	,,
Alcaloides amorphes	21·1	,,
Carbonate de sodium	2·9	,,
Eau	2·7	,,
Also in another experiment:—		
Quinidine	0·5	,,
Conquinamine	0·3	,,

I have been asked by the East Indian Government to give my opinion of the above as a medicament; and have objected to this mixture as containing so large a portion of alkaloid of uncertain description and of possibly injurious operation. Dr. Hesse‡ has found in the same compound "*Paricine* and two or three other amorphous basic substances." I myself found (in the product *first sent*) *copper* in so large a proportion as to coat the blade of a knife when introduced into a solution of the greenish powder. I have no doubt that the whole taken together would cure Indian fever, but should not like to subject myself to the treatment.

I have never put forward any claim to original discoveries as to *Aricine*; but having pretty frequently met with the bark in past years, I satisfied myself by many experiments of the substantial accuracy of the first published researches of Pelletier; and consequently have asserted the same at the time that the existence of *Aricine* was generally denied.

The first specimen of crystallized *Aricine* in my museum is dated October, 1849, and I have specimens of compounds of this alkaloid in 1853–'54 and '57. I have also some results from researches on the very peculiar colouring matter.

I am pleased that this subject is now again occupying the attention of chemists, and hope that the physiological effects of this singular substance, as well as those of *Paricine* will be investigated by some competent member of the medical profession.

This research possesses an interest beyond that which would at first appear, because it has relation to the classification of the different species of the genus *Cinchona*. It is obvious that the large production of quinine by the *C. Calisaya*; of cinchonine by the *C. Peruviana* and its congeners; of quinidine by the *C. Pitayensis*; of cinchonidine by varieties of *C. officinalis* and *C. lancifolia*; and of aricine by *C. Pelletierana*, point to real specific differences; and there is more even than this fact to be learned in the above connection.

In "Observations on the Present State of our Knowledge of the Genus Cinchona,"* published in the Report of the Botanical Congress of 1866, under the head "Jaen and Cusco barks," I have noticed that the *C. Pelletierana* is the true *Quina amarilla* or *yellow bark*, and that "around this are gathered other species of cinchona, which, viewed in this light, constitute a very exceptional and anomalous group of plants;† which most certainly belong to the genus cinchona, but in which the typical cinchonaceous elements are superseded by those corresponding to, and perhaps identical with, the products of other families of plants. I have shown under the heads *C. lutea* (*quod vide*) and *C. decurrentifolia*, in my illustrations of the 'Nueva Quinologia,' how botanical and microscopical researches illustrate and confirm each other; and how microscopical examination comes in to aid the diagnosis of the barks; all tending to show the *Ladenbergia-like* character which pervades them; and under the *C. lutea* it appears that Pavon's careful observation of the living plant brings out indirectly the same fact. He says that "a *milky juice* flows out when the tree is cut down or amputated;" that is to say, the milk cells are abundant and full of their peculiar product, in which respect the tree symbolizes specially with the kindred genus.

I refer to the "Report" itself for further observations on these yellow barks, and to my remarks‡ under *C. lutea* for the *yellow colour*. In conclusion I would briefly add that, the *red barks* are equally a *group of plants* of which the *C. succiruba* may be looked upon as the centre. (See my account of specimens of *C. succirubra* in my 'Nueva Quinologia, pp. 4, 5.) The *red bark* is only beginning to be fully investigated as to its alkaloids, and *even less so as to its other constituents*, as I have partly remarked in the work alluded to; but this much may be said with certainty, that the physiological effects must be considerably different from those of other barks. The Spanish physicians had an opinion about it, to which I cannot at the moment refer. I understand that a fluid extract of *C. succirubra* has recently obtained some celebrity, but have not yet had an opportunity of examining it. It is probable that its medicinal effects may vary from those of a tincture of *pale* bark, and still more widely from a tincture of *yellow* (cordifolia) or of *Calisaya* bark.

A vote of thanks to Mr. Howard was passed.

* The only perceptible difference is in the *colour*. Mine having been purposely crystallized in the first place from pure ether to distinguish it from cinchonine, retains some of the peculiar yellow colouring matter.

† Delondre, 'Quinologie,' p. 39, p. 21.

‡ *Pharm. Journ.*, April, 1879, p. 839.

* Report, p. 208.

† The group comprehends *C. Pelletierana*, *C. cordifolia*, *C. lutea*, *C. decurrentifolia*, *C. villosa*, *C. ovata*, *C. obovata*, *C. microphylla*.

‡ *Vide* 'Nueva Quin.,' *sub C. lutea*.

The author of the next paper not being present, an abstract of it was given by Mr. W. H. Naylor. The full text is as follows:—

The Chemistry of Chaulmoogra Oil.

BY JOHN MOSS, F.I.C., F.C.S. LOND. ET BER.

A body possessing well marked physical characters, and capable of producing effects interesting alike to the physiologist and the therapeutist is sure to excite that spirit of inquisitiveness which is the moving force in all scientific inquiry. The physiologist and the therapeutist both want to know what is the proximate cause of the phenomena noted by them, and the chemist busies himself to find it out; separating by his art the inert and diluting material. The members of this Conference sympathize most with the latter, and if each could be persuaded to tell the conclusion to which a scientific use of the imagination has led him in speculating as to the nature of the said proximate cause, nine times out of ten he would suggest an alkaloid. There is about an alkaloid something so definite, so tangible and real; it is so compact an expression of ideas and properties, is so representative and genuine, that to discover it is a desirable thing, and its presence is easily assumed where strongly marked properties exist. The thought is begot by a powerful desire, and is itself strong—so strong that all others relating to the same body are for the time subservient to it. That Chaulmoogra is a most powerful drug need not be insisted on here, seeing that the widely known favourable testimony of highly qualified observers in Europe and Hindoostan is concurrent with the position it occupies in the 'Pharmacopœia of India,' and the almost veneration with which it is regarded by the native Hindoos. That an alkaloid should be the first thing looked for when an examination of the oil was resolved upon, was a matter of course; had one been discovered further investigation had probably been stayed. As a guide and a warning to others who may be encouraged by this failure, the method adopted in searching for the possible alkaloid is here given.

§ 1. *Examination for Alkaloid.*

a. Volatile.—One pound of chaulmoogra was placed in a retort with twice its weight of water and boiled. The collected distillate, (4 ozs.), was perfectly clear, possessed the odour of the oil in a marked degree, and was neutral to test paper. With acetate of lead a precipitate was thrown down, as also with chloride of barium when made perfectly neutral with potash. With the usual alkaloidal reagents no change was produced in the liquid, which was accordingly precipitated with lead acetate, the precipitate collected, decomposed with hydrochloric acid and agitated with ether. Evaporation of the ethereal solution gave a fatty body, which was not further examined. The contents of the retort were now made alkaline with solution of soda and the distillation was continued; this time the distillate gave no indication with any of the reagents used in the first instance and was returned to the retort along with sufficient sulphuric acid to be in excess. Twelve ounces of distillate were collected and on the surface of it were floating aggregations of white, silky needles. The liquid was negative to reagents. The white needles were collected and found to weigh 2 grains. They possessed all the characters of cocinic acid, treated of afterwards.

b. Non-Volatile.—A pound of the oil was agitated with successive portions of warm water, acidulated with hydrochloric acid in a Winchester quart bottle. After each agitation the bottle was inverted and allowed to stand till cool, when the oil formed a solid cake, from which the liquid could be easily run away below. The united liquids were reduced in bulk over a water-bath and tested with the usual alkaloidal reagents, namely, phosphomolybdic acid, iodo-hydrargyrate of potassium, iodine in iodide of potassium, iodide of bismuth and potassium, and iodide of cadmium, each one of which produced a precipitate. The whole was now rendered alkaline by soda, filtered, and half the filtrate agitated with chloroform. The chloroform on evaporation to dryness gave a residue which was treated with very dilute sulphuric acid, and the acid solution was shaken with chloroform after addition of sufficient ammonia to make it alkaline. The chloroform solution was separated and divided, one portion being shaken with water containing sulphuric acid, and the other with hydrochloric acid. Very slightly coloured residues were obtained on allowing each of these solutions to evaporate spontaneously. The residues when microscopically examined exhibited after a time well defined isolated needles and prisms, few in number and widely scattered; the quantity of these crystals was so very minute that any attempt at a chemical examination was entirely precluded, even if its minuteness as compared with the original bulk of oil had not robbed them of all significance. The residues when dissolved in weak acid—they would not dissolve in water—gave a precipitate with ammonia which was found to agree in character with the ammonia salt of a fatty acid.

A like result attended the treatment of the second half of the filtrate with ether in place of chloroform. A further search for an alkaloid was made on the liquor produced when one pound of oil was saponified. The treatment was precisely as the foregoing after addition of soda. The precipitate formed by soda in the first instance, and already existing in the second, and which consisted of the hydrate and phosphate of calcium, vegetable tissue, etc., was digested in chloroform and further examined for alkaloid. Each attempt was rewarded with non-success.

Satisfied either that chaulmoogra contained no alkaloid at all, or that if it did the quantity was so very small that no share in the properties of the drug could be reasonably claimed for it, a fuller and more systematic examination than was at first contemplated seemed to be desirable. Such examination was accordingly instituted, and it grew in interest as fact after fact was slowly and laboriously laid bare. And here I would say that I know of no research drawing more frequently and more largely upon the patience and the resources both of mind and fingers of the chemist than the unravelling of the constitution of a complex fatty body, and my thanks are due and are cheerfully given to my friend and assistant, Mr. W. A. H. Naylor, for his unwearied and painstaking attention to my wishes and for his suggestive interest in the work, which was rendered more difficult by the exigencies of a busy laboratory where numerous and varied operations were proceeding at the same time.

§ 2. *General Examination.*

To make this account more complete it is necessary that I should refer to a previous paper published in the *Chemist and Druggist* for December, 1878.

To a general description there given of chaulmoogra were joined certain remarks having industrial and pharmaceutical interest; and besides these, the paper furnished results obtained in a preliminary examination undertaken as stated "with a view to obtain indications of the direction in which more particular investigation would lead to the most interesting and valuable results." A summary of these results will not be out of place here, inasmuch as it will assist in avoiding subsequent explanations.

a. Summary of results previously obtained.—Chaulmoogra oil has a decided acid reaction. The melting point is 42° C. and at that temperature the specific gravity is ·930. It froths freely when agitated with warm water and after standing separates over the surface of a milky emulsion. At the ordinary temperature alcohol (·807) dissolves a considerable proportion, including those constituents of higher melting point and acid reaction possessing the characteristic odour and acrid taste of the oil and giving Dymock's reaction (a rich olive-green colour with oil of vitriol) very readily. The portion not dissolved by cold alcohol exhibits a pale green colour with oil of vitriol and is completely dissolved by repeated treatment with warm alcohol of the same strength. Ether (·720), chloroform, carbon disulphide and benzine (·872) completely dissolve the oil, except (and the exception equally applies to alcohol) a minute proportion of flocculent dust consisting of oxalate and phosphate of calcium, sodium and potassium salts, vegetable tissue and albumenoid bodies. The albumenoid bodies are present in sufficient quantity to form a milky emulsion with a small proportion of whatever quantity of oil is agitated with water.

By saponification with potash and decomposition of the resulting soap by hydrochloric acid 81·11 per cent. of fatty acids are obtained, which after exposure assume a white bloom similiar to that observed on the surface of Japan wax. The fatty acids give a fine green colour on the application of Dymock's test.

b. The results which follow have been obtained since the publication of the paper above referred to, and though they still leave the chemical history of chaulmoogra oil in a somewhat incomplete state they form an interesting addition to our knowledge of this important drug.

The melting point of the fatty acids just as obtained from the oil in a mixed condition is 44°C. Numerous preliminary trials were made of processes for separating and identifying them which promised well on paper and were serviceable as illustrating the behaviour of the acids and their compounds under certain treatment, and which in addition to this, did indeed suggest the probable presence of acids afterwards found, but however interesting and instructive to the experimenter, the details would prove but tedious to others, and accordingly I shall confine myself to describing the processes finally adopted, by which the proximate principles to be described were actually separated.

c. Free fatty acids in the oil.—The strong acidity of the oil and its solutions indicates the presence of one or more free acids; to separate and identify these was the first part of the problem to be attacked. Half a fluid ounce of the oil was shaken with three fluid ounces of a saturated aqueous solution of hydrate of barium at 100° F. The watery liquid was removed and the oil washed with successive quantities of water at the same temperature as the solution originally used, until the washings came away neutral.

The united liquids were filtered, acidified with hydrochloric acid, and boiled. There was no separation. The oil therefore does not contain any compound of a fatty acid, and does not form with hydrate of barium any such compound, which is soluble in water or baryta water.

d. Oil treated as above will contain the fatty bodies originally present in it, and barium compounds of the free acids originally present. From this oil cold alcohol (·807) and ether (·735), used successively, dissolve away the former, leaving all the barium compounds; boiling alcohol dissolves a very few grains of the residue. The residue consisting of barium compounds was then fused by admixture with boiling water, hydrochloric acid added, and the fatty acids collected on a filter and washed with hot water till the washings were neutral and free from barium chloride. After this the fatty acids were kept melted on a water bath till dry, when they were treated with alcohol and the solution set aside. In a little while crystals appeared which when first tried melted at 55° C. By repeated crystallization from warm alcohol these were finally obtained of a pure white colour and having a constant melting point of 62° C. With the aid of a microscope and selenite plate this crystalline body was recognized as palmitic acid. The crystalline form and the arrangement of the crystals corresponded exactly with a beautifully executed photograph of palmitic acid forming one of a number in a pamphlet* published by Price's Patent Candle Company, and besides it corresponded in all characters to a specimen of chemically pure palmitic acid, for which as well as the pamphlet I am indebted to the kindness of the company.

On the first treatment with alcohol of the fatty acids separated as above a portion remained undissolved, which was subsequently found to go into solution when more alcohol was used, especially when warmed. This portion consisted of palmitic acid solely.

e. The alcoholic solution first obtained, from which crystals of impure palmitic acid separated as the alcohol slowly passed away into the air, yielded on evaporation to dryness a fatty acid, which when purified by repeated treatment with small quantities of cold alcohol had a fixed melting point of 29° C. This body is more fully described later on (*h*).

f. Turning now to the fatty acids obtained by decomposing the soap of chaulmoogra, 31·7 grams of the mixed acids were dissolved in just sufficient alcohol for the purpose and the solution was saturated by adding solution of ammonia (·959). This converted all the acids present into ammonia salts. Acid palmitate of ammonia is not freely soluble in spirit and separated out at once; the acid from this precipitate was prepared in the free state and identified. It was not pure but contained another acid not recognized at the time, which will be found freely described in *h*; this acid is also mentioned in *e*. The spirituous solution of the ammonium salts was now treated with chloride of ammonium and acetate of magnesium. These failed to produce any visible change in the solution, thus indicating the absence of more than traces of palmitic acid. On the further addition of an aqueous solution of chloride of barium a precipitate fell of a viscous character. This was collected and digested with cold alcohol, which dissolved a small portion, leaving a precipitate which was decomposed, washed, dried, dissolved in alcohol, and exposed to cold. The solution separated from the crystalline deposit of palmitic acid was now treated with lead acetate in presence of ammonia and warmed, and the precipitate resulting from this treatment was likewise set aside. The filtrate was kept warm until all the alcohol was expelled, and the liquid containing the lead salt thrown out of solution by the expulsion of the alcohol was treated with ether, by which it was completely cleared. Hydrochloric acid was now added, the chloride of lead produced removed by a filter, and the ethereal solution of fatty acid allowed to evaporate spontaneously. A crystalline substance separated in rosettes, which when subsequently crystallized from alcohol was quite colourless, but turned yellow in a few hours. It melted at 33° C. This is the melting point of hypogæic acid, which moreover possesses the characteristic of turning yellow a few hours after it is prepared. Hypogæate of lead is readily dissolved by ether; it also dissolves in warm alcohol, but the greater proportion separates out upon cooling. It is not precipitated by magnesium acetate in presence of alcohol. The barium compound also dissolves in hot alcohol but falls out of solution on cooling. The compounds of the acid under consideration possessed all these characters, and its identity with hypogæic acid was established by a combustion. 0·181 gramme was burned with chromate of lead and yielded ·1369 gramme of carbon and ·0217 gramme of hydrogen; side by side I give the numbers obtained, calculated into percentages, with those required by the formula for hypogæic acid, $C_{16}H_{30}O_2$.

	Numbers Obtained.	Theoretical Numbers.
Carbon . .	75·63.	75·59.
Hydrogen .	11·99.	11·81.

g. The precipitate produced by acetate of lead and not dissolved by warm alcohol was freed from adhering liquor by pressure between folds of bibulous paper and then digested in ether; hypogæate of lead was dissolved away. The insoluble portion was decomposed by hydrochloric acid and the free fatty acid crystallized from ether. It melted at 38·5° C. and crystallized in a form very closely resembling that assumed by palmitic acid, but when crystallized under the same conditions it is not so delicate as the latter. A further small quantity of this acid, as also of hypogæic acid, was obtained from the

* 'Examen der Acides Gras par la lumière olarisée.'

cold alcohol washings of the viscous barium precipitate. To examine it more particularly 660 grains of the mixed fatty acids were used for preparing some by a method slightly modified from the above. The acids were dissolved in alcohol and the solution was treated with ammonia and magnesium acetate. The precipitate, which will be considered later, was collected on a filter. Lead acetate was added to the filtrate and after two days standing the mixture was filtered. The precipitated lead salt was washed with cold alcohol, dried and digested in ether. The insoluble portion was again dried, fused on the surface of warm water, and decomposed by hydrochloric acid. The liberated fatty acid being removed by agitation with ether, was freed from the solvent and then dried over oil of vitriol. It weighed 18 grains, and by observation of the melting point was found to be still impure owing to the presence of palmitic acid. This was removed by fractionation from alcohol and th finael pure product, a white crystalline mass, weighed when perfectly dry 10 grains. The melting point was constant at 385° C.

0·171 gramme burned with chromate of lead gave ·184 gramme of water and ·446 gramme of carbonic acid, corresponding to ·0204 gramme of hydrogen and ·1216 gramme of carbon, or in 100 parts.

	Numbers Obtained.	Calculated from $C_{11}H_{22}O_2$.
Carbon . .	71·11.	70·97.
Hydrogen .	11·92.	11·82.

By the side of these numbers I have placed others with which they closely agree, calculated from the formula $C_{11}H_{22}O_2$, an acid not usually mentioned in the text-books, but which I find very fully described under the name of cocinic acid in a paper by M. Saint Evre—"Recherches sur les Acides Gras du Beurre de Coco."* He says "Il cristallise par le refroidissement de sa dissolution alcoolique en aiguilles incolores groupées en étoiles autour d'un centre commun. Il fond à la température de 34·70 et se dissout aisément dans l'éther et l'alcool à 36 degrés. Il est depourvu de toute espèce d'odeur, et lors qu'il a été maintenu en fusion pendant longtemps, puis soumis à l'action du vide, il se présente sous la forme d'un masse incolore, dure et cassante. Il se volatilise, mais seulement dans un courant de gaz." This desciiption applies perfectly to the acid separated from chaulmoogra with the single exception of the melting point. According to Dumas' theory a body having carbon atoms in the series $C_nH_{2n}O_2$ should melt at 36·5° C. Saint Evre's observation was as much below this point as that here recorded is above, and looking to the source whence his acid was obtained it was quite as likely to contain a minute trace of oleic acid as the cocinic acid from chaulmoogra is likely to have still held a trace of palmitic. Referring more particularly to the volatility of cocinic acid in a current of gas it will be seen in the section which describes the examination for alkaloid, that silky needles possessing all the properties of this acid were found in the distillate from chaulmoogra and water with sulphuric acid.

The position of cocinic acid is between rutic or capric acid and lauric acid in the series $C_nH_{2n}O_2$.

h. The magnesium acetate precipitate obtained in the last process was decomposed by hot dilute hydrochloric acid and the liberated fatty acids were washed till free from chlorides. Palmitic acid was separated from the mixture at first by dissolving in warm alcohol and cooling, but this method was altogether inadequate to its complete removal and a method of fractional precipitation was adopted; first, by the cautious addition of a concentrated aqueous solution of magnesium acetate to the simple alcoholic solution of the acid, and afterwards by similarly treating the solution when it had been made neutral by ammonia.

After the separation of the fractions the alcoholic strength and solvent power of the solution was reduced by the addition of water, and on standing a small quantity of magnesium salt separated out. That the last traces of palmitic acid were thus removed was shown by the following treatment of the filtrate. This was decomposed by hydrochloric acid, the fatty acid removed, washed and dissolved in alcohol. To the solution water was added till feebly opalescent and then the mixture was exposed to a temperature of 6° C. for some time without any further separation. The weak alcoholic solution was gently evaporated and allowed to crystallize. After repeated crystallizations a body was obtained of a feeble yellow tinge, which under the microscope shot out as it cooled into crystalline plates with a more or less deep thalloid fringe, polarizing at the margins only. The melting point was 29·5° C. Fractionated from alcohol the fractions were homogeneous, exhibiting precisely the same crystalline form and melting at exactly the same point.

0·348 of the acid burned with chromate of lead gave 0·3465 gramme of water, and 0·955 gramme of carbonic acid gas equivalent to 0·0385 gramme of hydrogen, and 0·2604 of carbon; or 11·06 per cent. of the former and 74·84 of the latter element.

In a second combustion 0·381 gramme gave 0·382 gramme of water and 1·048 of carbonic acid gas; equivalent to 11·13 per cent. of hydrogen and 75·01 of carbon.

In a third combustion 11·2 per cent. of hydrogen was obtained. The results placed side by side show as follows:—

	No. 1.	No. 2.	No. 3.
Carbon . . .	74·84	75·01	
Hydrogen . .	11·06	11·13	11·2

The numbers correspond to a member of the little known series $C_nH_{2n-4}O_2$, and the probable formula is $C_{14}H_{24}O_2$, which by calculation gives—

Carbon, 75; Hydrogen, 10·7.

Though additional data will be required to determine the formula I think it is certain that this body has not been previously examined and described, and accordingly, having reference to its source, I propose to name it *Gynocardic acid*, and trust shortly to be able to announce the correct formula.

This is the acid referred to in *e* and *f*, and as already stated has a pale yellow colour and a well marked crystalline form. Gynocardate of ammonium is soluble in water. The magnesium salt is insoluble in water, but dissolves in alcohol (·807) and falls out of solution on diluting. The lead and barium salts are insoluble in water, ether and cold alcohol.

§ 3. *Dymock's Test.*

Reference has been made in this paper to Dymock's test for chaulmoogra oil. Fuller reference will be found in the paper from which I have already quoted (*vide* p. 251), where the opinion was expressed that the reaction on which it is based was characteristic of the oil, and taken in connection with physical characters might be used as an indicator of genuineness. In the course of investigation I have been compelled to modify this opinion, and take the present opportunity of qualifying it. As progress was made in the work of separating the proximate parts of chaulmoogra, each was subjected to the test, with the result, at first, that the colour was invariably obtained. One of the first separated quantities of palmitic acid, gave the colour in so marked a degree that certain natural substances known to contain palmitic acid as well as the pure acid itself were submitted to the test. It was thus ascertained that pure palmitic acid does not present the reaction, nor do any of the bodies experimented with, including Japan wax and butter, except palm oil. This gives a splendid green colour with sulphuric acid when applied as Dymock directs, a colour of the same character as that afforded by chaulmoogra. The green coloration is therefore not peculiar to the oil, as was supposed by Dymock, but is a property which equally belongs to palm oil. As the working processes

* *Annales de Chimie et de Physique*, troisième série, 1847, xx., 91.

improved with additional knowledge of the material, the constituents of chaulmoogra which gave the green colour, were reduced and narrowed by purification till only the last, *gynocardic acid*, remained. It still remains. It has not been found possible by any means to deprive *gynocardic acid* of this colour-giving power. A quantity of it has been dissolved in alcohol and crystallized from it in successive small portions—each fraction has given the colour with equal intensity. It has been digested with animal charcoal, and after such treatment the colour has been verdant as before; it is inherent and a characteristic. *Gynocardic acid* also produces the acrid burning taste which is noticed when chaulmoogra is swallowed, and altogether appears to be a constituent of such importance as to deserve further attention, not only from a chemical point of view, but also in regard to its medicinal activity.

§ 4. *Constituents Separated and Recognized.*

Chaulmoogra oil then, so far as it is at present known, contains:—

Gynocardic Acid	11·7
Palmitic Acid	63·0
Hypogæic Acid	4·
Cocinic Acid	2·3

in combination with glyceryl as fats, and the two former in the free state as well. No attempt was made to determine accurately the proportion of each acid present, as the loss in purifying was necessarily considerable, but the figures against each represent fairly well the quantity of acid in 100 parts of oil.

The PRESIDENT said this paper was a very exhaustive and admirable one, and the members of the Conference owed their thanks not only to the writer, but to Mr. Naylor, whose clear and comprehensive condensation of its contents had placed the subject so lucidly before the Conference.

Mr. A. H. MASON said as some of the members present might be unacquainted with this oil, it would be well if information were given as to its origin and supposed properties.

Mr. NAYLOR said the oil was obtained from a plant known as the *Gynocardia odorata*, and had been used very successfully in cutaneous diseases. It was an oil much used in India, and had been sold in the bazaars there for a great number of years. It had also been used with considerable success in this country in cases of phthisis, but had not been previously studied chemically, except by Dr. Dymock.

Mr. WILLMOTT quoted a case in which it was found that the medical properties of chaulmoogra oil were not so great as those of gurjun oil.

Mr. BAXTER spoke of chaulmoogra oil as a cure for itch and mange in dogs.

Mr. GREENISH said that the green coloration produced by a drop of sulphuric acid brought into contact with the chaulmoogra oil, being considered by Dymock a test of the genuine oil, he would like to know from Mr. Naylor if he had tried it on oil extracted, for instance, by benzine, to ascertain if the coloration proceeded from the oil or from some organic matter which may have been pressed out into the oil.

Mr. NAYLOR, in reply, said chaulmoogra oil had been used for a variety of purposes, but it was never intended to be a panacea, and in some cases it had not been so successful as others. He had known it to be largely used in mange in dogs, and he had not heard of a case in which it had failed. With reference to the green colour produced with sulphuric acid, whatever solvent might be used, providing gynocardic acid was present, the fat from the solution would give a green colour. That test had been applied to the oil which had been extracted with benzol and oil obtained by pressure.

The next paper, which was read by Professor Attfield, the author not being present, was entitled—

THE CAPACITY OF DIFFERENT ORGANS TO ABSORB AND RETAIN ARSENIC IN CASES OF CHRONIC POISONING.

BY N. P. HAMBERG, M.D., H.M.P.S.

This paper called forth some adverse criticism, on the ground that the subject was foreign to pharmacy; and, as it did not contain anything which had not previously been established, its publication does not appear desirable.

The last paper read was—

NOTE ON THE ESTIMATION OF MORPHINE IN TURKEY OPIUM.

BY PROFESSOR FLÜCKIGER.

The estimation of morphine is the subject of many valuable papers which have been published in the various pharmaceutical periodicals. Numerous and elaborate as they are, these investigations have not, as far as I can see, arrived at a thoroughly satisfactory result. Without further discussing in this place the merits of these methods, I beg to submit to the Conference another process, of the utmost simplicity, yet of sufficient accuracy. How far this accuracy is attained by the method I now recommend remains for the profession at large to decide. It must be remembered that it is exclusively intended for the assay of official, *i.e.*, Turkey, opium. Valuable as may be the drug produced in other countries with regard to the industrial extraction of alkaloids, no modern pharmacopœia has ever admitted any other kind of opium than that of Asia Minor. My method will possibly prove less satisfactory if applied to Indian or Persian opium, although in my opinion, for a fair standard opium, it is a good and elegant process. It is as follows:—

Take of powdered opium 8 grammes (=123·5 grains), cold water 80 grammes; shake the mixture frequently; filter after twelve hours. The filter should have a diameter of five inches. The operation will afford on an average 65 to 70 grammes of clear liquid. No washing is to take place. 42·5 grammes of the liquid are collected in a little phial, the weight of which should have been marked on it. Then add to the solution 12 grammes of alcohol (sp. gr. 0·812 – 0·815), 10 grammes of ether and 1·5 gramme ammonia water of 0·960 sp. gr. The mixture after shaking will remain clear and allow a colourless layer of ether to make its appearance. The phial is corked and allowed to stay without further shaking it. After an hour or two, crystals of morphine begin to be formed, mostly at the border of the two layers. By and by they sink down to the bottom, and after a day or two the whole amount of whitish or white crystals of the alkaloid will be deposited. They are then to be collected by using two folded filters having a diameter of four inches. The phial is rinsed out with a mixture of 6 grammes of alcohol and 5 grammes of ether, and lastly with 10 grammes of ether, these liquids being gradually poured on to the crystals in order to wash them. The funnel in the meantime is carefully covered. The crystals are subsequently cautiously pressed between the folds of the two filters, which will almost completely absorb the mother liquor which the crystals of morphine may still retain. It will now be easy to remove the alkaloid very neatly from the filter; it must be weighed in the very phial in which some crystals may have remained obstinately attached to the walls. The phial lastly dried at 100° C. then contains the whole amount of morphine precipitated, that is to say its hydrate, viz., $C_{17}H_{19}NO_3 + OH_2$.

As to the mother liquor, it is to be observed for a day more in another corked phial; it does not usually afford a further crop of crystals. Yet in an open vessel amorphous matters are soon deposited.

A good Turkey opium being under examination will thus afford about 0·40 to 0·48 gramme of morphine, which are to be considered as deriving from half the weight of the sample, *i.e.*, from 4 grammes opium ; the percentage would then be 10 to 12.

The alkaloid must next be identified by resorting to the usual tests for morphine. Among them there is the official nitrate of bismuth, which I have pointed out some time ago* as one of the most characteristic tests for that alkaloid. If morphine is rubbed with concentrated sulphuric acid the liquid turns dark brown or black as soon as a little nitrate of bismuth is strewn on it. An excess of nitric acid present in the official nitrate of bismuth would at first produce rather a red hue. Lastly, there is also to be ascertained the purity of the crystals. To this effect take 1 decigramme of the morphine and dissolve it in 10 grammes of lime-water. If the lime-water is duly saturated, in the cold, the quantity mentioned will be a little more than sufficient. The morphine will then prove to leave a very trifling amount of colouring matter, quite insufficient to influence appreciably the percentage of the alkaloid. Should narcotine be present it would remain undissolved, and might be weighed if the whole quantity of morphine be treated with lime-water. But it would, in such a case, be much more advisable to get rid of the narcotine by repeating the experiment with another sample of opium. I would recommend then, as I have already urged in the 'Pharmacographia,' page 59, to dry the opium previously and to deprive it of narcotine by exhausting it with boiling ether. It must be borne in mind that we have to do now with perfectly dry opium, whereas in the beginning we started with air dry opium, the latter containing, possibly, as much as 7 or 8 per cent. of water.

If to the solution of morphine in lime-water a little chlorine water is added, a remarkable reaction is displayed: the mixture assumes a permanent bright red hue, which is highly characteristic ; this is, in fact, an excellent new test for morphine.

The assay as just described somewhat minutely is of the utmost practical simplicity; it must be granted that it claims no special rapidity, but it is by no means longer than any other process hitherto devised for the same purpose.

A few explanatory remarks must be still added. As a solvent for opium, cold water is by far the best, for the simple reason that it affords immediately a liquid ready for the precipitation of the alkaloid. It is true that the drug yields a less coloured solution by using alcohol, but this would require a distillation.

If opium is to be exhausted by means of water it is extremely difficult to point out how far the extraction must be carried on. Cold water on an average dissolves about 60 per cent. of standard Turkey opium if it is absolutely exhausted. By treating 8 grammes of opium with 80 grammes of water we should consequently obtain very nearly 85 grammes of solution. As it is practically almost impossible to get really as much as this, it will be safer to use just half the amount of the calculated liquid, namely, 42·5 grammes. The analyst who does not feel satisfied with this average number may ascertain exactly the amount of soluble constituents which his sample of the drug is able to yield ; he may then act accordingly.

I believe the morphine to be present in the opium as a sulphate, at least for the most part. This is evidenced by the fact that the alcoholic solution of opium is found to contain both the alkaloid and sulphuric acid. In the aqueous solution inorganic sulphates are also present chiefly sulphate of calcium, but in alcohol of all the sulphates only that of morphine (or other alkaloids) can be in solution. The sulphuric acid met with in the alcoholic solution of opium must therefore be due to sulphates of alkaloids. The solutions of opium display a slightly, yet undoubtedly acid reaction as the vegetable juices generally do. The acidity of opium becomes more distinctly manifest if its solutions are cautiously concentrated ; it is no doubt due to meconic acid.

It is important to precipitate the morphine from a solution containing alcohol and ether. By adding ammonia to an aqueous solution, a flocculent matter is precipitated. This abundant amorphous mass, either an alkaloid or not,—it is certainly far from being simply morphine,—remains in solution if the liquid contains a little alcohol ; one-third alcohol of the volume of the aqueous filtrate is quite sufficient for the purpose. Yet of no less importance is the action of the ether. It not only prevents the narcotine from being thrown down together with the morphine, but ether greatly promotes the formation of distinct and pure crystals of morphine. This alkaloid evidently separates very readily from a liquid saturated with ether.

No further mention is made in the above considerations of narcotine. Should its amount also be estimated in the official drug? I think not. The action assigned to narcotine by the physiological experiments appears to be not considerable at all. Should it, however, become desirable to estimate it, it would probably be a good plan to extract the opium first by water and then by acetic acid. The narcotine is present chiefly in the free state, as it is not really an alkaloid ; it is therefore not, or not entirely, removed by water. With acetic acid, as well as with other acids, narcotine forms not well defined salts ; the acids are simply solvents, from which it again separates as soon as the acid is neutralized. This is accomplished with carbonate of calcium. By shaking an acetic solution of narcotine and morphine with that carbonate, narcotine is precipitated ; not so the morphine. I have not, however, more exactly investigated this method, practical pharmacy, to which the present paper is devoted, being not strictly interested in the matter.

I believe that the above method for the estimation of morphine very well answers for pharmaceutical purposes. I shall be glad if the criticisms which it may meet with lead to some further progress in the question under notice.

Mr. Draper passed a warm eulogium on the paper which he said was characterized by great lucidity.

Mr. Naylor said it was not his experience that morphia existed in the form of sulphate of morphia, unless the paper referred to the Turkey opium. If morphia was dialysed the sulphate of morphia would undergo no decomposition whatever. If it was carefully examined by the microscope the sulphate of morphia could be readily seen, and so also could the crystals of the meconate of morphia if it was evaporated at a low heat. If meconate of morphia was heated at a high temperature it would split up. His objection to the process was that no very special provision in the process—as part of the process—was made for separating narcotine. The process to which they had just listened was identical with the beautiful process of Yvon published in the *Journal de Pharmacie et de Chimie*, only if his memory served him correctly the proportions of spirit and ether were a little different.

Mr. Williams viewed it as a slow process compared with others.

Professor Attfield admitted that it was a slow process, but easy.

The President said Professor Flückiger deserved their thanks for his paper, and the Conference accorded him that compliment.

Place of Meeting in 1880.

Mr. N. M. Grose (Swansea), introduced by the President, said he was deputed by the druggists of Swansea to convey to the British Pharmaceutical Conference a hearty invitation to visit the town in 1880, and if the association did them the honour to accept the invitation they would do all in their power to render their sojourn in Swansea agreeable.

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* See my 'Pharmaceutical Chemistry,' Berlin, 1879, page 373.

Professor ATTFIELD moved that the best thanks of the meeting be accorded to the chemists of Swansea, so ably represented by Mr. Grose, and that their invitation be accepted.

Mr. REYNOLDS seconded the motion and, adverting to the admirable way in which Sheffield had received the pharmacists, said Yorkshire felt proud of Sheffield for the way in which it had entertained the Conference.

The motion was then carried.

ELECTION OF OFFICERS.

A ballot for the President and Officers for the ensuing year was then taken, with the following result:—

President.

W. SOUTHALL, F.L.S., Birmingham.

Vice-Presidents.

N. M. GROSE, Swansea.
R. REYNOLDS, F.C.S., Leeds.
G. W. SANDFORD, Pres. Ph. Soc. of G. B., London.
W. WARD, F.C.S., Sheffield.

Treasurer.

C. EKIN, F.C.S., Bath.

General Secretaries.

Professor ATTFIELD, F.C.S., London.
F. BADEN BENGER, F.C.S., Manchester.

Local Secretary.

J. HUGHES, Swansea.

Other Members of Executive Committee.

M. CARTEIGHE, F.C.S., London.
T. GREENISH, F.C.S., London.
H. W. MALEHAM, Sheffield.
A. H. MASON, F.C.S., Liverpool.
C. SYMES, Ph.D., Liverpool.
J. C. THRESH, F.C.S., Buxton.
W. A. TILDEN, D.Sc., F.C.S., Clifton.
C. UMNEY, F.C.S., London.
J. T. WILLIAMS, Swansea.

Auditors.

G. ELLINOR, Sheffield.
J. LLOYD, Swansea.

THANKS TO THE LOCAL COMMITTEE, ETC.

Mr. WILLIAMS moved—

"That the cordial thanks of the non-resident members of the British Pharmaceutical Conference be given to the Local Committee, and the other Sheffield members, and especially to Mr. Maleham, Mr. Ward, Mr. Ellinor, Mr. Learoyd and Mr. Cubley for the very successful manner in which they had conducted the arrangements of the meeting."

He said Mr. Reynolds had stated that Yorkshire felt proud of Sheffield for the way in which it had entertained the Conference, and if Sheffield had satisfied Yorkshire he felt that the rest of the country must be satisfied.

Mr. DRAPER seconded the motion and referred to their cordial reception and the pains the Local Committee had taken in showing the pharmacists the various manufactories for which the town was famous.

The motion was carried unanimously.

Mr. WARD, in acknowledging the compliment, said it had afforded him extreme pleasure to see the Conference in Sheffield, but he must in justice say that nearly the whole of the work had devolved upon Mr. Maleham. If the association were gratified the Local Committee were satisfied, and if they were gratified the Local Committee were satisfied.

Mr. MALEHAM said he was glad to have an opportunity of expressing his gratification at the kind manner in which the services of the Local Committee had been acknowledged by their guests. He deprecated the idea that he had done all the work, and said he had been ably supported by the Local Committee and Mr. Learoyd, the assistant secretary.

Mr. LEAROYD and Mr. ELLINOR also acknowledged the compliment on behalf of the Local Committee.

Professor TICHBORNE moved the following resolution:—

"That the members of the British Pharmaceutical Conference, assembled in Sheffield, desire to express their best thanks to Messrs. John Brown and Co., Limited, and Messrs. Brown, Bayley and Dixon, for having thrown open their most interesting works, and also to the managers of departments and others whose courtesy and attention so enhanced the pleasure of the visit."

Mr. T. F. ABRAHAM seconded the motion, which was carried.

Mr. FOSTER moved the following resolution:—

"That the best thanks of the Conference be conveyed to Messrs. John Round and Son, Messrs. Joseph Rodgers and Son, and Messrs. Walker and Hall, who have so kindly afforded members the privilege of visiting their works."

Mr. WALTER HILLS seconded the motion, which was carried.

THANKS TO THE PRESIDENT.

Mr. SUMNER moved—

"That the best thanks of the Conference be given to the President for the able manner in which he has conducted the business of the meeting."

He said he was delighted at the ability shown by the young members of the Conference, and that their papers showed that they were making progress beyond their predecessors. He did not see why such should not be the case, for they should live on the experience of the past, and the practice of the present.

Mr. RADLEY, as the senior member of the trade in Sheffield, seconded the resolution, and referred to the efforts of the President in the promotion of pharmacy.

The motion was carried with acclamation.

The PRESIDENT, in acknowledging the compliment, said he was afraid his friends sadly overrated his efforts as President. It must not be forgotten that he followed a long list of distinguished men, from whose example he had had large opportunities for learning his duties; moreover the kind consideration he had received from every individual who had attended the meeting had rendered his task so easy that his own share of the merit of having presided with some success was very small indeed. He confessed to some feeling of regret at relinquishing his highly honourable post, but had the satisfaction of knowing that it would pass into the hands of a very able man, one whose scientific qualifications would certainly very much exalt its dignity.

THE RESIGNATION OF PROFESSOR ATTFIELD.

The PRESIDENT said although the positive proceedings of the Conference had now concluded, there was just one matter he should like to introduce to their notice. The opinion had been expressed in the Executive Committee at its sitting that afternoon, that the members of the Conference generally would probably wish that some permanent record of their obligation to Professor Attfield should be presented to him, now that he found it necessary to resign the post of Honorary Secretary. The Committee had accordingly prepared a resolution, which would now be submitted for the approval of those present.

"1. That under the circumstance of Dr. Attfield's announced retirement from the post he now occupies, it is desirable to institute some permanent recognition of the invaluable services to the Conference rendered by Professor Attfield as its Senior General Honorary Secretary since its establishment sixteen years ago.

"2. That the gentlemen present form themselves into a Provisional Committee to give effect to this resolution, with power to add to their number.

"3. That Mr. Carteighe be appointed Honorary Secretary *pro tem.* to the above Committee."

The Conference then broke up.

Parliamentary and Law Proceedings.

Prosecution for Sale of Adulterated Cream of Tartar.

At the Chertsey Petty Sessions on Wednesday, September 24, before W. C. Scott, Esq., chairman, B. L. Lewis, Esq., W. F. Harrison, Esq., Baron G. de Worms, H. Yool, Esq., and T. W. Weeding, Esq., Mr. George Boyce was summoned for selling to one Frank Walters a certain drug, to wit, 2 ounces of cream of tartar, to his prejudice, on the 19th of August.

Mr. A. Haynes appeared for the defendant.

Police-constable Waters said: On the 19th of August he went to Mr. Boyce's shop under instructions from Superintendent Bungard and asked for 2 ounces of cream of tartar and was served by Mr. Clark, the assistant. He paid 4*d.* for it. After receiving the cream of tartar he told the assistant it would be handed over to Superintendent Bungard, who would take it next day to Guy's Hospital to be analysed. Witness asked him if he would like to keep a portion of it. The assistant said that he did not wish to do so. Witness then sealed it up in his presence and twenty minutes later handed it over to Superintendent Bungard.

Cross-examined by Mr. Haynes: He bought some quinine wine and other articles at the same time that he purchased the cream of tartar. He asked the assistant to take a portion of each of the articles that he purchased, but the assistant declined.

Superintendent Bungard said: On the 19th of August he received 2 ounces of cream of tartar from last witness and on the 21st took it to Guy's Hospital. He produced Dr. Stevenson's certificate, which stated the cream of tartar to contain 11·7 of tartrate of lime and ·6 of sulphate of baryta, and that the foreign ingredients were insoluble and not injurious to health.

Cross-examinined by Mr. Haynes: The other articles purchased were sent to the analyst and reported to be genuine. This was the case for the prosecution.

Mr. Haynes then addressed the Bench. He said that for the last sixty years Mr. Boyce and his father before him had been chemists in the town, and always had the very highest character for selling the best and choicest articles, and never before had they had the least word of complaint. The charge that he had to answer that day was that Mr. Boyce sold an article that was not of the required quality. He could only have wished that Dr. Stevenson had been present, because he could then have asked him questions that would have put a proper complexion on the case. However, he had practical and scientific witnesses present who would inform the Bench as to the manufacture of cream of tartar, and it would be shown that no adulteration in the sense of the word had taken place, and moreover Dr. Stevenson's certificate showed that it was not injurious to health, and was, therefore, not prejudicial to the purchaser. Cream of tartar was manufactured in France and Spain and other wine-growing countries, and he could prove that it could not possibly be made without tartrate of lime, as through the processes it underwent such was incidental to its manufacture, and was, in fact, part and parcel of the drug. Mr. Hodgkinson, of whom the articles were purchased, would produce some cream of tartar in its crude state and inform them how it was manufactured. He would also tell them that Mr. Boyce always bought drugs of the very best quality and paid the very best price for them, and, in fact, such evidence would be given as he thought would completely exonerate his client. He then called—

Mr. William Hodgkinson, of the firm of Hodgkinson and Co., Aldersgate Street, who said that defendant and his father before him had been customers of his firm for many years. Mr. Boyce was very particular, and was always supplied with the very best drugs. The cream of tartar which was the subject of the present case he had reasons to know came from Messrs. Hodgkinson's stores. Cream of tartar was sent to this country from Spain and France and came in a state that was known as argol, and was consigned from the brokers to the manufacturers. The argol was generally taken from the docks by the grinders. The cream of tartar in question came into the market in the usual way and was ground by Messrs. Stafford, Allen and Sons, who returned it to his firm and they sent it out as it was purchased. Messrs. Allen and Sons were the only grinders of the drug. The article sent to Mr. Boyce was the very finest that could be obtained. Argol, or cream of tartar, was the natural product of the fermentation of the juice of the grapes. It was impossible to have cream of tartar without tartrate of lime, and he was informed from the best authority that it was generally found in quantities of from 10 to 20 per cent., and the lowest he ever heard of was 7 per cent. He recognized the sample of cream of tartar produced from its very fine grinding. It could not be obtained finer. He could not account for the very small amount of baryta being with the drug, but had seen it with cream of tartar before.

Mr Edward Ransome Allen, of City Road, London, said his firm received a delivery order to obtain the cream of tartar in its crude state. It was then ground and sent to Messrs. Hodgkinson, and nothing was added to it.

Mr. George Boyce said he purchased the drug of Messrs. Hodgkinson and sold it as he received it. He believed it was the best quality that he could possibly buy.

Dr. Benjamin Horatio Paul, Ph.D., F.C.S., and Editor of the *Pharmaceutical Journal*, said the term "cream of tartar" was, according to the British Pharmacopœia, a synonym for acid tartrate of potash. The article referred to was the medicinal form of acid tartrate of potash and that met with in commerce. It consisted essentially of the compound of tartaric acid with potash, together with some varying proportion of tartrate of lime, which was incidental to the manufacture of cream of tartar in the usual way. The presence of tartrate of lime in cream of tartar was indicated by the British Pharmacopœia. Sulphate of baryta was an extraneous impurity, but it was scarcely conceivable that so small a proportion as that indicated by the analyst's certificate could have been intentionally added as an adulteration. The only other possible explanation of its presence was accidental admixture; but it was an inert substance not injurious to health, and the trifling amount present did not sensibly affect the medicinal efficacy of the cream of tartar or its intrinsic value.

The Chairman said the Bench were unanimous in dismissing the case.

Death from Opium Eating.

On Tuesday, September 23, Mr. D. Wightman held an inquest in Sheffield, on the body of Sydney Barnes, 50 years of age, painter. The evidence was to the effect that for the last two years the deceased had suffered from "painter's cholic," and in consequence had lost the use of one of his arms. Some time last week he fell from the top of a vine house at Sharrow, and broke his ribs. A year or two ago he was in the habit of taking quantities of opium, but he had not done so latterly as far as his wife knew. On Saturday night he went to Mr. Ward's shop, on Sheffield Moor, and bought two separate pennyworths of opium, stating that he wanted the drug to relieve the pains in his side, caused by broken ribs. He returned home, and shortly after dinner on the following day he took the opium, except a small quantity, which his wife destroyed. In the evening he went to bed and slept soundly until Monday morning, after which time he remained in a drowsy state up to his death. On Sunday he told his wife he intended to go to the Hospital next day to see what was amiss with his side. It was explained that the deceased had taken about one scruple and a half of opium, equal to 720 drops of ordinary laudanum.

Mr. F. A. Willington, surgeon, said he saw the deceased for the first time shortly before three o'clock on Monday afternoon. He was then insensible, and evidently dying. He applied the usual remedies, but death ensued, caused by an overdose of opium.

The Coroner remarked that the man, in his opinion, had died from an overdose of opium. It had transpired that he had been in the habit of taking it regularly on previous occasions, and all the symptoms explained by the surgeon indicated poisoning by opium. The deceased had taken much more opium than a surgeon would have advised him to take. The quantity was sufficient to have poisoned all the persons in the room.

The jury returned a verdict of "Death from taking an overdose of opium for the purpose of relieving pain, brought on by a recent accident."—*Sheffield Daily Times.*

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[339]. I think "Minor" ought to use Acid. Nitric. Dil.

[340]. In answer to "Inquirer's" note, I have used at times a little glycerine to rub down the sulph. iodid. when making ung. sulph. iodid.; by this means he will produce an ointment slightly lighter in appearance, but a much more satisfactory preparation.

THOMAS E. CHADWICK.

[341]. Calx Hydrarg. Alba is white precipitate.

Manchester. W. WILKINSON.

[341]. Calx Hydrargyri Alba was the term by which the present Hydrargyrum Ammoniatum was known in the old London Pharmacopœia (1788), and therefore Ung. Hyd. Ammon., B.P., should have been dispensed.

W. F. NORMAN.

[341]. Unguentum Calcis Hydrargyri Albæ, *vel* Unguentum Hydrargyri Ammonio-Chloridi (Pharmacopœia Londiniensis, 1788):—

Take of—

Ammonio-Chloride of Mercury	2 drachms.
Lard	3 ounces.

Add the ammonio-chloride of mercury to the lard, and rub them together.

Norwich. W. S. CORDER.

[342]. The official Ung. Plumbi Subacet. Co., invariably assumes a streaked orange colour soon after it is made, but it rapidly becomes rancid and the colour disappears.

The orange tint is probably due to the separation of an oxide of lead and the disappearance of the colour to decomposition of the oxide by the fatty acids present in the rancid ointment.

Neither coloration nor rancidity appears if vaseline be substituted for the oil and wax, which alteration will possibly be made in the formula when we have a new Pharmacopœia.

R. H. PARKER.

[342]. I should be glad if some reader would reply to the query of "An Apprentice" in the Journal of Sep. 6, with regard to ung. plumbi subacet. co. I made a little and found it turned the pale orange colour he describes, and attributed it to the fact that the liq. plumbi was an imperfect solvent, it having deposited a good deal of plumbi carb. in the bottle, and the camphor acting upon it turned the oxyacetate into litharge again, and hence the colour. Again I made some with a perfectly fresh solution and, as "An Apprentice" says, followed the instructions implicitly, and I find after four or five days that has turned the same.

I cannot find any allusion to the cause in any work that I have referred to. And as it is an ointment not unfrequently ordered in prescriptions, it is of great importance that it should be sent out so that the patient should not be surprised to find an orange coloured ointment after a few days.

ALCHEMIST.

[343].

℞ Acet. Scillæ	℥iss.
Spt. Chloroformi	q.s.
Sacc. Ust.	q.s.
Aqua	ad ℥ij.

A teaspoonful every two or three hours.

How should the above be dispensed? Was I right in putting in ʒss spt. chlorof., and 6 minims sac. ust.?

[344]. Will a reader of the Journal say how he would dispense, or of what strength he would make the following solution?—

Solutio Cheltenham Salts.		℥xij.
Tinct. Zingib.	ʒij.	
Tinct. Card. Co.	ʒij.	

A wineglassful every third morning in half a tumblerful of warm water.

DISPENSER.

Notes and Queries.

[624]. COLOUR OF CLOTH.—Pure nitric acid is used to test the durability of the colour in cloth. The test depends on the length of time it takes to destroy the colouring matter.

W. FOWLER.

[625]. ANILINE COPYING INK.—Could any reader oblige me with a formula for making copying ink (aniline) for the gelatine letter press? By so doing he would greatly oblige.

QUÆRO.

[626]. CLEANSING OF OLD COINS.—Will any reader of the Journal kindly furnish me with a formula of a solution for cleansing old coins by simply immersing them?

THOS. F. ELTON.

Correspondence.

REGISTRATION OF CHEMISTS' ASSISTANTS AS BONA FIDE DENTISTS.

Sir,—Having read four letters in reply to mine, I can see but one, F. W. S., who sees the question as regards the registration of assistants in the right light. The legislators of the Dental Act were perfectly willing to recognize existing rights, but not to bring to life rights that had never existed at all, or to induce any person to register himself as a matter of convenience with the view of taking up dentistry at some future time and thus save himself the necessary education and examination. Nothing was said about preventing chemists or their assistants from extracting teeth (which is the least important part of a dentist's business), and it was not necessary to register in order to continue to do so, and to say the least it is contrary to the laws of common morality for a person not a dentist to register as being in *bonâ fide* practice as such. "Lower Molar" says he wrote to Mr. Miller asking if it was necessary to register as a dentist in order to extract teeth, and that he received the declaration papers in reply, etc., etc. I must call his attention to the fact that it is not the duty of the registrar to answer inquiries or to determine who is legally entitled to register, and that everyone is allowed to fill up the papers as his conscience will allow him, and that on payment of the fee his name is placed on the register *conditionally*, *i.e.* that his claim will bear investigation. Of course on the publication of the register the Dental Association will take up the matter of illegal registrations, or why should section xxxv. be inserted at all? If *bonâ fide* chemists and dentists, or even chemists who without assuming the title of dentist merely performed the operation of extraction, have registered as being in *bonâ fide* practice as dentists, it must surely be allowed that that does not constitute a right for their apprentices and assistants to do the same; the Act was for the protection of the public, and not to raise up an army of ignorant impostors who have sprung into life as dental practitioners during the passing of the Act, to the detriment of the public and degradation of the legitimate profession.

"Manager" must have a very poor idea of dental operations when he asserts that they can be performed as ably by dabblers in the art as by any professional dentist who has devoted all his attention to the *spécialité*. I should like to to see very much the chemist's assistant who could put in really reliable gold and amalgam fillings, fill root canals, cap exposed pulps, etc. The old proverb that a "Jack of all trades is generally master of none" is very applicable to the above, and a Ph. C., dental surgeon, etc., must have as many irons in the fire as he can keep warm.

J. J. MUSGRAVE.

Sir,—The writers of the letters relating to the Dental Practitioners Bill in your last issue appear to have all taken up arms rather hastily against Mr. Musgrave.

"Lower Molar" certainly may be in the right in considering himself a dentist from the mere fact of extracting teeth, but the question is still an open one as to whether when the weeding out of the Dental Register takes place those whose only claim towards registering themselves consists in the fact of their extracting teeth will be considered dentists by the Medical Council, should information be made against them. The declaration may be made, the fee may be received, but the whole responsibility of such declaration rests upon the person who makes it. Evidently clause xxxv. was inserted from a certain foresight possessed by promoters of the Bill. The spirit of the law will be frustrated perhaps by many; anyhow, Mr. Musgrave gives a friendly warning, to the effect that should the spirit of the Act, which the words *bonâ fide* convey, be carried out, many who are now on the register may possibly find their names erased in future (even if not in the present) edition of the Dental Register. Holders of the certificate must remember that the register alone will be legal evidence. The spirit of the Act appears to have been to protect those men who before its passing had been *bonâ fide* engaged as dentists, and had called themselves such before the public.

My only object in writing is to uphold Mr. Musgrave's action in writing his letter, and to suggest that those who took up arms against him should wait until they see whether there were any cause for so doing. Mr. Musgrave's opponents appear to have spoken with the dictum of both judge and jury in the matter, so they have hardly a right to be so harsh on him, who as they say, holds simply a brief. After all the only thing to be done is to wait and see. It is said that "the wicked fleeth when no man pursueth."

GEORGE ERNEST CLARKE, *Surgeon-Dentist.*

Woodbridge.

THE HEALTH OF THE DRUG TRADE.

Sir,—Mr. J. K. Nicol, in the Journal of the 6th inst., calls attention to the circumstance that a large percentage of chemists die at a very early age, and speculates as to the cause.

To satisfy myself that the average age was less than it ought to be, I have gone over the Journal obituaries for three years, 1875-6, 1876-7, 1877-8, and I find that the average is fifty. This is certainly not very encouraging for the rising race of pharmacists.

And now, what are the causes of this early mortality? It seems to me that there are three things to be taken into consideration in accounting for it. These are:—(1) Confinement, on account of the length of business hours. (2) The strain upon the mind which is inseparable from the proper conduct of a chemist's business. (3) The highly polluted atmosphere of the shops.

A chemist's business is, I should say, the most confining business under the sun. In a small business, where the proprietor cannot afford to keep an assistant regularly, he is frequently several weeks at a time without being away from his shop. People do not always expect to find a physician or surgeon at home, but they never for a moment entertain the idea of not finding a chemist ready at any time to answer his bell, and supply sixpennyworth of physic. And take the case of assistants. In England, where the situations are indoor, an assistant's life partakes very much of the nature of that of a domestic servant; perhaps two hours twice a week, at night, are allowed for recreation.

In Scotland the situations are outdoor, and most of the places close at 8 p.m., and as few of the shops have night bells—perhaps one in each district of the town—the greater number of the assistants are free every night after that hour. This would seem better. In reality it is not so. In order, I suppose, that the outdoor assistants should have no advantage over their indoor fellows in their chance of longevity, it is generally the case that they have to get their tea after 8 o'clock. In a few humane places arrangements exist for the assistants either to get out for half an hour to tea, or to have it on the premises. These places, however, are very few. It is needless for me to do more than refer to the injurious effects upon the health of so long a fast between dinner and tea, and the taking of tea at so late an hour. In English situations the hours are longer, but meals are had regularly. In Scotch situations the hours are shorter, but meals are had irregularly. Which is the better? To my mind there is little to choose in either.

The practice of pharmacy requires great care and attention. The strain upon the mental faculties of those engaged in a busy shop is consequently very great, and when continued during such a length of time must of necessity be exhausting. There are other businesses in which a concentration of attention, equal to that in ours, is required; but I am not aware of any in which it has to be kept up for the same length of time.

And, finally, there is the polluted atmosphere. Chemists do not feel the smell of their shops, because they have become accustomed to it. There are few, however, of their customers who do not feel what they call the "physicky" smell always present. Hydrochloric acid vapour, free chlorine, fumes of nitric and sulphurous acids, ammonia, and carbonic acid gas, not to speak of an occasional whiff of bromine, make a nice addition to the already not over pure air of a town. To be confined for twelve hours a day in a compound atmosphere of this kind can scarcely be conducive to good health. People say we cannot readily catch infection, because the germs of contagious diseases find the atmosphere of our shops fatal to them. This may be true, but to escape contagion only to share the fate of the germs is not much for which to be thankful.

It is time that attention should be directed to the unhealthy nature of our business, apart from long hours.

Instead of having long hours we ought to have exceptionally short ones. No doubt the claims of the public must be attended to. I do not, however, think that the public, exacting though it be, desires that the members of one class should sacrifice their lives to save those of the members of another class.

A free discussion of the subject may initiate a disposition on the part of employers to favour shorter hours of business, or, at least, the concession of more time for inhaling fresh air to their assistants. I am strongly of opinion that a reduction in the hours of business would be a very effectual means of raising the standard of the drug trade. The present hours are in their effects very demoralizing.

Edinburgh. JUNIUS.

Sir,—Like your correspondent, Mr. Nicol, the undue mortality in our trade has been matter for reflection with me for years. I commenced at one time tabulating the deaths recorded in your own and other journals, with the view of instituting a comparison with the average general mortality, but finding that the ages were frequently omitted, I gave up the attempt. Speaking from an experience of twenty years, I do not for one moment think that (special manufactures apart) there is anything in the atmosphere of the ordinary chemist's shop prejudicial to health. The cause is to be found almost solely in our own individual habits. In a business full of constant anxieties, we voluntarily keep too long hours—we voluntarily allow ourselves too little outdoor recreation. If our aim is merely through this business to obtain a social competency, it is yet highly necessary, but if passing beyond this, we are also striving for mental cultivation, it is yet more imperative that we allow nothing to defraud us of our chances of re-oxygenation. We voluntarily keep too long hours—voluntarily I advisedly said—we are not bound to keep our shutters down until the last possible customer has appeared.

If medicine is really wanted there is not much fear of patients dying for lack of ringing the druggist's bell, while with the shop open unnecessarily late, for one application that is really pressing there may be dozens of the most trivial character.

From the nature of our calling the public justly expect us to cheerfully attend to their true wants at whatever hours they may arise; but for that very reason they should be considerate of us in not infringing upon our ordinary leisure times unnecessarily. The public require educating in this respect. It would be the dawn of a new era with us were we to arrive at a general understanding to adopt hours akin to those in other callings, and to levy a mild percentage upon all business effected after the shop was closed.

Let each pharmacist thus arrange for himself, and for those in his employ, some respite for breathing time, and we shall soon hear less of undue mortality in our ranks.

One of the greatest obstacles, often, to improvement in this direction is, singularly enough, the solitary chemist,—he who has neither assistant nor apprentice.

His neighbours are all willing to close, but "Why should I shut up?" argues he. "I shall have no peace, the bell will ring, and I may as well be in my shop as in my back room."

Such a one should remember that none of us liveth to himself, that although he may not feel himself at liberty to leave his premises, he should surely hesitate before in effect compelling everyone else in the trade in the town also to remain at home.

Now that there is such a call for educated pharmacists, it is more than ever necessary that for the production of the *mens sana in corpore sano* the requisite leisure should be afforded.

Cambridge. J. T.

Sir,—The letters of your correspondents on the health of the drug trade would have been of more value if they had supplied authentic figures, either from the Registrar-General's report, or other sources, from which the longevity in our trade might have been compared with that in others. No opinion on such a subject can be worth anything unless it is based upon deductions drawn from correct statistics.

Such statistics I am unable to supply, but the following figures, taken from obituaries printed in the *Pharmaceutical Journal* during the years 1877, 1878, and 1879, may interest your readers:—

Two hundred deaths gave an average length of life of 51·8 years. Four lives exceeded eighty, and were eighty-one, eighty-three, eighty-six, and eighty-seven respectively. The shortest life recorded was twenty-one years.

A percentage gave the following results:—

7·	per cent. died between	twenty and thirty.
18·	,, ,,	thirty and forty.
19·5	,, ,,	forty and fifty.
19·5	,, ,,	fifty and sixty.
22·5	,, ,,	sixty and seventy.
11·5	,, ,,	seventy and eighty.
2·	,, ,,	eighty and ninety.

My obituaries were all exhausted, or I should have extended these figures, and so made the statistics reliable. It should be mentioned that nearly all the deaths were of chemists in business for themselves.

Denmark Hill. THOS. HENRY POWELL.

ESSENCE OF GINGER.

Sir,—I think that if Mr. Baildon will be at the trouble of again agitating his essence of ginger with silica (in very fine powder) and filtering, that it will become clear. I recently prepared some and found that upon first filtration it was opalescent, but refiltration has made it perfectly bright.

With regard to the alleged misprint, there is no mistake, but perhaps it would have been better to have said "until nothing further is precipitated." Upon first addition of the lime the tincture becomes very dark coloured; when more is added a somewhat bulky precipitate speedily falls and the solution becomes of a "rich yellow colour," but is much paler than when the first portion of the lime has been added. The proportions of the various resins differ so much in different specimens of ginger, that a little judgment is required in addition of lime, etc.

JOHN C. THRESH.

NITRATE OF PILOCARPINE.

Sir,—From the misinterpretation of my remarks on the solubility of the above (p. 240 last week), Mr. Gerrard cannot have read my statement (p. 215, *Pharm. Journ.* 1879) carefully.

W. MARTINDALE.

Erratum.—In Mr. Fletcher's paper on "Citrate of Iron and Quinine," page 228, line 25 from top, *for* (2·673×0·86) *read* (2·673×30·86).

"*Bonus*" is recommended to make his wants known by means of an advertisement.

J. H. Dingler.—*Hypericum androsæmum.*

H. Cocks.—The effect of the addition of sodium hyposulphite is well known, but the resulting product can no longer be correctly designated a preparation of iodine.

F. A. Barrow.—*Syrup of Gentian* (Codex).—Gentian Root, 100 grams; Boiling Water, 1000 grams; White Sugar, q.s. Pour the boiling water on the gentian, infuse for six hours in a closed vessel, strain and press. Add the sugar in the proportion of 190 parts to 100 parts of the infusion, and make a syrup by simple solution in a covered water-bath.

A. H. Pope.—See the section on crystallography in Fownes's 'Manual of Chemistry,' vol. i., or the more extended treatise in Watt's 'Dictionary.'

"*Alterative*" is recommended to communicate the circumstances to the Secretary of the local Association.

"*Army Compounder.*"—The principle which should be followed in making up mixtures containing resinous tinctures has been explained on several occasions recently. See, for instance, vol. ix., pp. 528 and 529.

W. B. Southgate.—The following recipe for "Pick-me-up" has already been given in the present series of this Journal:—Cardamons, 5 parts; Caraways, 2; Cochineal, 2; Cinnamon, 10; Raisins, 80; Orange Peel, 56: Ginger, 14; Gentian Root, 3; Wormwood, 2; Quassia, 1; Alcohol, (·838) 750; Water, 750. Macerate for fourteen days, filter, and add syrup 200 parts.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Wetzel, Wilkinson, Clarke, Wershoven, Musgrave, Postans, J. Griffith, Mushens, Turner, Howe, Catechu, Verus, Student, Junior, Omnes Moriemur, Chemist, Gaul, An Emigrant, A Sawney, G. H. L.

NOTES ON SOME JAPANESE DRUGS.

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society.

(*Concluded from page* 203.)

FRUITS AND SEEDS.

KOTREE SEE (18):—*Coriandrum sativum*, L.

The Japanese coriander seed does not differ in any respect from that of English commerce.

MAHNG DAH-RAH-GAY (19): — *Datura alba*, Nees.; Nees. in Linn. Tran. 17, p. 73; *D. Stramonium*, Thunb., Fl. Jap. p. 91.

Syn. MAN-TO-LO-HWA, Dr. Porter Smith, Mat. Med. Chin. p. 83; CHOSENASA-GAO, Sô mokou Zoussetz, vol. iii. fol. 55; MANDARA-REUGE, Phonzou Zoufou, vol. xxiii. fol. 20.

These fruits are rather smaller than those of *D. Stramonium*, more globular, with shorter spines, the base of the spines being markedly striated. The specimens have evidently been gathered and dried before ripe, the seeds not being mature.

Datura alba differs from *Stramonium* in its ovate downy leaves. It is used by the natives of India for poisoning, and professional poisons are often called dhatureas, on account of the use made of this drug. See 'Pharm. India,' pp. 175, 460.

MEH-NO-ME (60):—*Prunus Armeniaca*, L. (Apricot kernels).

Syn. KJOO, KARA MOMU, ANSU, Kæmpf. Amœn. p. 798, Thunb. Fl. Jap. p. 200.

These seeds correspond well with specimens of *P. Armeniaca* in the Indian collection. The endocarps, which are sparingly present, are quite smooth. The kernels are cordate, ovate, and about half an inch long and rather less in width, and two lines in thickness. The taste resembles that of a bitter almond.

Apricot kernels are known to yield an excellent oil, nearly, if not quite, equal to almond oil, but to what medicinal use the Japanese put these kernels, I have not been able to ascertain.

OO-BEI (35):—*Amygdalus nana*, L.

Syn. Prunus Mume, Sieb. et Zucc., Fl. Jap. I. p. 29; BAI, Thunberg, Fl. Jap. p. 199; UME AND UMEBOS, Kæmpf. Amœn, p. 799; MUME, MOMI, Fr. et Sav. vol. i. p. 117.

This drug consists of the dried unripe fruits. In appearance they resemble small prunes, but are very dry and hard. They have apparently been dried at a high temperature, since the kernels have a roasted taste and dark-brown colour internally. The endocarp or stone is half to three-quarters of an inch long and about half an inch wide, and one-third to half an inch thick. It is perforated with small holes like that of the almond. The taste of the sarcocarp, or fleshy part, is intensely sour.

The Japanese character, Bei, pronounced in Chinese Mei, is a generic term for any kind of plum, and is sometimes applied to other fruits. See Porter Smith, 'Mat. Med. Chin.' p. 174.

The fruits, preserved in dregs of Sacki or Japanese beer, are said by Kæmpfer to be exported to India and China.

According to Siebold and Zuccarini (*l. c.*, p. 30, 31) *Amygdalus nana* is much cultivated in Japan and was probably introduced from China. The same authors give a long and interesting account of the uses of this plant. It is a shrub or small tree from 12 to 20 feet feet in height, flowering early in February, and is one of the plants which the Japanese cultivate extensively in the form of miniature trees. The flowering branches are used to decorate the dwellings of the Japanese and the altars of their idols to indicate the approach of spring. The acid juice of the unripe fruits is used as a cooling drink in various fevers, for when ripe the taste is insipid. The acid juice is also used in the preparation of the delicate pink rouge from safflower.

REN-NIKH (51):—*Nelumbium speciosum*, Willd.

Syn. Nymphœa Nelumbo, L.; Thunb. Fl. Jap. p. 223; LIEN-GAU, Porter Smith, Chin. Mat. Med, p. 139, *sub* Lotus; REN, HATSIS; Kæmpf. Amœn. p. 880; HASU, Hachisu, Sô mokou Zoussetz, vol. x. fol. 9; Phonzou Zoufou, vol. xxxiv. fol 9.

This drug consists of the dark grey oval carpels, about five-eighths of an inch long, and one-third of an inch in diameter. The shell is moderately thin, but very hard, and encloses a sweet white starchy kernel. They are used in Cochin China, according to Loureiro (Fl. Cochin Chin. p. 341), both in food and medicine, in the latter for diarrhœa, etc. A long and interesting account of the uses of various parts of the plant is given by Dr. Porter Smith, in his 'Materia Medica of China.'

The Japanese character Ren is identical with the Chinese one for Lien, and means a river, the term nikh, meaning meat or food. The name "river-meat" is probably given on account of the kernels of the seeds being eaten.

SAI HEE (9):—*Citrus bigaradia*, var. trifolia, Thunb. Fl. Jap. 294.

Syn. SSI *vulgo* KARATATS BANNA GEES, Kæmpf. Amœn. p. 801 with *fig.*; KÔ KITS, Phonzou Zoufou, vol. lxxxvii. fol. 8.

This drug consists of the thin peel of a small orange about the size of the mandarin variety, which has the bitter flavour of the Seville orange. The peel has been removed entire by making four vertical slits in the peel nearly to the base of the orange and then pulling it off in one piece.

The Japanese characters above translated Sai-hee, are in Chinese pronounced Hiang-pi, Sai meaning green, and hee, peel or rind. This name is probably given on account of its being gathered before the fruit is ripe.

The rind, mixed with that of other species, is made, according to Kæmpfer, into a celebrated medicine called Ki-koku, a name also applied to the fruit.

SANG-SHIH SEE (36):—*Gardenia florida*, L.

Syn. SHAN-CHI-TSZE, Porter Smith, Chinese Mat. Med. p. 101; SAN CHE, Hanbury, Science Papers, p. 241, fig. 7; KUTSI JINASI, Fr. et Sav. vol. i. p. 207; SANSISI, MISUKTJINASI, Thunb. Fl. Jap. p. 109; KUTSJINAS, Kæmpf. Amœn. p. 808.

This fruit appears to belong to more than one species, but the larger proportion consists of the kind represented under fig. 7 in Hanbury's 'Science Papers,' p. 241. The fruits are about an inch or more long, three-eighths of an inch in diameter, bright brown colour, with six longitudinal narrow wings, and contain numerous seeds rather smaller and wider than linseed, bound together into a mass by a dried yellow pulp.

According to Mayer, the yellow colour of the pulp is due to a body named crocine, which appears to be identical with the polychroite of saffron. In China these fruits are supposed to possess emetic, stimulant and diuretic properties. A full account of the drug is given by Hanbury. The Japanese character for Sang-shih-see is identical with the Chinese one, although there is a slight difference in the pronunciation.

The Gardenia from which these fruits are probably obtained is a native of woody places in Japan, flowering in June and July, but is often used to form hedges in the gardens of the nobility. The fruits are also used as a dye.

SEKKEE-DOO HEE (24):—*Punica Granatum.* L.

Syn. SHIULI-P'I, Porter Smith, Chin. Mat. Med. p. 176; DSJAKURGO or SAKURO, Kæmpf. Amœn. p. 800; Thunb. Fl. Jap. p. 199.

This is the rind of the fruit dried. From its small size it would appear to be obtained from immature fruits. The pomegranate is stated by Kæmpfer to be rare in Japan and to produce an inferior fruit with a rather disagreeable taste, but Thunberg remarks that it is common about Kosedo.

SHO-EE-KOH (39):—*Fœniculum vulgare.*

Syn. SEN-RIO; KURE NO NOMO, Thunb. Fl. Jap. p. 120.

This is a small variety of fennel seed with a taste at first strongly resembling that of anise. The large vittæ, few in number, at once distinguish it from that fruit.

SHIKU-SHA (5): *Alpinia japonica*, Miq. Prol. p. 304.

Syn. Globba japonica, Thunb. Fl. Jap. p. 23; HANA-MIYO-GA, Sô mokou Zouss. vol. i. fig. 10; SAN DSJOKA, JAMMA MJOGO, Kæmpf. Amœn. p. 827; Phonzou Zoufou, vol. 10, fig. 5, Fr. et Sav. vol. ii. pt. 1, p. 20.

These are the seeds of a species of *Alpinia*, a few of the small fruits being mixed with it. The fruits, which are about the size of a large pea, but rather oval than spherical in outline, have a thin wrinkled pale-brown papery pericarp containing 3 to 8 triangular pyramidal seeds. The seeds are pale externally with a thin silvery coat, and have a faintly aromatic taste, but no pungency. These characters distinguish them from the fruits of *A. galanga* which are similar in appearance, but more oblong, and the seeds are remarkably pungent.

This plant grows in damp shady places near lakes, etc., and the fruit is ripe in December and January. It is often cultivated in Japan.

TAU NING (62):—*Amygdalus Persica.*

Syn. TOO, MOMU, Kæmpf. Amœn. p. 798, Thunb. Fl. Jap. p. 199, TAU-JIN, P. Smith, Chin. Mat. Med. 169.

These kernels are mixed with a few fragments of the endocarp, which is undoubtedly that of a small form of peach, Tau signifying a peach, and ning, kernels. In Chinese the last word is pronounced "jin."

Thunberg enumerates several varieties of the peach as follows: KE MOMU, with downy acute fruits; KATU ISI MOMU, with red glabrous, round fruits; KITO MOMU, with red double flower; SATO MOMU, with white simple flower.

In Japan the peach blossoms in March and April.

In China the kernels are used for coughs, blood diseases, amenorrhœa and worms.

From the list of Japanese drugs now concluded, it will be observed that there is a great similarity between the materia medica of China and Japan, an exchange of drugs evidently taking place between the two countries. Of the fifty-nine drugs here described, twenty-seven are apparently peculiar to Japan, and twenty-two others are common to China as well, while ten are well known in all civilized countries. The last include white hellebore root, zedoary root, mallow root, mallow leaves, elder flowers, burdock seed, pomegranate peel, orange peel, fennel seed, and coriander seed. Several in common use in this country are represented in Japan by analogous drugs, viz., Colchicum by the roots of *Fritillaria Thunbergii* and *Pinellia tuberifera*; *Triticum repens* by the root of *Eulalia japonica*; pulsatilla by *Anemone cernua* root; valerian by *Patrinia scabiosæfolia*; gentian root by *Gentiana Buergeri*; peppermint by Japanese peppermint; chirata by *Pleurogyne rotata*; and rue by *Evodia rutæcarpa*. Of Indian drugs *Datura alba* and *Cassia Tora* are used in Japan, while *Coptis Teeta* and *Datura alba* find a substitute in the roots of *C. anemonæfolia*. The influence of western civilization appears to have already had an effect on the materia medica of Japan; this is noticeable in the absence of any of the disgusting animal remedies used by the Chinese from the specimens sent over to this country. Hardly any of the Japanese drugs are altogether without sensible properties, either mucilaginous, tonic, astringent, aromatic or acrid, some of them being equal in power to analogous European remedies, and a few others, such as aconite root and valerian root, decidedly superior to the corresponding European drugs.

SUPPOSED IDENTITY OF COLUMBIN AND LIMONIN.*

BY E. PATTERNO AND A. OGLIALORO.

Schmidt (*Annalen*, 41, 338) considered that limonin was identical with the columbin extracted from colombo root by Wittstock (*ibid.*, 19, 298); and as the authors found much difficulty in preparing limonin in quantity from the seeds of the lemon and orange, whilst columbin could be obtained with comparative ease, they determined to examine into the question of the supposed identity of the two substances. The yield of limonin is but small, only 80 grams of the impure substance having been obtained from 15,000 grams of the seeds. It crystallizes in beautiful lustrous plates, and has the characters ascribed to it by Schmidt, except that it melts at 275° and not at 244°: moreover, it not only dissolves in potash without alteration, but also in baryta water, forming a kind of salt, which is not decomposed by carbonic anhydride. The formula which agrees best with the analytical results is $C_{26}H_{30}O_8$; this requires C = 66·38; H = 6·38.

When colombo root is extracted with ether and the solution is evaporated, a crystalline residue is obtained which, after being washed with a little cold ether to remove fatty matters, etc., is treated with boiling alcohol: on cooling, the solution deposits colourless prismatic crystals, which melt at 182°, and have all the properties of Wittstock's colombin. The results of the elementary analysis agree with the formula $C_{21}H_{22}O_7$, which requires C = 65·28; H = 5·69.

When the residue which is left after the separation of the columbin, and is almost insoluble in alcohol, is crystallized from boiling glacial acetic acid, it yields a second substance, having a melting point of 218—220°. Both this compound and Wittstock's columbin are therefore quite distinct from limonin.

* From the *Gazzetta chimica italiana*, 9, 64—67. Reprinted from the *Journal of the Chemical Society*.

The Pharmaceutical Journal.

SATURDAY, OCTOBER 4, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE ADMISSION OF WOMEN AS MEMBERS OF THE PHARMACEUTICAL SOCIETY.

IN the history of pharmaceutical affairs the first of October, 1879, will in future be memorable in that relation as the occasion when British pharmacists were relieved from the anomalous necessity of regarding their better halves as inferior to themselves. The persons most interested in this event have special reason to be thankful to the mover and seconder of the motion in their behalf for having at the earliest moment of the present session pressed forward the decision of the question whether women should be admitted to membership of the Society; for if it had been left for the following meeting of Council this achievement of petticoat emancipation would have been uncomfortably associated with the anniversary of another attempt to bring about social revolution. And considering how nearly opinions are balanced in regard to the desirability of admitting women into the Society it is, we think, at least fortunate for the *protégées* of Mr. HAMPSON and Mr. WOOLLEY that the advocacy of their case on the 5th of November has not afforded opponents an opportunity of instituting comparisons between their endeavours and those of GUY FAWKES and his colleagues.

For our own part we think that the movers of the resolution by which the petticoat has ceased to be a garb of disability for membership of the Pharmaceutical Society, and by which the admission of eligible persons into that body will no longer be regulated by circumstances over which the candidates have no control, may well be congratulated for having, by their success, done away with an obvious inconsistency.

From the time when the word "person" was, in point of law, decided to apply to women as well as men, the prosecution of the business of pharmacy under the terms of the Act of Parliament became by law as freely open to women as it had formerly been by usage, and although under the older *régime*, while submission to tests of qualification was voluntary, there might have been sound reason for declining to admit women as members of the Pharmaceutical Society, it is now very difficult, if not impossible, to say why women who have satisfied the requirements of the law in proving their eligibility to practise pharmacy should be refused participation in such benefits as appertain to membership of the Society. From a purely pharmaceutical point of view therefore, it may be regarded as matter for regret that any objection had ever been raised to the election of women as members, and we think that the very general support of Mr. HAMPSON's motion by the members of Council may be taken as expressing that view of the subject.

But the decision of the question from this point of view excluded from consideration most, if not all, of the arguments by which the election of female members of the Pharmaceutical Society was opposed. In the Council, at least, that opposition was not based upon narrow-minded feelings of jealousy, or of disrespect for women, any more than it was upon an assumption that they were incompetent to perform the duties of the pharmacist; but it was mainly out of consideration for what was held to be due to women in their social relations that the unfitness of some portions of the pharmacist's duty was urged as a reason for not admitting women as members of the Society. Their election into the body was held to be an encouragement for women to take up the business; it was opposed on the ground that it was an undesirable encouragement. This has always been the principle upon which Mr. SANDFORD has opposed the election of female members of the Society, and consistently with these views he has now, as President of the Society, recorded his vote against Mr. HAMPSON's proposition. There is, however, an absence of common ground upon which these opposite views respecting the election of female members can be considered together in such a manner that the acceptance of the one would involve the rejection of the other, and consequently we must infer that the altered direction of the votes given on the present occasion is due to the consideration of the question from a more special point of view than was formerly the case when Mr. SANDFORD's opinions were more generally supported. The desirability of putting an end to the agitation of this question also seems to have weighed with much effect in determining the votes of some members of the Council.

Incidentally the discussion of this matter suggests some important considerations as to the propriety of forcing to the issue of a vote a question upon which there are such opposite opinions. The fact that on two occasions the votes at general meetings of the Society were so evenly divided is scarcely a satisfactory ground for insisting upon the question being disposed of by the Council one way or the other. If those experiences pointed to anything they seem to favour the conservative course of keeping things as they were. Fortunately the admission of women as members of the Society is not calculated to affect very seriously the interests of other members, and there is consequently less reason for dissatisfaction with the settlement of the question by a narrow majority. But there are other subjects in regard to which we can conceive that either section of the equally divided pharmaceutical body would strenuously object to the decision of a question by so narrow a majority as that which has until the present occasion obtained in voting upon the female question either in the Council or at a general meeting.

However, it is far from being our desire to disparage on these or any other grounds the successful championship of the ladies by Mr. Hampson and Mr. Woolley, on the contrary, we congratulate Miss Clarke and Miss Minshull upon their election as members of the Society, and we congratulate the Society itself upon the removal of a restriction that was regarded as a grievance by those against whom it operated, with the result of stimulating an agitation which engaged more time and energy than the intrinsic merit of the question at issue really justified.

IRREGULAR SALE OF POISONS.

The intimation furnished by Mr. Flux at the hearing of the recent case of prosecution for illegal sale of poison, that any person might be the prosecutor in cases of irregular practice of this kind, has been very soon acted upon by the Chemists and Druggists' Trade Association. As will be seen from the report of legal proceedings at page 278, three such cases have been tried at Blackburn, Liverpool, and Birmingham, in all of which persons were charged, under the 17th section of the Pharmacy Act, 1868, with selling poison insufficiently labelled. In all of the cases the offence was virtually admitted by the defendants, and they were subjected to the payment of fines ranging from ten to twenty shillings and costs.

These cases will serve to bring before the minds of magistrates the fact that the provisions of the Pharmacy Act for the safety of the public are being systematically disregarded by a great number of persons throughout the county trading as oil and colour merchants, grocers, drysalters and patent medicine dealers. A great number of the poisons contained in the schedule to the Act are thus supplied to the public without bearing any of those precautionary protections against accident or misuse which the Legislature has indicated to be necessary. This fact has been emphatically pointed out by the jury in the late inquest at Newhaven (see p. 279), and the opinion had very properly been expressed by them that the preparation and sale of medicines containing dangerous ingredients should be restricted to duly qualified persons. The mere word "poison" written upon or placed as a printed label upon packets of such articles is not sufficient to satisfy the requirements of the Act, and hence persons selling poisons in this way are liable under the 17th section to a penalty of £5 and costs. Even if, in such cases as we have mentioned, the word poison, as well as the name of the poison, together with the name and address of the seller, were placed upon the packet or bottle containing the poison, and the provisions of the Act were complied with so far as the 17th section is concerned, persons selling poison in this way would be further liable to a penalty for breach of the law under the 15th section of the Pharmacy Act.

In the Horsington case the defendant pleaded as a defence that the laudanum he sold bore a patent medicine stamp, and it is well known that in some places the use of the stamp in this way is supposed to be a protection against liability under the Pharmacy Act. That it is not of such virtue to the unregistered vendors of poison is, however, beyond question, and we are glad to find action is being taken with the view of making these circumstances known to magistrates and the police as well as to the persons engaged in the irregular trade by which the public safety is imperilled and the business of the legally qualified chemist and druggist unfairly interfered with.

DEATH OF DR. MOHR AND M. POGGIALE.

With much regret we have to make known the death of Dr. Friederich Mohr at the age of 72. Originally a pharmacist at Coblentz, and since 1864 the Professor of Pharmacy at the University of Bonn, Dr. Mohr has established a world-wide reputation for his scientific acquirements and as author of several valuable works connected with chemistry, physics and geology. One of these, on practical pharmacy, is well known in this country in the form of a translation, edited by Professor Redwood; another, on volumetric analysis, has been made familiar to English chemists by the valuable labour bestowed upon it by Mr. Sutton, of Norwich. We hope shortly to be able to furnish our readers with some further account of the life of this remarkable man.

The October number of the *Journal de Pharmacie et de Chimie* also contains an announcement of the death of an active member of its editorial staff, M. Poggiale, and the discourses pronounced at his funeral by representatives from the various bodies to which he belonged. M. Antoine-Baudoin Poggiale was born in 1808, and his first memoir, published in 1834, was devoted to proving that the "parigline" of Palotta, the "smilacine" of Folchi, the "salseparine" of Tubeuf and the "parillinic acid" of Batka, were one and the same immediate principle. Amongst his subsequent works may be mentioned his treatise on Volumetric Analysis. M. Poggiale had filled the office of President of the Paris Society of Pharmacy and was a member of the Academy of Medicine.

Among the scientific works announced to be published during the coming season by Messrs. Macmillan and Co. is a "new and thoroughly revised edition" of Fluckiger and Hanbury's 'Pharmacographia.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, October 1, 1879.

MR. GEORGE WEBB SANDFORD, PRESIDENT.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT.

Present—Messrs. Atkins, Bottle, Churchill, Frazer, Gostling, Greenish, Hampson, Hills, Mackay, Richardson, Rimmington, Robbins, Savage, Shaw, Squire, Symes, Williams and Woolley.

The minutes of the previous meeting were read and confirmed.

Weights and Measures.

The President stated that on the day following the last Council meeting he had received the following letter from the Privy Council office:—

"Board of Trade,
"(Standards Department),
"7, Old Palace Yard, S.W.,
"3rd September, 1879.

"Weights and Measures Act, 1878.

"Sir,—I am directed by the Board of Trade to acknowledge your letter of 27th ult. on the subject of verifying and stamping apothecaries' weights and measures.

"In reply, I am to point out that the local authorities named in the above Act are charged with the duty of inspecting, verifying, and stamping all weights and measures used in the trade, and that this Board are not authorized to interfere therein.

"I am also to add that, if the Pharmaceutical Society will depute someone to call on Mr. Chaney at the Standards Office, 7, Old Palace Yard, that officer will be glad to give him any information that may be in his power with reference to the above Act.

"I am, sir,
"Your obedient servant,
"Henry G. Calcraft.

"G. W. Sandford, Esq.,
"President of the
"Pharmaceutical Society of Great Britain,
"17, Bloomsbury Square, W.C."

In accordance with this communication he had waited on Mr. Chaney, and the result of the interview had been that he had received the following information:—No order had yet been issued as to the verifying of glass measures, and it had not yet been decided to issue any respecting them; if determined on it would probably only refer to the top line of graduation, and not to the subdivisions. For the present chemists need fear no interference from local inspectors, because they were not in possession of the standards, and would not be for three months to come. With regard to the idea which some persons entertained that weights or measures could only be used in the district in which they had been stamped, Mr. Chaney said this was altogether a mistake. A weight or measure stamped in one district was good in every district.

Mr. Rimmington said it was very desirable that what the President had stated should be generally known.

Mr. Richardson had always understood that the standards in each district were regulated by the standard in London. With reference to the glass measures, he did not quite understand whether they were to go on under the old system or to wait.

The President said that at present they must go on; they could not get them verified by the local inspectors.

Mr. Richardson said nothing varied more than glass measures. When could they have them stamped?

The President said certainly not for two or three months, because the inspectors would not have any standards by which to try them.

Mr. Shaw said he understood it was competent for any one to send his glass measures to the stamping office to be verified, and that Mr. Greenish had already sent three or four dozen, which had been verified and a mark placed upon them.

The President said he could only repeat that at present no inspector had in his possession the standards by which he could verify glass measures.

The Vice-President said it was very important that it should be generally known to chemists that any inspector who required a chemist to have his measures verified was for the present exceeding his authority.

The Chemists' Ball.

It was unanimously resolved that an application from Mr. Arthur L. Savory, asking permission to use a room on the Society's premises, for a meeting to make arrangements for the Chemists' Ball, be acceded to.

Local Secretary.

Mr. Sharp was unanimously elected Local Secretary for Sunderland in place of Mr Nicholson deceased.

Elections.

MEMBER.

Pharmaceutical Chemist.

The following, having passed the Major examination and having tendered his subscription for the current year, was elected a Member of the Society:—

Grimble, Alfred ....Boston.

ASSOCIATES.

The following, having passed the Minor examination and tendered or paid as Apprentices or Students their subscriptions for the current year, were elected "Associates" of the Society:—

Goodall, Thomas Torby ....Derby.
Wilks, Charles Frederick ......York.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Rowntree, Alfred Henry.........Manchester.
Timm, Edmund ....Goole.

It was proposed by Mr. Hampson, and seconded by Mr. Woolley—

"That the following Pharmaceutical Chemists, having tendered their subscriptions for the current year, be elected Members of the Society:—

Clarke, Isabella Skinner ....London.
Minshull, Rose Coombes.........London.

Mr. Hampson, in moving this resolution, said he was very glad to see that the ladies had again applied for membership. Two or three years ago, this question had been, he thought, unwisely relegated to the annual meeting, but since then there had been two or three elections of Council, and they were now, he contended, perfectly entitled to interpret the Act of Parliament according to the best of their ability. He believed the two ladies in question, having passed the requisite examinations and become registered, were without any doubt eligible according to the Act of Parliament to become members. They had conformed to everything which the Act required, and he thought the duty of the Council was to elect eligible persons irrespective of anything else. He had been told more than once that it was a matter of option with the Council, but he could not see it in that light. The duty of the Council was not to make the law, but to carry out the law; and it seemed to him somewhat impertinent to say, 'Because you are a woman, although you have gained admission to the rights of pharmacy under the Act of Parliament, when you apply under another portion of the Act of Parliament to become a member of the Society, you shall be refused.' This refusal had continued to take place for several years, but he took his stand on this point that the Council could not say that one portion of the Act of Parliament was a public matter, and another was a private matter. Some members had taken this ground, but he altogether refused to accept it, because the operations of the Society were carried on by the members of the Society, and the members were for the most part elected because they were pharmaceutical chemists or chemists and druggists before the passing of the Act, and it seemed to him that to put any stumbling block in the way of carrying out the Act of Parliament was illegal. If the members of the Council refused to admit eligible persons to membership of the Society because of their own private convictions or sentimental views, they were overriding the Act of Parliament and neglecting their duty as a Council. But apart from the legal aspect, he would say that it appeared somewhat ungenerous, he would almost say unmanly, to continue this persistent refusal. Surely there could be no harm in admitting as members those who had satisfied the examiners; on the contrary, they would do the Society honour by admitting to its ranks properly qualified lady members. Besides, by a refusal these ladies were also denied the privileges of using the library and museum, the title of membership, which in some parts of the kingdom was considered of great value, and the Journal. He did hope that this question would now be taken out of the hands of the annual meeting, where it ought never to have been placed. It was part of the executive duty of the Council to elect all eligible persons, irrespective of their sex. It would be as reasonable to ask what church they attended as to inquire as to the sex of eligible persons who applied for admission, and he hoped the matter would now be settled by carrying out the Act in its entirety.

Mr. Woolley seconded the motion, and endorsed everything which Mr. Hampson had said. He should be sorry for the Pharmaceutical Council to be the last to grant a request, the justice of which was obvious, and which must, ultimately, inevitably be granted. Body after body was granting to women what was their undoubted right, and he did trust the Pharmaceutical Council would not be left in the unenviable position of being the last to recognize it.

Mr Williams said he intended to support the motion. He had watched the proceedings of two general meetings in which this question had been agitated, and he should be very sorry that such a question should again be discussed by the general body. The necessity for such discussion no longer existed, for on two occasions the meetings were so evenly divided that it was a mere toss up which opinion should be followed. Taking it in its broader sense and seeing that these pharmaceutical chemists had applied for membership, he could see no reason why the fact of their being ladies should prevent their being elected. He thought the question had now come back to the Council for decision, and it was time it was finally set at rest. He should vote for the motion on that ground, and also because he agreed with Mr. Hampson that there was no real reason why they should not be elected.

Mr. Atkins intended to support the motion, though he demurred to the remark that the question ought never to have been referred to the annual meeting. He was very glad it had been so referred, for he did not think it would have been well to attempt an organic change without feeling the pulse of the constituency. He was, however, quite convinced that it was undesirable to remit it still further. Having tested the opinion of the members twice, the Council had done all it was bound to do, and he believed its constituents would be thankful to have the question taken out of the arena of unprofitable discussion. It was unnecessary to go over again the abstract arguments, and he hoped the question had now been removed from the ground of controversy altogether.

Mr. Savage was very glad to have so far a unanimous expression of opinion as to the desirability of admitting these ladies to the Society. He had always held that they had a right to be admitted, and he felt more than ever the importance of saving any further discussion of the question. The admission of all who had distinguished themselves in the examinations was, he thought, desirable, and he thought it was very much to the credit of these ladies that they had had the moral courage and perseverance to go successfully through the ordeal.

The President said as he still adhered to the view he had always held, he must correct Mr. Savage as to the opinion of the Council being unanimous. He had always voted against the admission of ladies and should continue to do so. Mr. Hampson said the Council ought to carry out the laws, but if it were to carry them out without judgment, they would be utterly useless. Then again, Mr. Hampson said that the members carried on the business; but if so, they had the vote of the members against the admission of ladies.

Mr. Hampson: By a majority of one or two.

The President said never mind what the majority was, it was a majority, and having sent this question to the members for decision, he held that the Council was to a great extent bound by their decision. Mr. Hampson had said the members of the Council had withheld from ladies certain privileges, but they were only privileges which belonged to members of the Society, not privileges which conferred any rights in respect of trading. He need not say anything further, because his views were well known.

Mr. Mackay said that in these days of wars and rumours of wars, he felt disposed to be a man of peace. Although he had his own ideas with regard to the admission of ladies to membership, he could not hide from himself that there had been an immense deal of agitation about it, and unless it were settled to-day there would probably be a great deal more; he was therefore disposed to settle the matter by voting for the admission of ladies.

Mr. Frazer said he rejoiced at the conversion of some of the members, and he trusted the matter would now be settled.

Mr. Richardson heartily supported the motion. He looked upon pharmacy as a suitable occupation for women, especially in villages and small towns, and their reception as members would give an impetus to women to become pharmacists. He hoped the President would withdraw his opposition, and that the vote would be unanimous.

Mr. Bottle said he should vote for the motion, not with a view of conceding to ladies what Mr. Hampson asserted was their right, but as a matter of courtesy, which he thought they had well earned by passing the examinations, and also with a view of bringing about a peaceful termination to a question which had formed a bone of contention for some years. A prolonged agitation would be infinitely worse than admitting even a dozen women into the Society.

Mr. Shaw said he had always supported the admission of ladies, and he was delighted to find such a large number of conversions to the proposition now made. He regretted that the matter had ever been remitted to the annual meeting, and he would remind gentlemen that during the discussions on the Pharmacy Act it was distinctly stated that all persons passing the examination, or persons who became pharmaceutical chemists, should be eligible to become members of the Society. That was held out to everyone, and as ladies were not excepted, they had certainly a right to be admitted.

Mr. Greenish said he should vote for the motion as a simple act of justice to those who had qualified themselves by passing the examination and who had been left out in the cold for a long time.

Mr. Hills said he also intended to record his vote in favour of the motion.

Mr. Robbins said he had brought forward a motion last year to endeavour to settle this question by an appeal to the members, on which he had been outvoted. The matter had come before the Council several times and he thought the members were all getting tired of it. To avoid further agitation, and to settle the question, he thought the Council were now prepared to give an almost unanimous vote in favour of the admission of ladies.

The motion was then put and carried, the President being the only dissentient.

Mr. Bottle asked what would be the position of these ladies in case they changed their names.

The President thought the Married Women's Property Act would reserve to the ladies their right of membership.

Two persons were restored to their former status in the Society, upon payment of the current year's subscription and a fine.

Additions to the Register.

The Secretary reported that—

John Cammack, Benington, near Boston;
William Clarke Edmonds, Rawmarsh, Yorks;
Frederick Ellis, 25, Cleveland Road, Downham Road, Islington, N.;
Frederick John Sicre, 33, Molyneaux Road, Farnworth Street, Everton, Liverpool; and
William Henry Thomas, 94, Victoria Street, Dowlais;

having made statutory declarations that they were in business before the passing of the Pharmacy Act, 1868, and their declarations having been duly supported by medical practitioners, their names have been placed on the register.

Reports of Committees.

The President said that the Solicitor had been requested to attend at half past twelve, and he would therefore ask the Council to take the General Purposes Committee's report first, as it was on matters arising out of that report the Solicitor's opinion was required. The Council would of course go into committee to discuss these matters.

Mr. Symes said, in case a resolution was passed in regard to reporting the proceedings in committee, he could fancy it quite possible the Council might be in a dilemma as to what might be reported. He would suggest that the best mode of carrying out the resolution which was carried at his suggestion at the last meeting but one, would be, that the Council when in committee should frame a report which should be presented to the Council on resuming, and published. That was a parliamentary method of proceeding, and he merely rose to call general attention to that fact, so that when the Council went into committee the members should know what they were going into committee upon and should be in a position to frame a report of the proceedings to be presented to the Council on resuming.

Mr. Shaw said he was not present when the resolution referred to was passed, but he had read the report with interest. It struck him that the resolution would not amount to anything, and he found that, in answer to an inquiry, Mr. Symes explained that what had been optional in former times would now become compulsory. If he understood Mr. Symes's present proposal aright, it was this, that when the Council went into committee notes were to be taken, and when the discussion came to a close it was to be put to the members, and a decision come to as to what report should be published. This would be a most difficult thing to carry out, for immediately the Committee had closed one discussion it would have to open another as to what should be reported. Such a system would entirely destroy freedom of discussion. It had hitherto been left to the discretion of the professional reporter, who was constantly called upon to exercise his judgment in such matters, and he should recommend that the same course be followed in future, it being, of course, understood that the reporter would omit all personal matters and details of pending legal proceedings.

Mr. Hampson supported Mr. Symes's view. The resolution he brought forward some time ago was for the purpose of having a report of what took place in committee which would give satisfaction to the outsiders, and do no harm to the interests of the Society. It appeared to him that the best person to take the report would be the reporter himself; but it would necessarily be brief, and he thought it should be handed to the Committee, who should decide whether it was a faithful report and suitable for publication.

The President having read the resolution referred to,

Mr. Richardson said he feared that if Mr. Symes's proposal were adopted the members of Council would be there for a week. He thought the matter might safely be left to the President, the Secretary, and the reporter. He had been connected with a public body for nearly nine years, and he thought it would be much better if every report from a Committee were rendered in a form in which it could be published in the Journal and discussed in open Council.

The President said the Council had a good deal of business to do, and he must ask Mr. Symes to give notice of a motion if he had anything definite to propose, otherwise they must proceed with the report of the Committee.

GENERAL PURPOSES.

The report of this Committee was then read.

It consisted principally of correspondence with the Solicitor, with regard to sundry legal matters in which he had been instructed to take proceedings. There was also correspondence with the Secretary relating to alleged infringements of the Pharmacy Act, in regard to some of which the Committee recommended that proceedings should be taken. It also recommended that a grant of £35 be made to the Manchester Chemists and Druggists' Association, to partly defray the expenses of lectures on Chemistry, Materia Medica and Qualitative Analysis at the Manchester School of Pharmacy.

The Council then went into committee to consider the report and to confer with the Solicitor on certain points therein contained.

In the course of the conversation the Solicitor stated that he had just received a communication saying that—

Daniel Tudor Williams, of Aberdare,

who had been sued in the county court for a penalty for infringement of the Pharmacy Act, 1868, had paid the amount claimed, with costs, into court.*

On resuming, the report and recommendations of the Committee were unanimously received and adopted.

Mr. Churchill stated that he had just received a telegram from the Secretary of the Chemists and Druggists' Trade Association saying that in one of the cases which had been before the Committee, the Trade Association had prosecuted, and the defendent had been fined £1 and costs.

Mr. Richardson thought it would lead to confusion if both bodies undertook the prosecution of offenders.

The President said that anyone could institute proceedings under the 17th section; the Society did not generally prosecute under that section, which constituted a police offence.

The Council again went into committee to consider the opinion just given by the Solicitor with regard to a certain case which had been submitted to him, but after some discussion it was ordered to stand over to next month, the Secretary in the meantime to obtain fuller information.

The Council then resumed.

FINANCE.

The report of this Committee included a recommendation that sundry accounts be paid. It also stated that the Committee had considered the question referred to it by the Council, with regard to the payment of annual subscriptions to local secretaries, and was of opinion that

* It will be remembered that Mr. Williams's name was removed from the Register some time ago.

it would not be wise to alter the existing regulations, excepting in the form of letter sent to members who had not paid by March 31st, an amended form being submitted.

The report and recommendations were received and adopted.

LIBRARY, MUSEUM AND LABORATORY.

This Committee reported that a prosecution having been instituted against a member of the Society for the sale of cream of tartar alleged to be adulterated, the case had been under its consideration, and that as cream of tartar of commerce invariably contained a portion of tartrate of lime, it was deemed desirable that the Solicitor of the Society should watch the case at the time of the hearing. That he had been instructed to do so, and the magistrates had dismissed the summons.*

Mr. Woolley asked if the defendant received his costs.

The President said he could not answer that question.

Mr. Woolley said there was a case near Manchester, in which the analyst gave an opinion that proved to be totally erroneous with regard to a certain drug, and there costs were awarded against him. Honest tradesmen ought not to be subjected to this kind of persecution and have to bear the costs into the bargain.

The President said there had been another prosecution for the sale of cream of tartar in the same county, and no doubt by the same analyst, which the magistrates had dismissed without calling for any defence.

The report was received and adopted.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£15 to the widow of a registered chemist and druggist, aged 60. Applicant had a grant of £10 in February, 1877.

£15 to a member, aged 59, suffering from ill-health. He had a grant of £20 in August, 1878.

£10 to a former member, unable to work from sickness, who has had three previous grants.

£10 to a registered chemist and druggist, formerly in business, who has had two previous grants.

£10 to a registered chemist and druggist, who has also had two previous grants.

£5 to another registered chemist and druggist, aged 61, an unsuccessful candidate for an annuity last year, and who has had two previous grants.

£10 to a female registered chemist and druggist, who has had three previous grants.

One other application was ordered to stand over for further inquiries.

The Secretary had reported that there are now twenty-nine annuitants on the Fund, and given particulars of the age and date of election of each.

The Committee having considered the financial position of the fund, was of opinion that it was expedient to elect three pensioners, and recommended that the election be held on Friday, December 19.

Mr. Williams said the Committee only proposed to elect three annuitants, but there were nine candidates, and several other worthy objects could easily have been added to the list, but the Committee was really aground for want of funds. In fact it was running some risk in proposing to elect three, for in all probability the means would be exhausted by the end of the year. If the subscriptions were more general from those who now did not subscribe at all, there would be abundance of funds not only for three, but for the whole nine. He trusted that their friends in the country would see this, and recognizing that it was not a matter of disputed politics, but of genuine benevolence, would endeavour to give something, however small, to assist the fund.

Mr. Rimmington drew attention to the case of one of the annuitants whose conduct had on a former occasion been the subject of inquiry, and suggested that it would be well to remove him and put a better man in his place.

Mr. Williams said this could hardly be done offhand without due notice and consideration.

Mr. Bottle hoped the Council would feel that it was in a position to elect three annuitants, and he was sorry it could not be more. But he had felt on the previous evening when the Committee considered the matter that he could not go to the extent of proposing four, since the balance sheet showed that it was doubtful on which side the balance would be at the end of the year; but there would certainly be no surplus for investment. It was true that in the coming year some deaths might occur, but, on the other hand, as the annuitants became older they were entitled to larger pensions, and there were constantly more claims for casual relief. He therefore hoped that all who were able to contribute to the fund would assist in doing the large amount of good which the Benevolent Fund was calculated and he hoped for many years would continue to do.

The report and recomendations were unanimously adopted.

Mr. Shaw gave notice that he should next month bring forward a motion for the purpose of preventing canvassing cards and circulars being issued by candidates.

The Pharmaceutical Conference at Hanover.

Mr. Greenish stated that, with Dr. Paul and Mr Passmore he had attended the meeting of the German Pharmaceutical Association held in Hanover the first week in September. As on the former occasion in Coblentz, they were very cordially welcomed, and at the dinner the toast of the Foreign Guests had been received with considerable enthusiasm. There had also been placed at the disposal of each of them a guide to Hanover and its surroundings, also tickets of admission to the Pharmaceutical Exhibition and other places of interest in and about Hanover. Some specimens of new preparations shown in the exhibition had been promised for the Society's Museum. The apparatus, which formed an important part of the exhibition, was mainly composed of modifications of that of Beindorff, so well known in German pharmacies. There was also exhibited by a firm in Berlin a polarimeter very efficient, and at a moderate price, and a microscope of a construction that possessed some advantages over those in general use in this country; both of these there was some probability of being able show at one of the Evening Meetings of this Society. He should be glad to see some of their colleagues in Germany return the visit on one of our festive occasions in England. He had much pleasure in moving—

"That a vote of thanks be presented to the President of the German Pharmaceutical Association and the Local Committee at Hanover for their cordial reception of English visitors at the meeting of their Association."

The motion was seconded and carried unanimously.

PHARMACEUTICAL MEETING.

Wednesday, October 1, 1879.

The first evening meeting of the session took place on Wednesday, October 1, the chair being taken by the President of the Society at half-past eight.

The minutes of the last meeting were read and confirmed.

The President, having expressed his pleasure at seeing so large a gathering on the opening night of the session, called on Professor Redwood to present his—

Report on the Chemistry and Pharmacy Class.

Professor Redwood said the business of the evening being of a somewhat varied character, and the actors who were to take part in the proceedings

* This case was reported in the Journal of September 27.

being numerous, it was necessary, or at least desirable, that those who had merely formal duties to perform should be as brief as was consistent with setting forth the merits of those whom they had to introduce to the notice of the meeting. In reference to the examinations he might state that in his class and also in that of his colleague, Professor Bentley, who he regretted to say was unable to be present that evening, there had been three separate examinations. In the first place there were two examinations for those students who had studied five months, namely, one at the end of March, and one at the end of July. On these examinations a bronze medal was awarded and certificates of merit, the latter being only given to those students who obtained an equal number of marks to those who at the ten months' examination obtained a certificate of honour. The certificate of merit therefore in this case was really of greater value than the certificate of merit in the ten months' examination. As the result of the examination in March he found that there were five gentlemen in his class who received certain indications of merit; at the head of these was a gentlemen who would be found to figure also in subsequent examinations, one whose name could not fail to be familiar to them, namely, Mr. Mackay, of Edinburgh,—not a member of the family of Mackay's which they were most familiar with, but still it was satisfactory to know that talent was not confined to that one family. There were four other gentlemen, whose names appear below, all of whom obtained 75 per cent. of the highest number of marks which could be given, and they were all entitled to certificates of merit. In the July examination some of these gentlemen again appeared. Those who had previously obtained honours as five months' students could not compete on that occasion in the five months' examination; but there were again five gentlemen who obtained distinction, the bronze medal being awarded to Thomas Horton. In July also there was the examination for those who had been studying ten months, and those who had not been studying so long were eligible to compete, and occasionally did so, but it could not be expected that they would often succeed in competition with those who had been studying for double the length of time. Here again the silver medal was awarded to Mr. Mackay. As he mentioned the names of the other successful competitors, Professor Redwood said he desired to add one remark, namely, that it was a feature in these examinations of late years that a larger number of students had competed than was formerly the case, and further, that a larger proportion of those who had competed had proved successful in the competition. This was a highly satisfactory feature, inasmuch as it seemed to indicate that the students now obtained a more thorough preliminary education before they came to that school; they were better prepared, and were therefore more generally successful than was the case several years ago.

The following is a list of the students in this class to whom prizes have been awarded:—

FIVE MONTHS' COURSES.

FIRST COURSE.

Bronze Medal........................James B. Lillie Mackay.

Certificates of Merit ....
- Frank Harris Alcock.
- Beresford Fred. Harold Maudson.
- Edward Jarrett Eaton.
- James Henry Allan.

SECOND COURSE.

Bronze Medal........................Thomas Horton.

Certificates of Merit ....
- Henry William Drew.
- William Herbert Hyatt.
- George Wale.
- William Inchle Gulliver.

TEN MONTHS' SESSION.

Silver Medal........................James B. Lillie Mackay.

Certificates of Honour ....
- Thomas Horton.
- Edward Jarrett Eaton.
- James Henry Allan.

Certificates of Merit ....
- Frank Harris Alcock.
- Henry William Drew.

The following were the questions for the examinations:—

FIRST COURSE. BRONZE MEDAL.

Hours 10 till 2.

1. Define the meaning of the terms matter, force and inertia.
2. What is the meaning of the term weight?
3. What is the weight of a pint of rectified spirit, B.P.?
4. What marked distinctions are there between gaseous diffusion and liquid diffusion?
5. Briefly explain the undulatory or wave theory of light.
6. Describe the normal composition and characters of crystallized carbonate of potassium, and also of the carbonate of potash of the Pharmacopœia.
7. Give the composition of oxide of zinc, and describe the methods by which it may be produced.
8. In what state is bismuth principally found in nature? What is its melting point, and what appearance does the metal present when a mass of it, after being melted, and then cooled, is broken?
9. Give the respective compositions of the lowest and highest oxides of antimony, and describe the processes by which they may be obtained.
10. Give the respective compositions of glucose, alcohol, aldehyde, acetic acid, and acetone, and explain how these are or may be related to each other.

SECOND COURSE. BRONZE MEDAL.

Hours 10 till 2.

1. Describe the method of taking the specific gravity of calomel and also that of wax.
2. Explain the meaning of the term "allotropy."
3. What is the meaning of the terms "specific heat" and "latent heat?"
4. Describe the essential characters of an emulsion.
5. Describe ozone and peroxide of hydrogen, their properties and the method of producing them.
6. Describe phosphorus, its production from natural sources, its allotropic conditions, and its properties.
7. What is the natural source of cadmium, how is it isolated, and what are its properties?
8. Describe acetic acid, its production in various ways, and the relation it bears to alcohol.

SESSIONAL COURSE. SILVER MEDAL.

Hours—10 till 1, and from 2 till 5.

1. What is the weight of a pint of distilled water, and what is the specific gravity of a liquid, a pint of which weighs 9625 grains?
2. What are respectively the specific heats of water, oil, and mercury?
3. What is the velocity with which a body falls to the earth through a vacuum, at the latitude of London, in the first, second, and third second of time?
4. Describe the principle of the action of the siphon.
5. What is the law relating to the rate of diffusion among gases?
6. In what way does the density of a gas into which diffusion takes place affect the result?
7. Describe the production of chloride of magnesium and also of chloride of aluminium.

8. What is the composition, and the assumed constitution of borax, and how is the borax of commerce usually prepared?

9. What are the chemical charges that occur in the conversion of barley into malt?

10. Describe the production of lactic and butyric acid.

11. Describe the production of artificial urea, and point out the relation it bears to cyanogen.

Report on the Practical Chemistry Class.

Professor Attfield being next called upon, said he was much pleased to see such a large number of old students present, and no doubt his colleagues who lectured in that hall would be very glad if they could see such a muster every day in the session. He appeared there in two capacities, as professor and as examiner. As professor he had given in his report to the Council in the usual way at the end of the session, and that report he now held in his hand. He would not read the whole of it, but might say formally that the number of students was 75, the average period of work by each was six months, and the number of hours occupied in work daily during that period was three and a half. As compared with the previous session the number of pupils was the same, the average number of months' work was rather greater, but the number of hours worked daily was decidedly less, hence neither this nor, indeed, the previous one compared favourably with former sessions. Out of the 75 pupils only 5 attended for purposes other than those connected with pharmacy, whilst there were three ladies working at practical chemistry for the requirements of the medical profession. He might add with regard to the lady students that he saw no reason whatever why ladies should not work at practical chemistry in the Pharmaceutical Society's laboratories. With regard to the general work of the session, he had only to say that they had had what might be called a quiet session. They had got on remarkably well together throughout. The class consisted of gentlemen, and without exception they were men who had come to be prepared not so much for examination as for the general work of life. He trusted they were not disappointed. As examiner, he had to report that at the end of the session he held an examination for the Council prizes, when the student who obtained the highest number of marks was Mr. Frank Harris Alcock. He obtained 81 out of 100 marks, and hence took the silver medal. The second, Mr. F. W. Warrick, and third, Mr. R. J. Price, obtained 76 and 75 per cent. of marks respectively, and were awarded bronze medals, and then came five gentlemen whose numbers carried Council certificates. Nine other competitors obtained less than 60 marks, so that there were 17 in all, a good proportion of the whole number of students. This was the result of his examination, extending over two days, but he had also been teacher of these men, and had one way or other examined them for more than two hundred days during the session. He had thus gained so good a knowledge of the relative positions of these seventeen men that he was able to say that two who did not even obtain the minimum number of marks qualifying for a certificate of merit were as good men as those who had obtained marks qualifying them for medals. The sound, and he thought safe deduction, was that even a two days' examination conducted by a professor in the subject was an inefficient test of competency, but he would not be so disloyal to the School or the Society, to say nothing of himself, as thus to criticize his own action as an examiner, unless he were prepared with a remedy. The remedy he suggested was to let the professors' periodical examinations throughout the session count in the adjudication of position at the end of the session. It would be scarcely right, having said thus much about the two gentlemen who did not succeed, if he were not to add that in one of the two cases he knew why the competitor did not obtain a higher place, and in the other case he believed he knew the reason. In the one case the man was ill, and in the other case he thought he had good evidence that instead of analysing a certain solution which had been given to him, the man took up the wrong vessel and analysed something which had not been given to him. It was well known that he had great sympathy with men who failed at all kinds of examinations, because he knew it was not always their fault. Whether they failed because of such an accident as he had described or because they did not happen to be very well, or because they happened to have been educated at a school like his own, where the students were not so much prepared for examination as for the battle of life, and consequently, he was sorry to say, sometimes did not do very well at examinations; whatever the causes were, he had great sympathy with disappointed candidates, and he hoped this little suggestion with regard to his own work would have attention. The method might be carried further and deeper if the Council thought fit; if so, he was sure that a large number of good men would cease to suffer from failure at examinations.

The following is a list of students in this class to whom prizes have been awarded :—

Silver Medal	Frank Harris Alcock.
Bronze Medals	Fredk. Walmsley Warrick Robert John Price.
Certificates of Merit	Edward Jarrett Eaton. James B. Lillie Mackay. William Inchle Gulliver. Beresford F. H. Maudson. Thomas Horton.

The following were the questions for the examination :—

July 21st and 22nd, 1879.

Hours 10 to 5 each day.

(*Books and Memoranda permitted.*)

Standard number of Marks, 100.

FIRST DAY.

1. The "solution" given to you may contain any of the ordinary metallic salts used in medicine; analyse it, and state the result.

2. Is there any common poison in the "vomit" placed before you?

SECOND DAY.

3. Examine the specimens of epsom salt, iodide of potassium, sulphate of quinia and distilled water supplied to you, and report on their quality.

4. How much nitrate of silver is present in one fluid ounce of the "lotion" given to you?

Note.—Manipulation as well as results will be scrutinized.

Report upon the Botany and Materia Medica Class.

The President then, in the absence of Professor Bentley, presented the report which that gentleman had sent in. He first read a letter which Professor Bentley had addressed to him, explaining that his official duties at King's College, as Dean of the Medical Faculty, would prevent his being present that evening, and saying how deeply he regretted being deprived of the pleasure of meeting his old students on that occasion as he had been accustomed to do for so many years. The Professor's report stated that in the first course examination he had 19 candidates, the average marks being exceedingly good, some exceptionally so; the three first obtained respectively 90, 80 and 77 per cent., and 2 more 76 and 75. In the second course there were 6 candidates, 3 being specially worthy of distinction, who obtained respectively 92, 82 and 75 marks. At the terminal sessional examination there were 14 candidates, the majority of whom passed through it very creditably, and the first three obtained exceptionally high marks.

The following is a list of the students in this class to whom prizes have been awarded:—

Five Months' Courses.

FIRST COURSE.

Bronze Medal........................James B. Lillie Mackay.

Certificates of Merit .... Fred. Wm. Ed. Shrivell. / Frank Harris Alcock. / James Edward Williams. / Edward Jarrett Eaton.

SECOND COURSE.

Bronze Medal........................Thomas Horton.

Certificates of Merit .... Henry William Drew. / William Inchle Gulliver.

Ten Months' Session.

Silver Medal........................James B. Lillie Mackay.

Certificates of Honour .... Thomas Horton. / Frank Harris Alcock. / Henry William Drew. / Edward Jarrett Eaton.

Certificates of Merit .... James Edward Williams. / William Inchle Gulliver. / Fred. Wm. Ed. Shrivell. / James Henry Allan. / Percival C. Powrie. / Isaac Leach.

The following were the questions for the examinations:—

FIRST COURSE. BRONZE MEDAL.

Hours from 10 till 1.

1. Describe the structure of a seed; and define the terms dicotyledonous, monocotyledonous, and acotyledonous.

2. Describe the characters of (*a*) ordinary woody tissue; (*b*) disc-bearing woody tissue; (*c*) liber tissue; and mention the plants and parts of plants where they are respectively found.

3. Describe the structure of a leaf-bud. Define the following:—Herb, spine, runner, rhizome, corm, bulb, tubercule and tuber.

4. What are the botanical and geographical sources of Alexandrian and East Indian sennas? Describe their general and chemical characters and enumerate their official preparations.

5. What are the botanical and geographical sources of the official ipecacuanha? Describe its general and chemical characters, and show how it may be distinguished from the varieties of ipecacuanha known as striated and undulated.

6. What are the botanical and geographical sources of asafœtida. How may it be distinguished from the other official gum resins of the Umbelliferæ, and what are its official preparations?

SECOND COURSE. BRONZE MEDAL.

Hours from 10 till 1.

1. Describe the internal structure of an acrogenous or acotyledonous stem.

2. Define the following terms as applied to leaves:—Primordial, connate, decussate, equitant, crenate, serrate, lanceolate, obcordate, pinnate, and pinnatifid.

3. Describe the parts of a carpel; and explain the terms simple and compound pistil, apocarpous and syncarpous.

4. What are the botanical and geographical sources of sumbul? Describe its general and chemical characters, and mention its official preparations.

5. What are the common adulterants of scammony, and how may they be detected?

6. What do you understand by a balsam? Describe the botanical source, collection, preparation and general and chemical characters of balsam of Peru, and mention any official preparation into which it enters as a constituent.

TEN MONTHS' SESSION. SILVER MEDAL.

Hours from 10 till 1.

Botany.

1. Describe the structure of epidermal tissue.

2. Define the following:—Amentum, capitulum, cyme, thalamus, receptacle, disk, involucre, cupule, spathe, monœcious, diœcious, and corona.

3. Describe the several kinds of placentation, and give illustrations of natural orders in which they may respectively be found.

4. What is the nature of the fruit? Explain the composition of the following fruits:—Apple, strawberry, rose, acorn, fig, and pine-apple.

5. Distinguish the Compositæ from the Dipsacaceæ; and the Labiatæ from the Scrophulariaceæ and Boraginaceæ.

6. Give the essential characters of the following natural orders:—Ranunculaceæ, Leguminosæ, Umbelliferæ, Orchidaceæ, Iridaceæ, and Liliaceæ.

Materia Medica.

Hours from 2 till 5.

1. Describe the general and chemical characters of Senega root. Mention the roots which have been found mixed with it, and the means of distinguishing them.

2. What are the botanical and geographical sources of Ammoniacum? Describe its general characters, the mode in which it is obtained, and its composition; and mention its official preparations.

3. How would you distinguish the official jalap resin from the resins of Tampico Jalap, Scammony, and Guaiacum.

4. What are the supposed botanical sources of the official Rhubarb root? Describe its general and chemical characters, and show how it may be distinguished from English Rhubarb root.

5. Describe the characters of the flowers of *Anthemis nobilis*; and state how they may be distinguished from those of *Matricaria Parthenium.*

6. Describe the physical and chemical characters of Croton Seeds. Mention the differences between East Indian and English Croton oil, and give the dose and official preparations of Croton oil.

Report on the Botanical Prize.

The President read Professor Bentley's report on the Herbarium competition. There were four collections submitted, the first of which was admirable in every respect and included 800 specimens. For this he recommended that a silver medal should be awarded to Mr. Thos. F. Perkins. The second, by Mr. Walker, which contained 600 specimens, was also highly to be commended, and eminently deserved the bronze medal; and the third by Mr. Norman deserved a certificate of merit.

The following were the awards:—

Silver Medal ....Thos. Frampton Perkins.
Bronze Medal........................Charles Walker.
Certificate of Merit ....William Francis Norman.

THE COUNCIL EXAMINATION PRIZES.

Mr. SOUTHALL, being next called upon to report on the examination for the Pereira medal and other Council examination prizes, said he appeared in a position very different from that of the gentlemen who had already addressed the meeting, inasmuch as he and his colleague, Mr. Moss, had had no opportunity of seeing and conversing with the students whose work they had examined, as the Professors had, but simply knew them by the mottoes attached to their papers. The examinations had been gone through in a satisfactory manner, showing that the competitors had paid great attention to their studies.

The following are the names of the persons to whom the prizes have been awarded:—

Pereira Medal (silver); and Books value £5, presented by Mr. T. H. Hills.

Frank Harris Alcock.

Pharmaceutical Society's Medal (silver); and Books value £3, presented by Mr. T. H. Hills.

Marshall Leigh.

Pharmaceutical Society's Medal (bronze); and books value £2, presented by Mr. T. H. Hills.

Henry Allen.

The following were the questions for this examination:—

CHEMISTRY.

Time 10 to 1.

Five only of the following questions must be attempted:—

1. *Catalysis, Eremacausis, Fermentation, Putrefaction.* Define these terms and give an instance in which each is correctly applied.
2. How would you perform the analysis of glass?
3. What is a graphic formula? Give such formulas of Phosphoric Anhydride and Acetic Acid.
4. Give reasons for representing Ferric Chloride as $Fe_2 Cl_6$, and not $Fe Cl_3$, and Tartaric Acid as $H_2 C_4 H_4 O_6$, and not $HC_2 H_2 O_3$.
5. What is an *Alcohol*, an *Olefine*, a *Ketone*, a *Glycol*, a *Chlorhydrin*, a *Nitrile*? Give an example of each with formula.
6. What is the construction of Nicol's prism? Describe the effect produced upon a ray of light directed through its length. State also how light transmitted by one prism is affected by a second according to the relative positions of the two.

BOTANY.

Time allowed: Three hours.

In framing answers Candidates should not enlarge upon the questions, but should confine themselves to giving, as briefly and clearly as they can, the information required.

1. Expain the processes of assimilation and metastasis in the living plant.
2. Describe the organs termed elaters and their function, and mention the natural orders in which they occur.
3. Describe any special provisions you may be acquainted with for the fertilization of Orchids.
4. What are proliferous flowers, and what organs of plants are occasionally viviparous, giving examples of each?

MATERIA MEDICA.

1. Describe Myrrh, its chemical composition, the localities whence it is imported, and the history of its use.
2. Give any information you may possess respecting the cultivation of Cinchona in India, and name the most valuable species and varieties.
3. What are Hermodactyls?
4. What is Gurjun Balsam, and what is it remarkable for?

The PRESIDENT then presented the various prizes and certificates to the successful competitors, after which he called upon Mr. Taylor to state the result of the examination for

THE JACOB BELL MEMORIAL SCHOLARSHIP.

Mr. TAYLOR said he had now for four years shared the duty of conducting this examination and he must again express, as he did last year, his surprise and disappointment that these prizes received so little attention and attracted so few competitors. Last year Mr. Williams, the then President, drew forcible attention to the value of these scholarships, in the hope that more would be induced to compete for them, but this year the number was one less than last. When it was considered that these scholarships were worth nearly all the other prizes put together, and that there were only eleven competitors, it could not but occasion a feeling of surprise as well as regret. Of these eleven, eight were from London and one each from Nottingham, Brighton and Manchester. The successful candidates were Mr. Wm. Elborne and Mr. John Thomas. These gentlemen acquitted themselves so well, and their testimonials from previous employers were so good, that his colleague and himself had no difficulty in submitting their names to the Council. He trusted they would avail themselves of the privileges they had obtained, and if they made as good use of them as previous Bell Scholars had done, they would become accomplished and useful members of society and reflect credit not only on the Society but on the name of the distinguished man in whose name these scholarships were founded. He could not sit down without saying that the third candidate, who took the motto *Labor omina vincit*, did his work so well, that he hoped, if eligible, he would try again. But no doubt there were dozens of young men now engaged in pharmacy, who could pass an equally good, if not better examination than those who had now succeeded, and considering that the scholarships were worth £30 each in money, together with free education and all the privileges the Society could afford, it was really astonishing that so few should compete for them.

The PRESIDENT, after presenting the Bell Scholars with the books given by Mr. Hills, said he hoped that both the successful and unsuccessful competitors for the prizes which had just been distributed would be encouraged to renew their studies with zeal, and so prepare themselves, as Professor Attfield had expressed it, for the battle of life. They must remember that their education did not end here, and he hoped they would so extend it as to become ornaments both to society in general and to that Society in particular. They would be looked to for the future prosperity and honour of the Society. Those who had obtained the scholarships he would earnestly exhort to look at the bright example of their predecessors, and a very bright example was now before them in Dr. Tilden, one of the earliest Bell Scholars, who had already greatly distinguished himself, and promised to distinguish himself still more. Let them as far as lay in their power follow in such footsteps.

The successful candidates for these scholarships were:—

William Elborne
and
John Thomas.

The questions set for this examination were as follows:—

Time allowed: Three hours (12 to 3).

LATIN.

Translate into English:—

1. Tum vero omne mihi visum considere in ignis
Ilium, et ex imo verti Neptunia Troja:
Ac veluti, summis antiquam in montibus ornum
Quum, ferro accisam crebisque bipennibus, instant
Eruere agricolæ certatim; illa usque minatur,
Et, tremefacta comam concusso vertice, nutat;
Volneribus donec paullatim evicta supremum
Congemuit, traxitque, jugis avolsa, ruinam.
Descendo, ac, ducente deo, flammam inter et hostis
Expedior: dant tela locum, flammæque recedunt.

2. In Extractis præparandis, nisi aliter indicatum sit, humorem balneo aquoso in patinâ quamprimum consume, sub finem assidue spathâ movens, donec crassitudo sit ad pilulas fingendas idonea.

Grammatical questions on the above:—

3. Parse *visum, verti, veluti, ornum, accisam, instant, tremefacta, concusso.*

4. Explain the cases of *ignis, ferro, agricolæ, volneribus.*

ENGLISH.

1. Parse fully:—

The real strength and security of governments in these days lie in public opinion formed and enlightened by free discussion.

2. Write a short essay on Peace.

ARITHMETIC.

1. Simplify $2\frac{1}{3}+72\frac{5}{8}+316\frac{1}{6}+2\cdot875$.

2. A person sold ·15 of an estate to one person and then $\frac{5}{17}$ of the remainder to another person. What part of the estate did he still retain?

3. If 9 men or 15 women, working 10 hours a day could reap a field in 8 days 6 hours, in how many days of $10\frac{1}{2}$ hours each could 10 men and 12 women reap a field one-fourth larger?

4. Express a gallon in litres, and a kilometre in yards.

FRENCH AND GERMAN.*

Translate into English:—

Plusieurs furent pris, blessés, ou tués, ou entraînés loin du roi par la foule qui se jetait sur eux: il ne restait que cinq hommes auprès de Charles: il avait tué plus de douze ennemis de sa main, sans avoir reçu une seule blessure par ce bonheur inexprimable qui jusqu'alors l'avait accompagné partout, et sur lequel il compta toujours. Enfin un colonel nommé Dardof se fait jour à travers des Calmouks avec seulement une compagnie de son régiment: il arrive à temps pour dégager le roi.

And:—

Il s'est efforcé de connaître Dieu, que par sa grandeur est inconnu aux hommes, et de connaître l'homme, qui par sa vanité, est inconnu à lui-même.

Or:—

Er starb endlich auf einer italienischen Reise in der Stadt Mantua, im drei und siebenzigsten Jahre seines Lebens, und im Vollgenuss seines Ruhms, nachdem er hatte besessen das Vertrauen seines Königs vierzig Jahre ununterbrochen.

And:—

Nach Frankreich zogen zwei Grenadier,
Die waren in Russland gefangen,
Und als sie kamen ins deutsche Quartier,
Sie liessen die Köpfe hangen.

CHEMISTRY, PHARMACY, AND BOTANY.

Time allowed: Two hours (4 to 6).

1. Describe the process for the manufacture of commercial oil of vitriol. What is Nordhausen sulphuric acid, and how can it be prepared?

2. Acidum hydrochloricum, B.P., has a specific gravity 1·16, and contains 31·8 per cent. by weight, of hydrochloric acid gas. How many fluid ounces of the B.P. acid can theoretically be prepared by the decomposition of one pound of pure chloride of sodium by means of sulphuric acid?

3. Give the official process for making ferri phosphas, with any remarks you may consider suitable.

4. State what you know concerning rectified spirit and proof spirit. How can a spirit 60° over proof be reduced to proof spirit? Name a few tinctures made with rectified spirit, and give reasons for its employment in those tinctures.

5. Give the Pharmacopœial process for making injectio morphiæ hypodermica, suppositoria morphiæ, tinctura opii and syrupus papaveris.

6. What is thistledown? Describe the inflorescence of the oat.

7. Give an account of the germination of an almond, and describe the tissues of which the bark of an exogenous stem is composed.

The President then called upon Dr. Tilden to deliver the—

Inaugural Sessional Address.

Ladies and Gentlemen,—

The Council of the Pharmaceutical Society of Great Britain has done me the honour to request that I would address a few words to the assembled students on this interesting anniversary. Those who have preceded me in this position upon corresponding occasions have been, every one of them, men older in years than myself, of wider knowledge and experience, and above all distinguished practitioners of pharmacy; but, I think the Council did wisely to engage, once in a way, the services of one who, whilst retaining distinct and pleasurable recollections of his association with pharmaceutical students, has in the course of events so far severed connection with the pharmaceutical body that he can look upon their proceedings from the standpoint of an outsider. Notwithstanding misgivings as to my individual fitness for the post, I did not hesitate to accept the invitation of the Council, because I was anxious to testify to all my good friends here my reciprocation of the kind feelings which led to the proposal. I had no better way of expressing my thanks than to accede to the request.

We are met together, as every one present is aware, for the express purpose of doing honour to the students attending the courses of instruction in this institution. In the name of the Council, the Professors and Officers of the Society, I have first of all to express to those students who have just received their prizes at the hands of the President, most hearty congratulations upon the success with which their labours have been crowned, and to wish them prosperity in the career upon which they are now about to enter. Gentlemen, you are justly proud of the honours which are the reward of your industry. You are justly gratified at the approbation of your friends. You have listened, I doubt not, with

* The candidate is at liberty to choose either French or German, and is not required to show a knowledge of both.

quickened pulse to the praises pronounced by your professors. You have received the applause of this great meeting. I am sure that the memory of these things will abide by you, and when, in future years, some of you may appear as spectators at a renewal of this scene to celebrate the successes of those who will come after you, you will all feel stirred, as we do to night, with a sympathetic triumph.

There is another class of students, for the moment less distinguished, but in general equally deserving of respect. I mean the students who have not received prizes—to whom, I feel also, every one present will desire that I should say a few words of encouragement.

Do not despair, my friends, because you have no trophies to carry away with you. If you have worked steadily, with an honest desire to learn, you have gained that which will serve you more usefully in the battle of life than prize-books or certificates. You carry with you the recollection of conflicts with self, of struggles against difficulties apparently insuperable, of encounters with temptation in which you have come off victorious, and these experiences, added to even a moderate amount of professional knowledge, will make good and useful citizens of you. But my belief is that we may anticipate something even better than this. When I look back through the prize-lists of past years, I see there many names that have since become distinguished in the ranks of pharmacy, and when I remember that in the competition for prizes there is often but a small, and sometimes a scarcely discernible difference between the merits of the best man, who gets the prize, and the second best man, who does not get it, I feel satisfied that of the majority of the students of this institution we have not heard the last when they take their leave of the place.

But I must not forget, gentlemen, to urge upon you all, whether prize-takers or not, the importance of seriously and systematically continuing your studies. I do not mean to say that I would advise everyone to go on working away at the whole range of subjects to which your attention has been directed in your progress through this school. It is now the time when each of you may follow the bent of his own inclination. I do not say I hope you will choose chemistry or botany or therapeutics, or any other branch of science in particular, but I am myself deeply impressed with the necessity for a reasonable interest, call it a "hobby" if you like, to every reasonable man. And I ask you to take my word for it there is no prophylactic so potent, no remedy so sure, against the inevitable weariness which sooner or later overtakes the mere idler or seeker after pleasure.

Some of you probably think you have learnt a great deal since you came here. Relatively to your former state of ignorance that is no doubt true, but after all what you now know by comparison with what you have yet learn is a mole-hill to a mountain. Do not suppose I wish to disparage. This is merely the condition of everyone in this room, professors (if they will forgive my saying so) and all, and the wisest man is he who recognizes this somewhat humiliating fact the soonest, and does his best to add to his little heap.

What is the use of all this? I will tell you presently some of the so-called practical uses, but in the meantime I want just to remind you that increased knowledge will give you a treasure which, in one way at least, is better even than a good balance at the bank. It will give you self-respect. I do not mean conceit, that peculiar and special vice of half-educated people. I mean by self-respect that kind of self-knowledge which enables a man to estimate his own powers at their true value, avoiding, on the one hand, exaggerated distrust on the score of defects perceived and, on the other hand, undue exaltation by reason of conscious ability.

But I would impress upon you young pharmacists the importance of finding your "hobby," if possible, in your business. If you make your business the real occupation of your life it will certainly yield you a harvest not merely of internal satisfaction, a reward rich enough in itself, but tangible advantages such as commend themselves to the commercial mind are equally certain to accrue. This is true of every calling in life. It is almost a truism. But in its special application to pharmacy I want to speak a few words. The old-fashioned pharmacist, represented in my memory by the late Henry Deane, was a man with a soul, but not above his business. I know that, happily, some of the race remain. Such a man knows the contents of every bottle and drawer in his shop, not merely in regard to cost and retail price, but the entire history and precise quality of each particular sample. He buys no concentrated abominations whilst the roses, long innocent of any tint but brown, moulder in their dusty corner. His aromatic waters are distilled and have no acquaintance with calcined magnesia. He has his own views on the proper season for the preparation of liquor taraxaci and makes it with his own hands. He knows what medicinal plants grow in his own neighbourhood, and he prefers to make his own extracts of henbane and conium. I spare you the rest. You know how much more I might say, but if you have any doubt whether this kind of thing pays look round at any such men you can find and judge for yourselves of their prosperity.

But there is another aspect of the same question. Some years ago a remarkable paper was read at the Pharmaceutical Conference by Mr. Joseph Ince. Everyone present will understand that I refer to the essay on "Pharmaceutical Ethics." In that paper Mr. Ince did not hesitate to declare unreservedly that "pharmacy is a trade," and in a meeting which included many of the most able, and not a few of the most influential of living pharmacists, there was no dissentient from that view of the matter. So far as I am able to judge, and in spite of Acts of Parliament since devised to regulate the practice of pharmacy, the occupation of the pharmacist is not materially changed since 1866. But it appears to my humble judgment that this dictum of Mr. Ince's, whilst absolutely and literally true, does not cover the whole of the facts of the case. The pharmacist is a tradesman, but interwoven with his trade is a multifarious system of transactions involving the employment of knowledge and skill, gathered through the somewhat prolonged course of training, which at present culminates in the examinations of this Society. And it is a question in my mind whether the ideal pharmacist ought to be purely a tradesman.

When the time comes, as I believe it will come, and perhaps very soon, the pharmacist who desires to do so will be in a position to make his election between a kind of business represented by the shop on the one hand, the mere drug store bringing according to the accounts of the grumblers neither honour nor profit; and on the other hand a calling in which he will have due exercise for what professional skill he may possess and gather his income somewhat in accordance with the customs prevailing in other professions. But this will not be done by railing at the law, the public, or the doctors. A young man having passed his examination, whether it is the Minor or the Major, is not entitled on that account to regard himself as an unrecognized and unrewarded benefactor of the human race. He has suffered all this toil and expense, not I apprehend for the good of mankind, but because he knows there is at the end of it a monopoly, such as it is, of a certain calling reserved for him by the law. I know the reply which is almost upon the lips of some of my hearers. Look at the state of trade, look at the cheap drapers and grocers, who destroy all one's profit, and then the co-operative stores!

Let us look at this calmly for a few minutes. So far and so long as the pharmacist is a trader, he must take with other traders the chances of competition and the stores, and he must submit to the neglect of what is called "society." I know not what may be the end of all this, and I question whether in this room there is a prophet who is qualified so far to prophesy. But it is perfectly clear to my mind that no amount of remonstrance, be it never so reasonable, no amount of reproach, be it never so vehement, will prevent the public from supplying themselves in any way which the fashion of the moment renders the most acceptable.

It appears to me that the pharmacist will be more likely to improve his position by stedfastly promoting the cause of higher education, and by maintaining an attitude of dignity in that professional citadel in which he cannot be assailed, and into which, sooner or later, I believe he will not only be obliged to retreat, but will find it his best interest to do so. In plain English what does all this mean? I figure to myself a time when the pharmacist will leave to his neighbour, the grocer, the sale of such commodities as starch, mustard, pepper, cigars, British wines, aerated waters, quack medicines, and all such trumpery; when he will no longer dispute with the hairdresser the trade in toothbrushes, pomade, and shaving soap, and will no longer think it necessary to deck his pharmacy with glittering smelling bottles or chest protectors in bright array; when the plate glass front shall disappear from without, and the counter with at least half the mysterious, and often meaningless, gold labels from within.

But I know that all this sounds unpractical, if not impossible. I admit that it is very largely so at the present moment, but not, I venture to think, in the immediate future. I am aware that after taking away from the pharmacist the whole or nearly the whole of his trade, the residue of pure pharmacy and dispensing practice remaining over would, in too many cases, be sadly unproductive of income. Although these should undoubtedly constitute the chief avocation of the pharmacist, yet I may be permitted to remind you that the chemist and druggist and the pharmaceutical chemist have contrived to secure to themselves the patent of a title which Sir Humphry Davy himself, unless he happened to be on the pharmaceutical register, would not now be suffered to use unchallenged. Does not this suggest something? It points, I think, unmistakably to a development which the pharmacist, with due qualifications, has within his reach. Who so well fitted as he, by his special training, to become the public adviser upon all questions connected with sanitary affairs, to investigate cases of poisoning or adulteration? What is there to prevent him from in time supplanting the half-informed medical officer of health, and the too often incompetent public analyst? If he wishes to get a further stamp put upon his qualifications, either for his own gratification or for the satisfaction of his clients, there is the Institute of Chemistry ready to examine him. I should be taxing your patience too severely if I were to attempt to enter into further detail upon this topic which, however, appears to me to be worthy the deliberate and serious consideration of all pharmacists, but more especially of you students who are about to commence your professional career. I do not say you are driven to anything of the kind I have endeavoured feebly to picture. If you prefer it, or find it advantageous in the pursuit of that indispensable commodity, a sufficient income, or for other reasons find no escape from the prevalent form of general business, no one can question your right to do as you think fit; but I ask you as reasonable men whether you can be justly surprised that a generally ignorant, always unreasoning and careless public, should fail to appreciate at their due value professional services performed, and professional opinions pronounced behind a barricade of little articles that would find their appropriate place in an Italian warehouse or a fancy bazaar.

But my task is only half accomplished. I should be neglecting a most important part of my duty if I omitted to address myself to those who are about to commence or to continue their studies to-morrow. There is but one golden rule for the student, and that is, learn all you can and learn it thoroughly. Some there may be here who feel disposed to question the utility of all this chemistry and botany that the pharmaceutical student is now expected to learn. I can only assure you that if you will but wait patiently you will discover in time a practical application for every scrap that you can gather of this seemingly superfluous knowledge, and wish you had more. When it was my fortune to have to do with pharmaceutical students they were invariably most earnest, painstaking and industrious, and I have no doubt that these qualities still form their most prominent characteristics. They were, however, liable to one or two little weaknesses which I dare scarcely hope have since disappeared. My attention was very frequently drawn in those days to a disposition to regard every question from the so-called practical point of view, a certain degree of restlessness being too often manifest when anything like general theoretical questions came to be discussed, unless they happened to bear in the most direct and unmistakable manner upon some subject of every day life. I do not mean to imply that this is a peculiarity of pharmacists or of pharmaceutical students, but merely that they are not free from this which is the characteristic error of most practical men. I remember a speaker upon some occasion, I cannot now remember the who, when or where, took upon himself to declare that there was no such thing as *pharmaceutical* chemistry. Such an expression sounds a little startling, but the meaning of the speaker was probably this, that the broad principles of science remain the same no matter what application you propose to make of them, and that without a knowledge of these principles you may know the whole of materia medica from beginning to end and yet be absolutely ignorant of chemistry; you may be familiar with the name and even with the aspect of every flower of the field and have no claim to be considered a botanist. Science does not consist in mere manual dexterity, neither does it consist in a knowledge of any number of hard names. One of the most serious consequences of neglecting all but what lies close at hand is this, that whilst you may learn to perform with the most punctilious accuracy all kinds of individual operations, you remain almost as incapable as ever of coping with any unexpected difficulty, and you are quite unable to assist in making the advances which pharmacy, in common with every other human art, must continue to make if it is to survive?

There is just one other topic, in conclusion, to which I must advert. We have all heard a great deal in this room and elsewhere about that ugly word "cram." Now whilst I sympathize with nearly all that has been said and written upon the subject, and whilst I deplore the existence of a system so destructive, I think there has been just sufficient ambiguity in the use of the term to make some students feel the denunciations rather too wholesale and somewhat indiscriminate. There are two sorts of "cram." The one is both foolish and dishonest. But although, I suppose, we must admit that it is sometimes practised by candidates for pharmaceutical examinations, I have so much confidence in the skill and experience of our Board of Examiners, that I do not believe the system meets with greater success here than at other institutions, or even so great. I need not enter now into details because the subject has been discussed over and over again *ad nauseam*. But I would just suggest to those young men who propose to devote that portion of their time which should be spent in the acquisition of knowledge to the invention of schemes for cheating the examiners, that it will be to their own interest to credit the examiners with just a little common sense as well as knowledge of their business, or they may find out to their disappointment that the Board is not made up, as they fondly suppose, of a pack of idiots like themselves. The legitimate process, on the other hand, is that kind of cramming to which every student must resort if he wishes to pass a given examination safely and honourably. This process consists in nothing less than learning very thoroughly the subjects in which he is to be examined, and for the time, no others. It seems to me unreasonable to complain of a student because he declines to make the attempt to study the whole of a text-book, of botany for example, when the board before whom he is to present himself for examination has previously announced that it intends to examine him in a portion only of that subject. It may fairly be assumed that the limit has not been fixed without due deliberation, and if the student honestly sets to work at the task assigned, that is all that can be expected of him. One cannot be said to know a subject well unless he is prepared to answer clearly and intelligently any reasonable questions that may be put to him in that subject, and therefore the most important thing to aim at is precision, without which a great deal of knowledge may become worse than useless for the purposes of examination, and let me add of practical life. From all which you will perceive that I am one of those persons who, whilst recognizing the possible harm that may befall that rare phenomenon, the extraordinary genius, by reason of the existence of the examination system, yet hold the opinion that in the influence of the system upon the cause of education the good decidedly predominates.

To candidates for examination let me add one hint. Supposing the student to have attained to an accurate knowledge of the subject, or that part of it in which he is to be examined, what reasonable grounds ca there be for that excessive nervousness displayed by some candidates? If I were an examiner, a candidate in this condition would excite my suspicions at once. I should either suppose the nervousness assumed, with the object of deceiving me, or I should credit him with a knowledge of defects apparent to his own consciousness, though hidden from mine.

And now, Gentlemen, I need not detain you any longer. You are about to enter upon a period in your career, at once the most interesting and the most delightful. One word of caution. You all start off, I know, with a great stock of resolutions and good intentions. Take care they are not all wasted at the outset. In commencing an ascent the experienced mountaineer will start soberly, and pursue, at a steady pace, the path previously determined upon. The unskilful only tries short cuts, exhausts himself by spurts, or loiters, with the notion that it will be time enough to make up lost ground later in the day. Be advised in time. You have in your professors experienced and able guides. Follow them, act upon their instructions as to your journey, and do not be lured from the open path by people who tempt you with vain promises to relieve you of your labour. We who have climbed the same heights will watch your progress with unfailing interest. We know what are the difficulties you are likely to encounter and how they are to be surmounted. But we know, also, that the labour must be your own.

The PRESIDENT proposed a vote of thanks to Dr. Tilden for the admirable and practical address which he had just given. While it contained excellent advice to the younger members of the meeting, he was quite sure there was no one present, even as old as himself, who would not be benefited by a careful consideration of it.

The VICE-PRESIDENT said such a resolution really required no seconder, but he hoped he might be excused if he added a word or two, for two reasons. In the first place, they would wish to express in the most emphatic way their appreciation of Dr. Tilden's kindness, and therefore, perhaps, it would be appropriate that he, in his official position as Vice-President, should second the vote of thanks. Secondly, he was probably better acquainted than many present with Dr. Tilden's claims to their gratitude. Dr. Tilden had for several years occupied a very important scientific position in the locality with which he was himself connected, and consequently he knew the work Dr. Tilden had been doing there, and the high position he had taken. Under such circumstances it might not unreasonably have happened that Dr. Tilden might have forsaken pharmacy altogether; but that was not so. In his own endeavours to advance scientific tific pharmacy he had constantly received the greatest possible assistance from Dr. Tilden, who had helped forward the work with his large knowledge and high scientific attainments in a manner which no other gentleman could possibly have done. Therefore, when that gentleman now came forward to deliver his address to the students who were aiming to sustain pharmacy in its highest *rôle* they must not regard it as a spasmodic effort on his part, but as the last of a long series of acts all tending in the same direction.

The motion having been carried by acclamation—

Dr. TILDEN said it had given him great pleasure to appear there on that occasion, and he esteemed it an honour to receive the invitation of the Council. They would easily understand that he might have acquitted himself better if he had been called upon at a somewhat earlier date, because, coming tenth or twelfth in a succession of men who had occupied a similar position, it became increasingly difficult every year to say anything worthy the acceptance of the meeting. And when it was remembered that the best men were always selected first, it would be seen that those who came later had an additional difficulty to contend with. There were probably many parts of his address which might require further elaboration and explanation than he had been able to give, in order to make his meaning acceptable to members of the Society, and he felt that he had to some extent taken a liberty in attempting to express himself on some of the topics on which he had touched, but he hoped that any imperfections of that kind would be excused, for his intentions certainly were of the best.

The meeting then adjourned to Wednesday, November 5.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Annual Meeting of the thirtieth session of this Association was held in the Royal Institution, September 25, 1879. The president, Mr. T. Fell Abraham, in the chair. The minutes of the last general meeting were read and confirmed. The donations to the library were duly acknowledged. The following annual report of the council and the treasurer's financial statement, which showed a balance in hand of £13 15*s.* 3*d.*, were read.

ANNUAL REPORT.

"In presenting the Annual Report of the Thirtieth Session of the Liverpool Chemists' Association, your Council has pleasure in observing the renewed energy and increased scope of usefulness which characterize the proceedings of the session now closing.

"Twenty-four new members and thirteen associates were elected during the past session, fourteen members and four associates have retired from various causes, leaving the number at present on the list 172—consisting of 17 honorary members, 130 members, and 25 associates.

"There were eleven general meetings held during the session, the time of each being fully occupied with papers of chemical, pharmaceutical, or general scientific interest, whilst many important subjects were discussed under the head of miscellaneous communications.

"There has been a marked improvement in the attendance of members and associates at the meetings. This, comibned with a more general activity, appears to your Council a very encouraging sign. The Council is glad also to report that your fourteenth Conversazione proved itself a very successful and enjoyable entertainment, whilst financially it yielded a credit balance to the general fund. The Association is indebted to the several members who rendered their services, to the exhibitors of the numerous objects of interest, and in particular to Mr. Edward Davies, F.C.S., F.I.C., for his exceedingly interesting lecture on 'Phosphorescence and Fluorescence.'

"The Association, as in the previous year, took part in the holding of the Second Associated Soirée of the Literary, Scientific, and Art Societies of Liverpool, and is indebted to Mr. Davies on that occasion also for the delivery of an entertaining and appreciated lecture.

"The School of Pharmacy was provided with courses of lectures on Chemistry by Mr. Thomas Williams, F.C.S.; Botany, by Dr. Shearer; and Materia Medica, by Dr. Carter. Eight pharmaceutical students attended the Chemistry Class, and, at the close, an examination was held, under the superintendence of the President. The questions were kindly supplied by Professor Attfield, who also adjudicated the answers, deciding in favour of Mr. John Albert Jones, who will this evening be awarded the President's prize.

"The syllabus for the forthcoming Chemistry Classes has been already issued. The lectures on Materia Medica and Botany will be announced in due course.

"Several donations of books and pamphlets have been added to the Library during the session, and some periodicals and journals have been bound. Various specimens have also been contributed to the Museum, including a complete series illustrative of sugar refining, from Mr. J. T. Armstrong, F.C.S. The re-arrangement of the contents of the Museum has made some progress. The issue of books from the Library amounted to 445 volumes, in addition to references.

"Invitation having been received to send delegates to the British Pharmaceutical Conference, held at Sheffield, the President, Vice-President, Treasurer, and Mr. A. H. Mason, F.C.S., were appointed and attended.

"The ballot at the concluding general meeting for the appointment of President for the thirty-first session resulted in the election of Mr. Charles Symes, Ph.D.

"Mr. Armstrong having resigned his seat on the Council in consequence of removal from the neighbourhood, Mr. Thomas Garside, F.C.S., was elected in his place.

"The following members of Council retire by rotation, and are eligible for re-election:—Messrs. T. F. Abraham, E. Davies, T. Garside, and T. Williams."

It was moved by the president, seconded by Mr. E. F. Morton, and carried unanimously, that "The reports as read be adopted and together with the list of members and abstract of proceedings of the past session be printed and circulated among the members."

It was proposed by Mr. Joseph Hallawell seconded by Mr. A. Watt, F.C.S., F.I.C., and carried unanimously, that "The best thanks of the meeting be given to the donors to the Library and Museum, to the authors of papers and to the exhibitors of apparatus, etc., during the past session."

It was proposed by Mr. T. H. Johnson, F.C.S., F.I.C., seconded by Mr. Henry Burroughs, and carried unanimously, that "The best thanks of this meeting be given to the officers and council for their services during the past session."

The president's prize of books offered to the student in the chemistry class who should pass the best written examination was produced, having been awarded on Professor Attfield's adjudication to Mr. John Albert Jones. The meeting then proceeded to the election of four members of council. Messrs. Edward Davies, F.C.S., F.I.C., Thomas Garside, F.C.S., Alexander Watt, F.C.S., F.I.C., and Thomas Williams, F.C.S., were declared duly elceted.

Parliamentary and Law Proceedings.

PROSECUTIONS UNDER THE 17TH SECTION OF THE PHARMACY ACT, 1868.

At the Blackburn Borough Police Court, on Friday, September 26, 1879, before Messrs. E. Wharton (chairman) and W. Hopwood, Stephen Green, drysalter and patent medicine vendor, appeared in answer to a summons charging him with unlawfully selling poison.

Mr. Henry Glaisyer, solicitor, Birmingham, appeared in support of the summons, being instructed by the Chemists and Druggists' Trade Association of Great Britain. He said the summons was issued by Mr. William Frederic Haydon, the Secretary of the Association, under the provisions of the 17th section of the Pharmacy Act, 1868, which said—"It shall be unlawful to sell any poison either by wholesale or by retail unless the box, bottle, parcel, wrapper or cover in which such poison is contained be distinctly labelled with the name of the article and the word 'poison,' and with the name and address of the seller of the poison; and any person selling poison otherwise than is herein provided shall upon a summary conviction before two justices of the peace in England be liable to a penalty not exceeding £5 for the first offence, and for the purposes of this section the person on whose behalf any sale is made out, an apprentice or servant, shall be deemed the seller." Mr. Haydon came to Blackburn on the 30th of July last, and visited the defendant's shop in Bolton Road and purchased a pennyworth of oxalic acid, a pennyworth of white precipitate powder, or ammoniated mercury, and a packet of rat poison, containing strychnine, all of them being poisons mentioned in the schedule to the Act and subject to its provisions. It was proposed to proceed only in one of these cases, that of the oxalic acid. The label on the packet contained only the word "poison," and therefore there were two particulars in which the statute had not been complied with. The name of the poison was not mentioned, and the name and address of the seller of the poison was not stated. The defendant was not a chemist, and was therefore unqualified to sell poison at all. A penalty is provided by the statute for selling poisons by unauthorized persons. but such penalty was not recoverable before the magistrates, and the defendant was charged on that occasion with having infringed the statute by not having labelled the packet in accordance with the provisions of the 17th section. Mr. Glaisyer, in continuation, drew attention to the fact that the business belonged to the defendant beyond a doubt, for his name appeared on a board over the door, and he had also paid rates in respect of the premises. The provisions of this statute were necessary in order to protect the public and afford a ready means of tracing where poison was obtained in cases where it was subsequently improperly used.

The defendant pleaded guilty, and said he was sorry for doing wrong. He had been in the trade twelve years.

The Chairman: You must have known you were doing wrong.

Mr. Glaisyer: I may state for the information of the Bench that in consequence of the sale of poison being made in this way so frequently, the present proceedings have been instituted in order to make known the provisions of the statute.

The Chairman (to the defendant): This is the first case of this description that we have had in this court, and we shall be content if you pay a fine of 20*s.* and the costs. You are liable to a fine of £5 and costs.

At the Liverpool Borough Police Court on Saturday, September 27, 1879, before Messrs. Henry Hugh Hornby and Edward Browne, justices of the peace, Mr. Richard Rowland Minton and others, trading as R. R. Minton and Co., appeared in answer to a summons charging them that they did on the 6th day of August last, at the borough of Liverpool, unlawfully sell to William Frederic Haydon, at 135, St. James's Street, certain poison, to wit, oxalic acid, in a certain packet, the cover of which packet did not set forth the name of the article or the name or address of the sellers of the same, contrary to the provisions of the 17th section of the Act, 31 and 32 Vict., cap. 121.

Mr. Henry Glaisyer, solicitor, of Birmingham, instructed by the Chemists aud Druggists' Trade Association, appeared in support of the summons. The defendant appeared in person.

Mr. Glaisyer, in opening the case, said that the defendants were the partners in the firm of Messrs. R. R. Minton and Co. They carried on an extensive business in this town, at Cheapside, and other establishments, as oil and colour merchants. The summons, as in the previous case, was issued under the provisions of the Pharmacy Act, 1868, 31 and 32 Vict., cap. 121, sec. 17, which he read. The facts of the case were shortly these:—Mr. Haydon, the secretary of the Chemists and Druggists' Trade Association, came to Liverpool on the 5th of August, and visited the defendant's shop, 135, St. James's Street, and there he purchased a pennyworth of oxalic acid, which is one of the poisons mentioned in the schedule to the statute. There was no label placed on the packet, but the word "poison" was written on it. There were therefore two particulars in which the section of the Act had not been complied with. There was no doubt the business belonged to Messrs. Minton and Company. Their name appeared on brass plates attached to the windows of the shop, and also on many articles in the shop, and in addition they were rated for the premises and had paid rates due in respect of them.

Mr. Hornby: You say the word "poison" was written on the packet?

Mr. Glaisyer: The word "poison" was written on the packet, but not the other particulars.

Mr. Goodwin, who appeared for defendant, said he did not dispute that defendant sold this article; but it was a long time ago.

Mr. Stubbs: What you have to say is in mitigation.

Mr. Goodwin: We only wish to say it is not an article we generally keep; we did not know in fact that it was in the shop. A young man got it to oblige a few customers. It is used by dyers principally, and is sold in very small quantities. It is quite an omission that the young man has not put a proper label on the wrapper.

William Frederic Haydon, called, sworn, and examined, gave evidence bearing out the opening statement by Mr. Glaisyer.

Mr. Goodwin: As one of the principals I might as well say we admit we are guilty in this matter. But really we were not aware the acid was being sold. We leave ourselves entirely in your hands. We will take care that in future nothing of the kind shall occur. I have no doubt we have transgressed the law.

Mr. Hornby: The defendants are fined 10*s.* and costs.

At the Birmingham Police Court, on Wednesday, October 1, 1879, before Messrs. Ralph Heaton and Henry Wiggin, Joseph Guest Earp, oil and colour merchant, 22, Cheapside, Birmingham, was summoned by the Chemists and Druggists' Trade Association of Great Britain, for a contravention of the 17th section of the Pharmacy Act, 1868, "by selling certain poison, to wit, oxalic acid, in a certain packet, the cover of which packet did not set forth the name of the article, or the name or address of the seller of the same, contrary to the statute in such case made and provided."

Mr. Glaisyer appeared in this case, instructed by the Chemists and Druggists' Trade Association of Great Britain, the information being laid by the secretary, Mr. W. F. Haydon.

Mr. Glaisyer said the summons was issued under the provisions of the Pharmacy Act, 1868, 31 and 32 Vict., cap. 121, sec. 17 (as in the previous cases). The facts of the case were shortly these:—Mr. Haydon visited the defendant's shop, 22, Cheapside, Birmingham, on the 8th of August last, and there he purchased a pennyworth of oxalic acid, which is one of the poisons mentioned in the schedule to the statute. The label placed on the packet contained the word "poison" only. There were therefore two particulars in which the section of the Act has not been complied with. There was no doubt the business belonged to Mr. Earp. His name appeared over the shop door, and in addition he was rated for the premises.

The defendant: No doubt about it.

Mr. Glaisyer: I am instructed to press for a heavy penalty, Mr. Haydon having in June, 1877, two years since, purchased poisons from the defendant, who was at that time warned that he was acting illegally. A month after that purchase, Mr. Haydon was told by an assistant of the defendant that Mr. Earp only sold poisons to persons he knew. In August last defendant sold the poison with which he was now charged.

William Frederic Haydon, called and sworn, deposed to the above facts.

In reply to a question, Mr. Haydon said that in June, 1877, he purchased from the defendant oxalic acid and red oxide of mercury, both poisons scheduled under the Pharmacy Act, and this being so far as he was aware, the defendant's first offence he reported the purchases to the Secretary and Registrar of the Pharmaceutical Society of Great Britain. He now produced a letter, dated July 5, 1877, which he received from the Secretary and Registrar of that Society, stating that he had written to the defendant giving him notice that if he continued to infringe the provisions of the Pharmacy Act, legal proceedings would be taken against him without further notice. In July of the same year, witness went to the defendant's shop and again endeavoured to purchase oxalic acid, but was told by the assistant that they had ceased to sell poisons except to persons they knew as customers.

The defendant: I have never been warned.

The magistrates' clerk to Mr. Haydon: The letter you have produced is not admissible as evidence that the defendant has been previously cautioned.

The defendant: My foreman has omitted to put the name of the article and my name and address on the packet. We sell oxalic acid to boot makers, and for cleaning brass.

The magistrates' clerk to Mr. Haydon: Have you cautioned the defendant yourself?

Mr. Haydon: I have not.

Mr. Heaton, addressing defendant: You have not conformed to the Act of Parliament. It requires that you should put the name of the poison upon the packet, also your own name and address. Had it been clearly proved that you had been cautioned previously, we should have inflicted the full fine. You must, however, pay 20*s.* and costs.

The Sale of "Fever Powders."

On Tuesday, September 30, the Deputy Coroner for East Sussex (Mr. J. E. Fullagar) held an adjourned inquest at the Bridge Hotel, Newhaven, on the body of Elizabeth Ellen Young, a little girl aged four years and eleven months, who was supposed to have died under suspicious circumstances.

Mr. Edward Henry Moore deposed that he was the public analyst for the county of Sussex. He received from P. S. Renville a packet containing twelve powders. They bore a label, indicating that they were "Welch's Fever Powders," and professing to be prepared by Henry Moon, Trafalgar Street, Brighton. They were in six sets of two powders each, professing to be suitable for different ages of children, and there was a blank space on the labels for the age to be filled in. The different sets were for cases of children from six to eight years of age, four to six years, three to four years, two to three years, one to two years, and four to seven months. He had made an analysis of the powder, and had found that the composition was entirely sugar and calomel. He had further assured himself of the absence of those mineral poisons which, from their appearance, would be likely to be mistaken for calomel, viz., antimony, arsenic, a possible impurity of calomel, and bichloride of mercury. Taking the powders generally, the proportion of calomel was 1 to 3 grains. The difference in the weight of the powders, as presumably for the same age, was in eight cases out of ten exceedingly marked. In the two powders for children from three to four years of age there was a difference of weight of three-quarters of a grain, representing a variation of one-quarter of a grain of calomel. The variation averaged in the eight powders from 12 to 25 per cent. In all cases of variation the proportion of calomel to sugar was fairly sustained. In the two powders for four to six years there was a variation of half a grain, one weighing $4\frac{1}{2}$ grains ($1\frac{1}{2}$ grain calomel), and the other 5 grains ($1\frac{1}{6}$ grain calomel). The greatest difference was noticeable in the powders for children of from six to eight years, where there was a variation of 1 grain in weight. The two powders, one to two years, and the two from four to seven months were identical in weight. The first representing 4 grains to each powder, consequently containing $1\frac{3}{4}$ grain of calomel, and the latter containing $2\frac{2}{10}$ grains of calomel. The powders from three to four contained $1\frac{3}{4}$ grain of calomel. Calomel was a difficult powder to mix with nice accuracy owing to its extreme weight as compared with its usual excipient. The difference of the weight of some of the powders was to such extent as to be suggestive to measuring rather than weighing. In his opinion the powders were imperfectly described as "Fever Powders," and the use of calomel would be prejudicial in a case like the present.

Police Sergeant Renville stated that he purchased twelve powders at Mr. Samuel Sargeant's shop, on Tuesday evening last. Mr. Sargeant served him himself. The six sets, for different ages of children, were kept in six different boxes, which bore a label outside stating the age of the child for which the powder was intended. The packets containing the powder were all alike, and there was a blank space for the age to be filled in. Mr. Sargeant filled in the ages on the twelve packets in witness's presence. He sent them to Mr. Moore.

Mr. T. M. Cann stated that he had made a *post-mortem* examination of the deceased, and found that death was due to inflammation of the bowels. A powder containing one and three quarter grains of calomel would tend to aggravate the symptoms instead of relieving them. That amount of calomel would not necessarily be too much for a child if it was administered by a medical man for certain diseases, but it was a highly injurious medicine for general distribution. In cases like the present it would increase the inflammation, but it would not be possible to ascertain where the natural inflammation left off, and the inflammation caused by calomel commenced. The powders were very improperly described as fever powders, for although calomel might be useful in certain special instances, it would be injurious in the great majority of fevers.

This concluded the evidence, and the Deputy-Coroner then summed up, remarking that one good result of the inquest would be that parents would be warned against buying a powder which they might imagine to be a cooling or aperient medicine, but which in reality contained a very dangerous ingredient. In this case it had not been proved that death was caused through the taking the powder, especially as evidence had been given showing that a portion of the medicine was vomited, but at the same time these so-called fever powders were being extensively used, and might produce very injurious effects. Apart from the dangerous nature of the powder itself, he considered that the packets were sold in a manner which might very easily lead to a serious blunder. The envelopes containing powder of different strengths were precisely alike, and it would be a very easy mistake to sell them out of the wrong box, or to get the packets in the different boxes confused. If the jury were of opinion that death could not be traced to anything else but natural causes, it would rest with them, if they thought fit to do so, to append a rider expressing their opinion concerning the indiscriminate sale of dangerous medicines.

After some consideration, the jury returned a verdict of "Death from natural causes," and added the following rider:—"The evidence discloses that a medicine fit only for skilled application is being indiscriminately sold and administered by incompetent persons, and the jury are of opinion that the sale and preparation of medicines containing dangerous ingredients should be restricted to duly qualified persons, and the active ingredient of such medicines should be stated on the wrapper in which the medicine is contained."—*Brighton Gazette.*

Correspondence.

Trading by Government Clerks.

Sir,—I am sorry to see that the retail traders in London have again been making themselves ridiculous by holding a meeting in Exeter Hall. They seem to have attempted to make capital out of the presence of a provincial mayor, who expressed disappointment at the smallness of the number of representatives. I know nothing of that gentleman's social status at home, but I suspect that he felt anything but flattered with the society in which he found himself in Exeter Hall.

From the small number who attended it seemed to be inferred that retail traders are lukewarm as to the effect upon their businesses by competition with trading establishments conducted by the clerks in the service of the government. The fact is they feel the grievance very keenly, but they have no power at the present to grapple with it. As a body they are men of sense and judgment and bear their grievance quietly rather than mix themselves up with such as gave evidence before the Royal Commission or those who constituted the conference at Exeter Hall.

I have watched the progress of the stores with some interest and I have observed with regret the ill-judged action taken by a certain class of retailers to counteract their progress. I admit the perfect freedom of every one to purchase his requirements in any market which may be most to his fancy and I think no one denies the right of fair and legitimate competition in business which gives stimulus to enterprise, and at the same time offers every facility for enabling the public to spend their money to the best advantage.

As regards the establishment of trading concerns conducted by the clerks in the employ of the government I maintain without fear of contradiction that the system is an illegitimate and dishonorable innovation upon the vested interests of a very large and important section of the taxpaying community, a system altogether uncalled for by the requirements of the public and utterly unjustifiable, as it aims to subvert interests which are national and to set up no compensating interests in their stead. Government clerks, whether active or pensioned, are in every sense of the word the servants and dependents of the public; although they are not under the immediate control of the public, their salaries and pensions are paid out of the earnings of the public through those whom the latter entrust with the custody of their welfare. As such the clerks in the employ of the government have neither legal nor moral right to do anything detrimental to the interests of any portion of the community. What would be thought of an individual taking service under another and taking advantage of some hitch in his contract to use the advantages of his position for his own benefit and to the detriment of his employer. Yet the government clerks now engaged upon the stores are in exactly the same position. They may be under no contract prohibiting them from such proceedings, but that arises only from the fact of such restrictions not having been previously required. Circumstances alter cases and what would be considered actionable at, if not punishable by law in an individual, seems to be justified in this case by the social status of those engaged in it.

I cannot but feel surprised at the keen patronage bestowed upon the stores by many landed proprietors and clergymen of the Church of England, although I must admit there are many exceptions. I see landed proprietors and clergymen whose rents and tithes are realized in the neighbouring market towns spend as little of their money as possible in those towns, but supply their establishments from the stores, although their predecessors and even they themselves at one time seemed to have no idea of spending their money except in their own neighbourhood. Of course every one is perfectly at liberty to spend his money where he thinks proper, but I would ask such if that is an equitable application of the principle "live and let live." I have also been surprised at the favourable attention bestowed upon the stores by professional men such as lawyers and doctors. Now these gentlemen as a rule are dependent for their incomes upon the personal feeling of the community around them, and yet I know several who are stealthily keeping their household from the stores. It is not difficult to bring such gentlemen to their bearings, as tradesmen clients have only to transfer their patronage to such as spend their money at home. I have seen the principle applied in two cases with electrical effect; one had the chagrin of seeing a younger rival pocket an account of close upon fifty pounds which he would have received himself, but for the careful housekeeping of his good lady, and I saw another visibly cringe under the same process from a like cause; few can afford to lose practice any more than traders can afford to lose business.

In my day the best feeling existed amongst the town tradesmen towards the county families and the feeling was reciprocated; now I am sorry to see that a stand-off feeling is gaining ground and that owing to nothing which has taken place between them, but from the habit of the latter to take advantage of the illegitimate system of trading inaugurated by the clerks in the government offices. Now, sir, it is admitted that the antagonism of class against class in the case of capital and labour is a national misfortune. Is it desirable then that division should be still further increased by setting the middle and upper classes against each other, and that at the instigation of a small body who were unknown and possessed no influence until they commenced their system of trading and gave it influence by combining with it a state title?

The clerks in the government offices have a perfect right to co-operate in supplying themselves with the necessaries of life, but they have no right whatever to extend their operations beyond their own immediate class as they are now doing. They are not only supplying their own wants, but they are increasing their salaries by taking advantage of facilities which were never intended for such a purpose and at the expense of a class who are heavily taxed to support the expenses of the state, part of which, no matter what proportion, are the salaries and pensions of active and retired clerks in the employ of the state. Promoters of stores may say what they like about the small percentage of the business of the country which they do, but that is not the point. The question to be decided is, Are the clerks in the government offices to be allowed to receive salaries at the expense of the public and at the same time to be allowed to embark in business to the detriment of those out of whose earnings their salaries are paid? I think that the subject only requires to be brought fairly before the government and the system can admit of no defence. To those who are already so engaged I would give a certain time, say three years, either to withdraw their connection or to resign the service of the state, although they have no claim to consideration on account of vested interests. The remedy is in the hands of the retail traders; a general election is close at hand and they have sufficient influence to demand the support of a measure for such a purpose.

A Looker-on.

Communications, Letters, etc., have been received from Messrs. Leslie, Moscrop, Rogers, Siebold, Brayshay, Hall, Need, Shillcock, Tanner, Evans, Burrell, Rusticus, Elevator, Ph. Chemist and Dentist, Nostrum, Ink, Chemist and Dentist, Analyst for the County of Surrey, Student, Eboracum, Potassium, X. Y. Z., A. B., F. W. S. G., J. S., R. W., H. P.

NOTES ON INDIAN DRUGS.

BY W. DYMOCK.

(*Continued from page* 123.)

OPHIOXYLON SERPENTINUM, *Linn.*, APOCYNEÆ.—*The root. Vernacular*: CHOTA-CHAND (Hind.); CHANDRÁ (Beng.); HARKAI (Bomb.); PATALAGANDHI (Tel.).

History, Uses, etc.—This shrub is mentioned in Sanskrit works under the name of sarpagandha. The Hindus use the root as a febrifuge and as an antidote to the bites of poisonous reptiles; also in dysentery and other painful affections of the intestinal canal. By some it is supposed to cause uterine contraction, and promote the expulsion of the fœtus. Ainslie gives the following account of it: "Tsjovanna amelpodi is the name given on the Malabar coast ('Rheede Mal.,' vi., 81, t. 47) to a plant the bitter root of which is supposed to have sovereign virtues in cases of snake bites and scorpion stings; it is ordered in decoction to the extent of a pint in twenty-four hours, and the powder is applied, externally, to the injured part. The plant is the radix mustela of Rumphius ('Amb.' vii., 29, t. 16). The Javanese class it among their anthelmintics, and give it the name of puli pandak. It may be found noticed both by Burman, in his 'Thesaur. Zeylan.' (t. 64), and Garcia ab Horto ('Hist. Aromat.'); the latter recommends it as stomachic. Rumphius speaks of it as an antidote to poisons, and Bontius, in his 'Hist. Mat. Med. Ind.' tells us that it cures fever" ('Mat. Ind.' ii., 441).

In the Pharmacopœia of India its use in labours to increase uterine contraction is noticed, upon the authority of Dr. Pulney Andy, but we have no evidence of its efficacy in such cases. In Bombay most of the labourers who come from the Southern Concon keep a small supply of the root, which they value as a remedy in dysentery and other painful affections of the intestines.

Description.—Root crooked, tapering from half an inch in diameter downwards. Bark soft, corky, marked by longitudinal fissures, light brown; wood brittle, showing rings and medullary rays, visible to the naked eye. Taste very bitter; odour of the fresh root acrid.

Microscopic structure.—The suber upon transverse section presents the appearance of a piece of honeycomb, viz., alternate rows of long tubular cells and compressed scales. The inner portion of the bark consists of a delicate parenchyma, loaded with starch, and traversed by indistinct medullary rays. The wood is remarkably starchy.

The root is not an article of commerce.

The ALLAMANDA AUBLETII (*Cathartica*, Linn.), APOCYNEÆ, is said to have been introduced into India from Brazil by the Portuguese. It has become quite naturalized, and in some places has run wild. Though not used in India, it has a medicinal reputation, the leaves being considered a valuable cathartic in moderate doses, especially in the cure of painter's colic; in overdoses it is said to be violently emetic and purgative. Ainslie has a short notice of the plant, and mentions its use at Surinam by the Dutch as a cathartic. It is a beautiful climbing shrub, very common in Bombay gardens. The leaves are elliptic, lanceolate, and arranged in fours round the stem on very short petioles. The flowers are large, yellow,

and funnel shaped, and are borne at the ends of the branches. It has no native name, but the gardeners call it peula, which simply means yellow.

CARISSA CORUNDAS, *Linn.*, APOCYNEÆ. *The root. Vernacular*: KARONDA, KARAUNDA (Hind); KARWAND KARINDA (Bomb); KARAMCHA (Beng.); KALAKA (Tam.).

History, Uses, etc.—This very common shrub, called in Sanskrit, karamardaka, is remarkable for its white jasmine-like flowers, which have a powerful odour, and for its purple-black fruit, which, unripe, is so much used by Europeans for preserving. The natives also use the unripe fruit for pickling. It is described in native works on materia medica as astringent, and the ripe fruit as cooling, acid, and useful in bilious conditions.

The root has a reputation as a bitter stomachic, but I have no experience of its use.

Description.—Roots long, brown and scabrous; wood very close grained and tough. The greater part of the bark consists of enormous stony cells, often more than an inch in length, flat, and closely packed together, forming a network round the wood, through the interstices of which the soft parenchyma comes in contact with the cambium layer.

The odour of the root is disagreeable, and the taste acrid and slightly bitter.

The fruit in size, shape, colour, and taste is not unlike a damson.

STRYCHNOS POTATORUM, *Linn. fil.*, LOGANIACEÆ. *The seeds. Vernacular:* NIRMALI (Hind., Beng., Bomb.); TETRAN-KOTTAI (Tam.).

History, Uses, etc.—This seed, in Sanskrit kataka or ambuprasada, has been in use in India from the earliest ages for the purpose of clearing muddy water. It is mentioned by Susruta in his chapter on water. One of the seeds is usually rubbed hard for a short time round the inside of the earthen pot, into which the water is afterwards poured and left to settle; the impurities subside and the water remains clear and tasteless. Medicinally nirmali rubbed down with honey and camphor is applied to the eyes to strengthen the sight and prevent lacrymation, it is also used in ulceration of the cornea and purulent discharge from the conjunctiva (Confer. Chakradatta). Mahometan writers tell us that it is cold and dry and that when applied externally to the abdomen it relieves colic; they also notice its use to strengthen the sight, and as a remedy in snake-bite. The author of the 'Taleef-i-shareefee' recommends it in irritation of the urinary organs and gonorrhœa. He directs four of the seeds to be powdered and mixed with a little curd of milk, to be tied up in a piece of cloth and steeped in water during the night. The infusion is to be taken in the morning. Ainslie says, "The fruit, though when very young it is made into a preserve and eaten, is reckoned, in its mature state, amongst the emetics of the Tamool doctors in Southern India; given in powder in the quantity of about half a teaspoonful." The *clearing nut* has a place in the secondary list of the Pharmacopœia of India, and is there said to be used as a remedy in diabetes on the authority of Kirkpatrick A suggestion is also made that the nut would be of use if supplied to troops marching in the rainy season, when little but muddy water can be procured.

Dr. Pereira (*Pharmaceutical Journal*, 1850, vol. ix., p. 478) suggests that the property of clearing water possessed by these seeds depends upon the albumen and casein which they contain. If the seeds be sliced and digested in water, they yield a thick mucilaginous liquid, which when boiled, yields a coagulum (albumen), and by subsequent addition of acetic acid, it furnishes a further coagulum (casein) (Confer. 'Phar. of India,' p. 146).

Description.—The seed is nearly orbicular button-shaped, about ½ an inch in diameter and ¼ inch thick; round the border is a slightly prominent ridge, which makes the junction of the two portions of albumen constituting the bulk of the seed. At one point a slight irregularity of the ridge marks the situation of the radicle; from this runs a faintly projecting line to the umbelicus, which is central and well marked; a hardly perceptible depression marks the opposite side of the seed. The integuments are yellowish grey and covered with fine silky hairs. The albumen horny but not quite so hard as that of nux vomica. The embryo consists of a club-shaped radicle and two delicate heart-shaped cotyledons. The albumen is tasteless.

Microscopic structure.—The hairs have a similar structure to those of nux vomica, and show the same play of colours with polarized light.

STRYCHNOS COLUBRINA, *Linn.*, LOGANIACEÆ. *The root and wood. Vernacular:* NAGA-MUSADI (Tel.); MODIRA-CONIRAM (Mal.); KUCHILA-LATA (Hind., Beng.); GOAGARI-LAKRI (Bomb.).

History, Uses, etc.—This scandent strychnos is supposed to be the arbor ligni colubrini of Rumphius, who states that it is used in Java as a febrifuge and anthelmintic and also externally in certain skin diseases. Horsfield notices its use in cutaneous affections and to alleviate the pain and swelling from confluent smallpox. Ainslie says that it is the dund-ul-sini of Avicenna; but this I think must be incorrect, as dund is the name given in Arabic works for *Croton tiglium.*

Virey, in his 'Histoire Naturelle des Médicaments,' p. 191, informs us that bois de coulenore in an overdose occasions tremors and vomiting, but mentions at the same time, that in smaller doses it may be considered as a useful vermifuge, and be given also with advantage in obstinate quartan agues. Guibourt considers that *S. colubrina* yields the true lignum colubrinum, or pao de cobra of the Portugnese, but he is unable to decide whether the wood usually found in commerce is produced by this tree or by *S. nux vomica.* (Confer. Guibourt, 'Hist. Nat.' ed 1869, vol. ii., p. 527.) Its claims as an antiperiodic have been examined by Dr. Berdenis Van Berkelow (Schmidt's 'Jahrbucher,' May 24, 1866, and 'Brit. and For. Med. Chir. Rev.,' April, 1867, p. 527.); and after a trial with it in twenty-two cases, quartan and tertian, he reports favourably of its action, and considers that from its cheapness it may advantageously be used as a febrifuge. In Bombay shops, two kinds of lignum colubrinum (goagurree-lakri) are met with; the genuine and least common is the wood of *S. colubrina* the other that of *S. nux vomica*; both are much used by the Hindus on account of their tonic properties in dyspepsia and malarious affections. In the dyspepsia of vegetarians preparations containing strychnia are particularly efficacious. I usually prescribe the extract of nux vomica in half grain doses and find that it has all the virtues of the lignum colubrinum.

Description.—The smaller branches with the bark on, form the goagurree-lakri of the shops. The general structure of the bark resembles that of nux vomica, but it is of a rusty colour, and the small warts upon it instead of being pale are of a bright rusty brown. The pieces of wood vary in size and length, and are much more knotty and crooked than those of nux vomica. The texture of the wood is also closer, harder, and of a deeper colour; when touched with nitric acid it turns of a reddish orange.

Microscopic structure.—The bark is thicker than that of nux vomica, but resembles it in structure, with the exception that the zone of stone-cells is wider and more irregular, and the cells themselves are bright yellow, and larger. (See microscopic structure of nux vomica bark).

PHYLLANTHUS NIRURI, *Linn.*, PHYLLANTHUS URINARIA, *Linn*, EUPHORBIACEÆ. *The plants. Vernacular:*—(P. NIRURI), JARÁMLA (Hind.), BHUI-ÁMLA, (Beng.), BHUI-AUNLA (Bomb.), KIZHKÁY-NELLI (Tam.), P. URINARIA bears the same names with the addition of the adjective *red.*

History, Uses, etc.—These plants are common weeds which appear in the rainy season. The name bhumyámlaki, which occurs in Sanskrit works, is probably applicable to both. Hindu physicians consider *P. niruri* to be deobstruent, diuretic and healing; they prescribe the dried plant in powder or decoction in jaundice. The dose of the powder is about a teaspoonful. Meer Muhammad Husain in his 'Makhzan' tells us that the milky juice of *P. niruri* is a good application to offensive sores and that a poultice of the leaves with salt cures scabby affections of the skin; without salt it may be applied to bruises, etc. From Ainslie we learn that these two plants are the *Herbæ mœroris alba* and *rubra* of Rumphius, and that an infusion of the leaves of *P. niruri* with fenugreek seed is considered a valuable remedy in chronic dysentery; also that the leaves are a good stomachic bitter. In Bombay *P. niruri* is used as a diuretic in gonorrhœa and acidity of the urine.

Description.—*P. niruri*, annual, erect-branched; branches herbaceous, ascending, floriferous; branchlets filiform; leaves elliptic, mucronate, entire, glabrous; male and female flowers in separate axils, male on the lower ones; dehiscence of anthers transverse, glands in the female bifid and trifid; capsule globose, smooth, two seeds in each cell; seeds triangular ('Bombay Flora').

P. urinaria.—Root generally annual, though in some soils bi- and even perennial. Stem erect, striated, of a pale reddish colour. Branches several, ascending, striated from the insertions of the stipules. Leaves scattered, spreading, pinnate, from one to two inches long, flower bearing. Leaflets alternate, linear, oblong, entire, smooth, three-fourths of an inch long, and one-fourth broad. Petioles compressed, somewhat triangular. Stipules of the petioles three-fold, acute, membranaceous; those of the leaflets two, lateral. Male flowers, exterior leaflets axillary, two to three, subsessile. Calyx, nectary and stamens as in *P. niruri.* Female flowers, lower leaflet axillary, solitary, sessile. Calyx and nectary as in the male. Capsule scabrous, three-celled, six-valved. Seeds two in each cell, transversely striated on the outside. It is immediately distinguished from *P. niruri* by its sessile flowers and scabrous capsules (Roxb.).

(*To be continued*).

THE DIGESTIVE FERMENT OF CARICA PAPAYA.*

BY A. WURTZ AND E. BOUCHUT.

The analyses of Vauquelin and the observations of Cossigny, Bajon, Endlicher, Peckholt, Roy, and Moncorvo, concerning the digestive action of the juice of the papaya, induced one of the authors to obtain some of this product from America, and submit it to a number of experiments which have been carried out during two years in the Hôpital des Enfants Malades. These have been recently completed from a chemical point of view in the laboratory of the Faculty of Medicine.

The liquid juice which flows from incisions made in the tree is neutral and milky. It coagulates immediately and separates into two parts, a kind of insoluble or slightly soluble pulp, and a colourless and limpid serum.

Juice which had been sent to the authors had undergone alteration which was manifested by a putrid odour. In this the butyric ferment was discovered. In order to protect the juice from this change some was sent mixed with sugared water or glycerine and aromatized with some drops of oil of peppermint. In this state it appeared as a thick milky liquid, without any odour suggesting fermentation. Put into contact with raw meat, fibrin, boiled white of egg or gluten it attacked and softened them after a few minutes, and eventually dissolved them after a digestion of some hours at 40° C. Milk is coagulated at first and the precipitated casein is afterwards dissolved. The false membranes of croup, removed by tracheotomy, and worms, such as ascarides and tæniæ, are attacked and digested in a few hours. Without doubt this juice contains a digestive ferment analogous to that which is secreted by the carnivorous plants, *Nepenthes*, *Drosera*, and *Darlingtonia*, to which Messrs. Darwin and Hooker have called attention. It is known that Messrs. Gorup-Besanez and Will have separated from this juice a kind of vegetable pepsin.

The following is a description of the experiments made to recognize the nature and mode of action of the digestive ferment which exists in the *Carica Papaya*, and which appears to be more active than that secreted by the above-mentioned plants:—

(1). The milky liquid described above was thrown upon a filter and the gelatinous precipitate washed several times with distilled water. The solution, with the wash waters added to it, was reduced to a small volume in a vacuum, then mixed with ten times its volume of absolute alcohol. A white precipitate was formed which was left in contact with the alcohol during twenty-four hours, then collected on a filter and dried in a vacuum. There was thus obtained a white amorphous matter that was entirely and easily soluble in water. The aqueous solution was again precipitated with alcohol, and the new precipitate, washed with absolute alcohol, was dried in a vacuum. In this state, the product obtained appeared under the form of a white amorphous powder, completely soluble in water, a property that indicates the absence of vegetable albumen, coagulable by alcohol.

According to a preliminary analysis, this body, which is a ferment, contains 10·6 per cent. of nitrogen. Its concentrated aqueous solution possesses a slightly astringent taste, becomes slightly turbid upon boiling, gives with alcohol an abundant precipitate and is precipitated by nitric acid, an excess of which dissolves the precipitate, forming a yellow liquid. Acetate of lead and tannin form with it abundant precipitates.

0·1 gram of ferment, precipitated once by alcohol, was dissolved in 50 c.c. of distilled water, and the neutral solution digested at 40° C. with 10 grams of moist fibrin. At the end of ten hours the fibrin was dissolved except a residue weighing 1·5 gram in the moist state.

0·1 gram of ferment precipitated once by alcohol, was dissolved in 50 c.c. of water, and the solution, rendered slightly alkaline by caustic potash, was digested at 40° C. with 10 grams of moist fibrin. At the end of ten hours the fibrin was dissolved, except a residue of dyspeptone. The filtered liquid, slightly alkaline, gave a precipitate with acetic acid; it was also precipitated by nitric acid and became turbid upon boiling. The conversion into peptone was not complete.

0·15 gram of ferment, precipitated once by alcohol, was added to 10 grams of moist fibrin reduced to a thick jelly with 75 c.c. of water acidulated by $\frac{2}{1000}$ of hydrochloric acid. This jelly, heated in a stove to 40° C., liquefied in a quarter of an hour. At the end of two hours the whole was reduced to a turbid liquid. The finely divided precipitate remained in suspension in the liquor and presented the appearance of dyspeptone of fibrin. Its weight was 1·8 gram in the moist state and 0·48 gram when dry. The filtered liquid gave a precipitate with nitric acid.

0·1 gram of ferment, precipitated twice by alcohol, was added to 20 grams of moist fibrin and 150 c.c. of water and the whole heated in a stove to 40° C. during twenty-four hours. At the end of that time the fibrin was dissolved, except a residue weighing 2·5 grams in the moist state. The digestion was not prolonged because the liquor manifested signs of putrefaction. The filtered solution was coagulable by heat and precipitable by nitric acid.

In this experiment, made with a neutral liquid, as in that which was made with one slightly alkaline, the fibrin dissolved without swelling. The flocks at first softened, preserving their form and volume, and were disintegrated by dissolving; there remained a residue of dyspeptone.

It results from the preceding experiments that the nitrogenous matter precipitable by alcohol from the aqueous juice of the papaya possesses the property of dissolving large quantities of fibrin, and is distinguished from pepsine by the character that it dissolves fibrin, not only in the presence of a small quantity of acid, but even in a neutral or slightly alkaline medium. This ferment the authors designate under the name of "papaïne."

(2). The carefully washed pulp from which the aqueous liquid containing the papaïne had been separated was submitted to long washings with distilled water. These wash waters, having been evaporated in a stove at 40° C. and reduced to a small volume, gave with alcohol a precipitate that dissolved fibrin under the same conditions as the papaïne precipitated directly from the aqueous juice. This experience gave rise to the thought that the soluble ferment might have its origin in the action of water upon the pulp, which itself has very decided digestive properties, and which possesses, even after long washing, a slightly acid reaction. However, this point is reserved, for the pulp to which it refers is difficult to wash and only yields to water very slowly the soluble ferment it retains. It is besides very aqueous: 54 grams of this pulp left upon evaporation only 2·5 grams of a solid residue having a gummy appearance.

20 grams of this pulp, well washed with water and containing 0·9 gram of dry substance, were put to digest, at 40° C., with 56 grams of moist fibrin and 200 c.c. of water. The digestion was prolonged during forty-eight hours, some drops of prussic acid being added to prevent putrefaction. The fibrin was completely dissolved: the weight of insoluble residue was inferior to that of the pulp introduced.

10 grams of well washed pulp (leaving after drying 0·43 gram of solid matter) were digested at 40° C. with 17 grams of moist fibrin and 50 c.c. of water, with the addition of one drop of hydrocyanic acid. The whole was dissolved at the end of twenty hours, save a residue weighing 3 grams in the moist state, or 0·71 gram after desiccation. The filtered liquid gave no precipitate with nitric acid.

In these last experiments there was not only solution of the fibrin but transformation into peptone, *i.e.*, complete digestion. The filtered liquid, having been con-

* Read before the French Academy of Sciences, Aug. 25, 1879 (*Comptes Rendus*, vol. lxxxix., p. 425).

centrated in a stove, gave with alcohol an abundant precipitate, which collected at the bottom of the vessel in clots of gummy appearance and presenting all the characters of peptone of fibrin. It was entirely dissolved in water, and the aqueous solution was not coagulated by heat; it gave no precipitate either with nitric acid or with ferrocyanide of potassium added to acetic acid. Heated with an excess of nitric acid, it gave a yellow liquor (xanthoproteic acid). With acetate of lead it gave a slight turbidity, with tannin an abundant precipitate. Diluted with water it gave with picric acid a yellow precipitate soluble in an excess of peptone and in a great excess of water or picric acid. This is, according to M. Henninger, a very delicate reaction of fibrin peptone.

The alcoholic liquors from which the papaïne had been precipitated were distilled *in vacuo* at a low temperature and put into contact with fibiin and water. The fibrin was not dissolved; the ferment had been entirely precipitated by the alcohol.

It results from these experiments that *Carica Papaya* contains an energetic digestive ferment that can be easily isolated.

THE ACTION OF HEAT IN VACUO ON METALS.*

BY T. A. EDISON.

In the course of my experiments on electric lighting I have developed some striking phenomena arising from the heating of metals by flames and by the electric current, especially wires of platinum, and platinum alloyed with iridium. These experiments are in progress.

The first fact observed was that platinum lost weight when heated in a flame of hydrogen, that the metal coloured the flame green, and that these two results continued until the whole of the platinum in contact with the flame had disappeared. A platinum wire four-thousandths of a inch in diameter, and weighing 306 mgrms., was bunched together and suspended in a hydrogen flame. It lost weight at the rate of a fraction less than 1 mgrm. per hour as long as it was suspended in the flame. When a platinum wire is stretched between two clamping posts, and arranged to pass through a hydrogen flame, it is coloured a light green; but when the temperature of the wire is raised above that of the flame, by passing a current through it, the flame is coloured a deep green. To ascertain the diminution in the weight of a platinum wire when heated by the electric current, I placed between two clamping posts a wire five-thousandths of an inch in diameter, and weighing 266 mgrms. This wire, after it was brought to incandescence for twenty minutes by the current, lost 1 mgrm. The same wire was then raised to incandescence; for twenty minutes it gave a loss of 3 mgrms. Afterwards it was kept incandescent for one hour and ten minutes, at which time it weighed 258 mgrms.—a total loss of 8 mgrms. Another wire, weighing 343 mgrms., was kept moderately incandescent for nine consecutive hours, after which it weighed 301 mgrms., showing a total loss of 42 mgrms. A platinum wire twenty-thousandths of an inch in diameter was wound in the form of a spiral one-eighth of an inch in diameter and one-half an inch in length. The two ends of the spiral were secured to clamping posts, and the whole apparatus was covered with a glass shade 2½ inches in diameter and 3 inches high. Upon bringing the spiral to incandescence for twenty minutes that part of the globe in line with the sides of the spiral became slightly darkened; in five hours the deposit became so thick that the incandescent spiral could not be seen through the deposit. This film, which was most perfect, consisted of platinum, and I have no doubt but that large plates of glass might be coated economically by placing them on each side of a large sheet of platinum, kept incandescent by the electric current. This loss in weight, together with the deposit upon the glass, presented a very serious obstacle to the use of metallic wires for giving light by incandescence, but this was easily surmounted after the cause was ascertained. I coated the wire forming the spiral with the oxide of magnesium, by dusting upon it finely powdered acetate of magnesium: while incandescent the salt was decomposed by the heat, and there remained a strongly adherent coating of the oxide. This spiral so coated was covered with a glass shade, and brought to incandescence for several minutes; but instead of a deposit of platinum upon the glass, there was a deposit of the oxide of magnesia. From this and other experiments I became convinced that this effect was due to the washing action of the air upon the spiral; that the loss of weight in and the coloration of the hydrogen flame were also due to the wearing away of the surface of the platinum by the attrition produced by the impact of the stream of gases upon the highly incandescent surface, and not to volatilization, as commonly understood; and I venture to say, although I have not tried the expeiiment, that metallic sodium cannot be volatilized in high vacua by the heat derived from incandescent platinum; any effect that may be produced will be due to the washing actiou of the residual air. After the experiment last described I placed the spiral of platinum in the receiver of a common air-pump, and arranged it in such a manner that the current could pass through it, while the receiver was exhausted. At a pressure of 2 millimetres the spiral was kept at incandescence for two hours before the deposit was sufficient to become visible. In another experiment, at a higher exhaustion, it required five hours befoie a deposit became visible. In a sealed glass bulb, exhausted by a Sprengel pump to a point where a quarter of an inch spark from an induction-coil would not pass between points 1 millimetre apart, was placed a spiral, the connecting wires passing through the glass. This spiral has been kept at the most dazzling incandescence for hours without the slightest deposit becoming visible.

I will now describe other and far more important phenomena observed in my experiments. If a short length of platinum wire one-thousandth of a inch in diameter be held in the flame of a Bunsen burner, at some part it will fuse, and a piece of the wire will be bent at an angle by the action of the globule of melted platinum; in some cases there are several globules formed simultaneously, and the wire assumes a zigzag shape. With a wire four-thousandths of an inch in diameter this effect does not take place, as the temperature cannot be raised to equal that of the smaller wire, owing to the increased radiating surface and mass. After heating, if the wire be examined under a microscope, that part of the surface which has been incandescent will be found covered with innumerable cracks. If the wire be placed between clamping posts, and heated to incandescence for twenty minutes, by the passage of an electric current, the cracks will be so enlarged as to be seen with the naked eye; the wire, under the microscope, presents a shrunken appearance, and is full of deep cracks. If the current is continued for several hours these effects will so increase that the wire will fall to peices. This disintegration has been noticed in platina long subjected to the action of a flame by Prof. John W. Draper. The failure of the process of lighting invented by the French chemist, Tessie du Motay, who raised sheets of platinum to incandescence by introducing them into a hydrogen flame, was due to the rapid disintegration of the metal. I have ascertained the cause of this phenomenon, and have succeeded in eliminating that which produces it, and in doing so have produced a metal in a state hitherto unknown, and which is absolutely stable at a temperature where nearly all substances melt or are consumed; a metal which, although originally soft and pliable, becomes as homogeneous as glass and as rigid as steel. When wound in the form of a spiral it is as springy and elastic when at the most dazzling incandescence as when cold, and cannot be annealed by any process now commonly known, for the

* Paper read before the American Association for the Advancement of Science; Saratoga Meeting.

cause of this shrinking and cracking of the wire is due entirely to the expansion of the air in the mechanical and physical pores of the platinum, and the contraction upon the escape of the air. Platinum as sold in commerce may be compared to sandstone, in which the whole is made of a great number of particles with many air spaces. The sandstone upon melting becomes homogeneous and no air spaces exist.

With platinum or any metal the air spaces may be eliminated and the metal made homogeneous by a very simple process. This process I will now describe. I had made a large number of platinum spirals, all of the same size and from the same quality of wire; each spiral presented to the air a radiating surface of three-sixteenths of an inch; five of these were brought by the electric current up to the melting-point, the light was measured by a photometer, and the average light was equal to four standard candles for each spiral just at the melting-point. One of the same kind of spirals was placed in the receiver of an air-pump, and the air exhausted to 2 millimetres; a weak current was then passed through the wire, to slightly warm it for the purpose of assisting the passage of the air from the pores of the metal into the vacuum. The temperature of the wire was gradually augmented, at intervals of ten minutes, until it became red. The object of slowly increasing the temperature was to allow the air to pass out gradually and not explosively. Afterward the current was increased at intervals of fifteen minutes. Before each increase in the current the wire was allowed to cool, and the contraction and expansion at these high temperatures caused the wire to weld together at the points previously containing air. In one hour and forty minutes this spiral had reached such a temperature without melting that it was giving a light of twenty-five standard candles, whereas it would undoubtedly have melted before it gave a light of five candles had it not been put through the above process. Several more spirals were afterwards tried, with the same result. One spiral, which had been brought to these high temperatures more slowly, gave a light equal to thirty standard candles. In the open air this spiral gave nearly the same light, although it required more current to keep it at the same temperature. Upon examination of these spirals, which had passed through the vacuum process, by the aid of a microscope, no cracks were visible; the wire had become as white as silver, and had a polish which could not be given it by any other means. The wire had a less diameter than before treatment, and it was exceedingly difficult to melt in the oxy-hydrogen flame. As compared with untreated platinum, it was found that it was as hard as the steel wire used in pianos, and that it could not be annealed at any temperature.

My experiments with many metals treated by this process have proved to my satisfaction, and I have no hesitation in stating that what is known as annealing of metals to make them soft and pliable is nothing more than the cracking of the metal. In every case where a hard drawn wire had been annealed a powerful microscope revealed myriads of cracks in the metal. Since the experiments of which I have just spoken I have, by the aid of Sprengel mercury pumps, produced higher exhaustion, and have, by consuming five hours in excluding the air from the wire and intermitting the current a great number of times, succeeded in obtaining a light of eight standard candles from a spiral of wire with a total radiating surface of 1-32nd of an inch, or a surface about equal to one grain of buckwheat. With spirals of this small size which have not passed through the process, the average amount of light given out before melting is less that one standard candle. Thus I am enabled, by the increased capacity of platinum, to withstand high temperatures, to employ small radiating surfaces, and thus reduce the energy required for candle light. I can now obtain eight separate jets, each giving out an absolutely steady light, and each equal to sixteen standard candles, or a total of 128 candles, by the expenditure of 30,000 foot-pounds of energy, or less than one horse-power. As a matter of curiosity I have made spirals of other metals, and excluded the air from them in the manner stated. Common iron wire may be made to give a light greater than platinum not heated. The iron becomes as hard as steel, and just as elastic. Nickel is far more refractory than iron. Steel wire used in pianos becomes decarbonized, but remains hard, and becomes the colour of silver. Aluminium melts only at a white heat.

In conclusion, it may be interesting to state that the melting-point of many oxides is dependent on the manner of applying the heat; for instance, pure oxide of zirconium does not fuse in the flame of the oxy-hydrogen blow-pipe, while it melts like wax and conducts electricity when on an incandescent platinum spiral which is at a far lower temperature; on the other hand oxide of aluminum easily melts in the oxy-hydrogen flame, while it only vitrifies on the platinum spiral.

PILL COATING.*

BY ROBERT H. DIMOCK.

Pills without coat are, when freshly made, undoubtedly most active, but if kept for any length of time, grow hard and more or less insoluble. Mr. H. M. Wilder's recommendation to keep them in mass and make them as required (as in the case of blue mass, and directed by the British Pharmacopœia) is a good suggestion, but some inconveniences are connected with it which interfere with its general adoption. Inclosing or coating the mass, when freshly made in the form in which the pills are to be taken, and thus preventing drying and hardening, is an improvement; and when we not only preserve the pills from deterioration through atmospheric influences, but also improve the appearance and conceal the taste, it would seem as though we had reached perfection. Still, there remains an opportunity for experiment to fill a want felt at the prescription counter; we need a coating which can be applied to the fresh pill as soon as formed, and which will dry sufficiently in a few minutes to permit the pill being placed in a box. I hope to supply that need, in this paper, and think the process will enable any pharmacist to coat all the pills he dispenses with a permanent soluble coating.

Sugar, as a coating, is very beautiful in appearance, and pills so coated are fairly active, when well made; but the use of sugar-coated pills compels the druggist to depend upon the wholesale manufacturer, as with no means or machines can he coat, on a small scale, pills with sugar to compare in appearance with those in the market. The necessity for drying the pills, to prevent the discoloration of the sugar and allow perfect adherence of coating, and the time required to bake on the coating, removes sugar, when used alone, from those materials which may be employed at the prescription counter with economy of time.

It seems hardly necessary to speak of resinous coatings, as apart from the insolubility of the resin the same dry, hard pill is needed as in the case of sugar. Dipping in gum, or sugar solution, and then rolling in either powdered starch, slippery elm, French chalk, etc., fails to produce a coating which I would take much pride in; the pill dries slowly, and when dispensed in an excess of powder without drying, complaints are raised that the coating adheres to the fingers or to the patient's mouth, and that the pill tastes very bad. When thoroughly dry, I find these coatings very insoluble, more so than at first I would have thought possible.

A mass for coating, composed of flaxseed, Irish moss and sugar (as recommended in the *Druggists' Circular*) was tried, but was found to harden slowly and to mould easily, but to be very soluble. Gelatin has given me

* From the *American Journal of Pharmacy*, September, 1879.

the best satisfaction, and more closely approaches, I think, what we want in a quick yet efficient coating, as pills can be coated while soft, the coating hardens quickly, is elegant in appearance and does not require much skill in applying. Among the disadvantages in its use should be mentioned insolubility of coating, if the gelatin has not been carefully selected; moulding, if the coating is too thick; stickiness of coating, from carelessness about concentration of solution; the time required and the trouble in handling the pills on needles; inability to keep the mass ready for use, owing to decomposition, and the injury caused by successive heatings.

Moulding of the gelatin, both in solution and on the pill, will be, to a certain extent, remedied by the addition of 10 grains salicylic acid in solution with 8 grains borax to 1 ounce gelatin and ½ ounce water. If the water-bath is made properly shallow, time will be saved in melting; but the injury caused by heating the mass many times can only be obviated, I think, by using the solution described below. The time occupied in the hardening of the coat sufficiently for placing the pills in a box is not under fifteen minutes in the most favourable dry and cool weather, while in mine it will average ten minutes.

Of the different kinds of coatings having gelatins for their base, Garod's consists of gelatin, 5 oz; gum arabic, 3 oz.; sugar, 2 oz.; water, q. s.; it does not harden as quickly as gelatin alone, and has not as bright and fine an appearance, but is very soluble. It has probably been suggested by the composition used for capsules.

The coating most satisfactory to me, perhaps because originating with me, is made as follows:—

Take of—

Gelatin	ʒvj
Acid Acetic, No. 8	f℥i ʒvj
Spirit of Nitrous Ether	f℥j
Granulated Gum Arabic	ʒj
Oil of Gaultheria	♏v

Dissolve the gelatin and gum in the acetic acid with the aid of a water-bath, then add the other ingredients, and mix. If the coating solution is to be used with needles alone, substitute for the gum two drachms more of gelatin. Keep securely corked in a wide mouth bottle. Make the pill mass a very little softer than ordinarily; use as little powder as possible in rolling out; when the mass is nearly brought to the proper length for cutting, lay a thread long enough to reach over the sides of the machine before the pill mass, then roll to the proper length and form pills by the machine. With some masses it may be necessary to cut with a sharp knife a slit in the top of the roll, then lay the thread in the slit and close by rolling. If the mass is of proper consistency and the machine handled right, every pill will be nicely formed and all connected *by the thread.* Then take hold of each end of the string of pills, shake off powder if there is any adhering, dip in the coating solution and twirl as though it was a toy buzz-wheel, which will throw off excess of coating; then hang up by placing pins through each end of the thread and then into wood, and expose to as cool a draught of air as possible. When hard enough to place in the box, cut the thread close to each pill with a pair of scissors or sharp knife, thus leaving no hole in the coating; the little piece of thread in each pill in length equal to the diameter of the pill should do no harm.

Pills can be coated in this way, I think, in less time than by any other method. They compare favourably in appearance, solubility, etc., with pills coated with any other substance, or with the same substance in any other and longer way. With sufficient practice, every pill can be caught on the thread and neatly rolled without touching with the fingers; twenty-four pills, or more, according to the size of the machine, can thus be coated as easily as one by the needle, as ordinarily used, and as a matter of course they dry quicker, as in coating with the needle the last pill coated will not be hard when the first is ready for the box. Even if at first only half the number of pills adhere on the thread, they may be coated as easily as one, and the remainder can be coated on the needles until the manipulator improves.

Some of the advantages of this coating are that it is always ready for use—and thus injury caused by repeated heating is prevented—it does not mould or decompose, it drys or hardens quickly, can be applied to pills as soon as made, and when applied is more soluble than gelatin alone.

I would say, in conclusion, that I have been able by practice to make the thread work successfully on my machine, but there is, perhaps, enough of trouble in learning how, to make it doubtful that this method will be of general use; still it is an idea which is freely given for what it may be worth. The coating may not be entirely new to others, but it is to me, and, as far as has been possible, I have reviewed the pharmaceutical literature on this subject. It may be capable of improvement; and for such purpose, and for a trial of what I believe to be its advantages over other coatings, it is now placed before the profession.

CALCIUM PHOSPHITE.*

BY R. ROTHER.

When sugar is added to saturation to a solution of calcium hypophosphite, the latter is precipitated. This fact is not generally known, and hence it is highly probable that a dense syrup of the mixed hypophosphites contains little if any of the calcium salt. Therefore, only a moderately thin syrup is certain of representing the requisite amount of calcium as one of the components of the compound syrup of the hypophosphites. In the presence of iron a precipitate also forms, but the proportion of sugar has apparently no share in this change. The statement is circulated, but it is not clear on what authority, that ferric hypophosphite, when contained in such a syrup, easily reverts to the ferrous form by reason of the reducing action of the hypophosphorous acid. In view of this supposition, it was proposed to substitute the very soluble ferrous salt for the uncertain and difficultly soluble ferric hypophosphite. This compound syrup is not, however, much in vogue. The writer once prepared such a syrup, but found, contrary to expectation, that the ferrous salt readily oxidized, even in the presence of sugar forming the dark green and very soluble ferroic (ferro-ferric) hypophosphite. Now, if the ferric salt suffered a reduction, it seems that this intermediate ferric compound would result without yielding a precipitate, unless the latter were occasioned by the generated phosphoric acid as calcium phosphate. The fact is, that ferric hypophosphite occurs in several modifications, of which the crystalline variety is next to insoluble in hypophosphorous acid, and hence it is this compound which deposits from the syrup. Having on hand a quantity of this sediment, the writer attempted to regenerate it by reducing it to the ferrous condition by the intervention of sulphurous acid. This treatment, however, resulted in an altogether unexpected reaction, wherein the sulphurous acid was decomposed into sulphuric acid, sulphur and oxygen; the latter, reacting upon the hypophosphorous acid of the sediment, converted it into phosphorous acid. The same result was obtained by mixing sulphurous and hypophosphorous acids together. In moderate concentration the precipitation of sulphur was instantaneous, but in dilute solutions this was preceded by a transient yellow coloration of the liquid. When solutions of calcium hypophosphite and sodium sulphite are mixed calcium sulphite is precipitated. The addition of chlorhydric acid to this mixture redissolves

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* From the *Pharmacist* for August, 1879.

the calcium sulphite; but no further reaction sets in until both the hypophosphorous and sulphurous acids are entirely freed by the addition of enough chlorhydric acid. The evidence of the resumption of change appears in the production of the deep yellow solution above mentioned; this persists for about five minutes, more or less, according to the degree of concentration, and is then followed by a copious deposit of sulphur, mixed with calcium sulphate. The yellow coloration is by no means due to nascent sulphur in solution. It is caused by the intermediate formation of hyposulphurous acid, H_2SO_2 (not the thiosulphuric acid, $H_2S_2O_3$, formerly called hyposulphurous). The decomposition of the sulphurous acid is complete in six or eight hours. The solution, after filtering off the sulphur, is but mildly acid, and yields, on the addition of ammonia, a crystalline precipitate of calcium phosphite. This precipitate, however, contains less than half of the phosphorous acid generated, owing to the fact that hypophosphorous acid is monobasic, whilst phosphorous acid is dibasic, and also that a small loss of calcium is incurred as sulphate. Therefore, the liquid filtered from the calcium phosphite, on being treated with calcium chloride, gives an additional precipitate of calcium phosphite. But if the liquid filtered from the sulphur be treated with calcium carbonate, a much larger amount of calcium phosphite is thrown down than with ammonia. If after several hours the mixture is filtered, and to the neutral filtrate calcium chloride be added, a further precipitation of calcium phosphite takes place. The addition of a very little ammonia to the precipitate, with calcium chloride, always causes this to become more distinctly crystalline and to subside more rapidly. The calcium phosphite is most speedily and conveniently washed by decantation.

Calcium phosphite is a white crystalline powder, which, when heated in a test tube, evolves spontaneously inflammable hydric phosphide, accompanied by slight detonations. When raised to a certain temperature it suddenly becomes incandescent for a moment and then leaves a residue of calcium phosphate.

When 60 grains of calcium hypophosphite are converted into phosphite by the addition of 180 grains of sodium sulphite, 120 grains of chlorhydric acid and 4 fluid ounces of water, filtration after a lapse of six or eight hours, exposure of the filtrate to dissipate excess of sulphurous oxide and final addition of ammonia, the yield is only 40·75 grains; but the amount of phosphorous acid present is sufficient to produce 97·4 grains of the salt, as follows:—

$$CaH_4(PO_2)_2 + O_2 = CaH_4(PO_3)_2, \text{ or } CaHPO_3 + H_3PO_3, \text{ and}$$
$$CaH_4(PO_2)_2, (170) : CaHPO_3OH_2, (138) :: 60 : 48{\cdot}7,$$

and as the quantity of calcium contained in the hypophosphite, as seen from the above, is only half enough to neutralize the phosphorous acid, giving theoretically but 48·7 grains of the phosphite, it is evident that the introduction of the requisite amount of calcium will afford double this, or 97·4 grains. The difference between 48·7 and 40·75 grains is loss attributable to calcium sulphate and solubility of the phosphite. It appears that no phosphoric acid is generated, as decomposition of the precipitate with oxalic acid and treatment of the filtrate with ammonio-magnesian sulphate fails to give the characteristic precipitate.

SPECIFIC GRAVITIES OF FATS, RESINS, ETC.*

BY DR. H. HAGER.

The author first describes a simple method for determining these specific gravities. This consists in melting the respective fat, dropping it into a flat-bottomed vessel containing alcohol, in such a manner that the point from which the drops are allowed to fall is not over three centimetres distant from the surface of the alcohol, and that each drop be allowed to fall on a different spot. The fat globules thus deposited at the bottom are then removed to a liquid, consisting of either alcohol, water or glycerin, or mixtures of these, until after careful stirring and reduction or increase of the density, by the addition of one or another of the above liquids, the fat globules are held in equilibrium in any part of the liquid. The specific gravity of the latter is then determined, and this is, of course, at the same time the specific gravity of the fat. The author then gives a list of specific gravities, which is here reproduced:—

	Sp. gr. at 15—16° C.
Butter Fat, clarified by settling	0·938 – 0·940
„ „ several months old	0·936 – 0·937
Artificial Butter	0·924 – 0·930
Hog's Lard, fresh	0·931 – 0·932
„ „ old	0·940 – 0·942
Beef Tallow	0·925 – 0·929
Sheep's Tallow	0·937 – 0·040
Beef and Sheep's Tallow, mixed 1:1	0·936 – 0·938
Butter of Cacao, fresh	0·950 – 0·952
„ „ very old	0·945 – 0·946
„ and Beef Tallow, mixed 1:1	0·938 – 0·939
Expressed Oil of Nutmegs	1·016 – 1·018
„ „ „ extracted with carbon disulphide	1·014 – 1·015
Expressed Oil of Nutmegs, adulterated with fatty acids	1·010 – 1·011
Expressed Oil of Nutmegs, crystalline	0·965 – 0·966
Stearic Acid, melted and in drops	0·964
„ „ crystalline	0·967 – 0·969
Wax, yellow	0·959 – 0·962
„ African	0·960
„ yellow and resin, mixed 1:1	0·973 – 0·976
„ „ and paraffin, mixed 1:1	0·916 – 0·919
„ „ „ yellow ceresin, mixed 2:1	0·942 – 0·943
Ceresin, yellow	0·925 – 0·928
Wax, Japan	0·977 – 0·978
„ „ very old	0·968 – 0·970
„ white, very old and true	0·963 – 0·964
„ „ new	0·916 – 0·925
„ „ „ and stearic acid, mixed 1:1	0·945
Wax, sp. gr. 0·963 and stearic acid, sp. gr. 0·963 mixed 1:1	0·975
Ceresin, very white, pure	0·905 – 0·908
„ white	0·923 – 0·924
Araucaria Wax	0·990
Resin (fr. pine), yellow transparent	1·083 – 1·084
„ whitish, opaque	1·044 – 1·047
„ very dark colophony	1·100
Shellac, light coloured	1·113 – 1·114
„ darker	1·123
„ bleached	0·965 – 0·968
Dammar, old	1·075
Copal, East Indian	1·063 – 1·070
„ West Indian	1·070 – 1·800
„ very old	1·054 – 1·055
Benzoin, Siam	1·235
„ Penang	1·145 – 1·155
„ Borneo	1·165 – 1·170
Guaiac Resin, pure	1·236 – 1·237
Amber	1·074 – 1·094
Sandarac	1·038 – 1·044
Mastic	1·056 – 1·060
Balsam of Tolu, old brittle	1·231 – 1·232
(Kamala	1·115 – 1·120)
(Lycopodium	1·016 – 1·020)

Many of these figures may be used as criteria for distinguishing the various bodies.

* *Pharm. Centralh.*, 1879, 132. Reprinted from *New Remedies*, September, 1879.

RADIANT MATTER.*

BY WILLIAM CROOKES, F.R.S.

To throw light on the title of this lecture I must go back more than sixty years—to 1816. Faraday, then a mere student and ardent experimentalist, was twenty-four years old, and at this early period of his career he delivered a series of lectures on the General Properties of Matter, and one of them bore the remarkable title, *On Radiant Matter*. The great philosopher's notes of this lecture are to be found in Dr. Bence Jones's 'Life and Letters of Faraday,' and I will here quote a passage in which he first employs the expression *Radiant Matter*:—

"If we conceive a change as far beyond vaporization as that is above fluidity, and then take into account also the proportional increased extent of alteration as the changes rise, we shall perhaps, if we can form any conception at all, not fall far short o Radiant Matter; and as in the last conversion many qualities were lost, so here also many more would disappear."

Faraday was evidently engrossed with this far-reaching speculation, for three years later—in 1819—we find him bringing fresh evidence and argument to strengthen his startling hypothesis. His notes are now more extended, and they show that in the intervening three years he had thought much and deeply on this higher form of matter. He first points out that matter may be classed into four states—solid, liquid, gaseous, and radiant—these modifications depending upon differences in their several essential properties. He admits that the existence of Radiant Matter is as yet unproved, and then proceeds, in a series of ingenious analogical arguments, to show the probability of its existence.†

If, in the beginning of this century, we had asked, What is a Gas? the answer then would have been that it is matter, expanded and rarefied to such an extent as to be impalpable, save when set in violent motion; invisible, incapable of assuming or of being reduced into any definite form like solids, or of forming drops like liquids; always ready to expand where no resistance is offered, and to contract on being subjected to pressure. Sixty years ago such were the chief attributes assigned to gases. Modern research, however, has greatly enlarged and modified our views on the constitution of these elastic fluids. Gases are now considered to be composed of an almost infinite number of small particles or molecules, which are constantly moving in every direction with velocities of all conceivable magnitudes. As these molecules are exceedingly numerous, it follows that no molecule can move far in any direction without coming in contact with some other molecule. But if we exhaust the air or gas contained in a closed vessel, the number of molecules becomes diminished, and the distance through which any one of them can move without coming in contact with another is increased, the length of the mean free path being inversely proportional to the number of molecules present. The further this process is carried the longer becomes the average distance a molecule can travel before entering into collision; or, in other words, the longer its mean free path, the more the physical properties of the gas or air are modified. Thus, at a certain point, the phenomena of the radiometer become possible, and on pushing the rarefaction still further, *i.e.*, decreasing the number of molecules in a given space and lengthening their mean free path, the experimental results are obtainable to which I am now about to call your attention. So distinct are these phenomena from anything which occurs in air or gas at the ordinary tension, that we are led to assume that we are here brought face to face with Matter in a Fourth state or condition, a condition as far removed from the state of gas as a gas is from a liquid.

Mean Free Path. Radiant Matter.

I have long believed that a well-known appearance observed in vacuum tubes is closely related to the phenomena of the mean free path of the molecules. When the negative pole is examined while the discharge from an induction-coil is passing through an exhausted tube, a dark space is seen to surround it. This dark space is found to increase and diminish as the vacuum is varied, in the same way that the mean free path of the molecules lengthens and contracts. As the one is perceived by the mind's eye to get greater, so the other is seen by the bodily eye to increase in size; and if the vacuum is insufficient to permit much play of the molecules before they enter into collision, the passage of electricity shows that the "dark space" has shrunk to small dimensions. We naturally infer that the dark space is the mean free path of the molecules of the residual gas, an inference confirmed by experiment.

I will endeavour to render this "dark space" visible to all present. Here is a tube (Fig. 1), having a pole in the

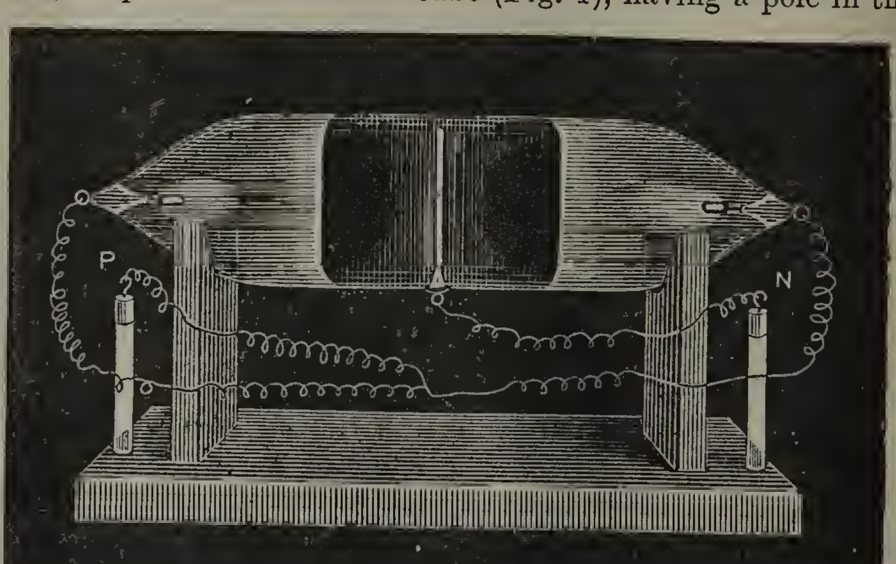

Fig. 1.

centre in the form of a metal disk, and other poles at each end. The centre pole is made negative, and the two end poles connected together are made the positive terminal. The dark space will be in the centre. When the exhaustion is not very great the dark space extends only a little

* A lecture delivered to the British Association for the Advancement of Science, at Sheffield, Friday, August 22, 1879.

† "I may now notice a curious progression in physical properties accompanying changes of form, and which is perhaps sufficient to induce, in the inventive and sanguine philosopher, a considerable degree of belief in the association of the radiant form with the others in the set of changes I have mentioned.

"As we ascend from the solid to the fluid and gaseous states, physical properties diminish in number and variety, each state losing some of those which belonged to the preceding state. When solids are converted into fluids, all the varieties of hardness and softness are necessarily lost. Crystalline and other shapes are destroyed. Opacity and colour frequently give way to a colourless transparency, and a general mobility of particles is conferred.

"Passing onward to the gaseous state, still more of the evident characters of bodies are annihilated. The immense differences in their weight almost disappear; the remains of difference in colour that were left, are lost. Transparency becomes universal, and they are all elastic. They now form but one set of substances, and the varieties of density, hardness, opacity, colour, elasticity and form, which render the number of solids and fluids almost infinite, are now supplied by a few slight variations in weight, and some unimportant shades of colour.

"To those, therefore, who admit the radiant form of matter, no difficulty exists in the simplicity of the properties it possesses, but rather an argument in their favour. These persons show you a gradual resignation of properties in the matter we can appreciate as the matter ascends in the scale of forms, and they would be surprised if that effect were to cease at the gaseous state. They point out the greater exertions which Nature makes at each step of the change, and think that, consistently, it ought to be greatest in the passage from the gaseous to the radiant form."—'Life and Letters of Faraday,' vol. i., p. 308.

on each side of the negative pole in the centre. When the exhaustion is good, as in the tube before you, and I turn on the coil, the dark space is seen to extend for about an inch on each side of the pole.

Here, then, we see the induction spark actually illuminating the lines of molecular pressure caused by the excitement of the negative pole. The thickness of this dark space is the measure of the mean free path between successive collisions of the molecules of the residual gas. The extra velocity with which the negatively electrified molecules rebound from the excited pole keeps back the more slowly moving molecules which are advancing towards that pole. A conflict occurs at the boundary of the dark space, where the luminous margin bears witness to the energy of the discharge.

Therefore the residual gas—or, as I prefer to call it, the gaseous residue—within the dark space is in an entirely different state to that of the residual gas in vessels at a lower degree of exhaustion. To quote the words of our last year's President, in his Address at Dublin :—

"In the exhausted column we have a vehicle for electricity not constant like an ordinary conductor, but itself modified by the passage of the discharge, and perhaps subject to laws differing materially from those which it obeys at atmospheric pressure."

In the vessels with the lower degree of exhaustion, the length of the mean free path of the molecules is exceedingly small as compared with the dimensions of the bulb, and the properties belonging to the ordinary gaseous state of matter, depending upon constant collisions, can be observed. But in the phenomena now about to be examined, so high is the exhaustion carried that the dark space around the negative pole has widened out till it entirely fills the tube. By great rarefaction the mean free path has become so long that the hits in a given time in comparison to the misses may be disregarded, and the average molecule is now allowed to obey its own motions or laws without interference. The mean free path, in fact, is comparable to the dimensions of the vessel, and we have no longer to deal with a *continuous* portion of matter, as would be the case were the tubes less highly exhausted, but we must here contemplate the molecules *individually*. In these highly exhausted vessels the molecules of the gaseous residue are able to dart across the tube with comparatively few collisions, and radiating from the pole with enormous velocity, they assume properties so novel and so characteristic as to entirely justify the application of the term borrowed from Faraday, that of *Radiant Matter*.

Radiant Matter exerts powerful Phosphorogenic Action where it strikes.

I have mentioned that the Radiant Matter within the dark space excites luminosity where its velocity is arrested by residual gas outside the dark space. But if no residual gas is left, the molecules will have their velocity arrested by the sides of the glass ; and here we come to the first and one of the most noteworthy properties of Radiant Matter discharged from the negative pole—its power of exciting phosphorescence when it strikes against solid matter. The number of bodies which respond luminously to this molecular bombardment is very great, and the resulting colours are of every variety. Glass, for instance, is highly phosphorescent when exposed to a stream of Radiant Matter. Here (Fig. 2) are three bulbs composed of different glass ; one is uranium glass (*a*), which phosphoresces of a dark green colour ; another is English glass (*b*), which phosphoresces of a blue colour ; and the third (*c*) is soft German glass—of which most of the

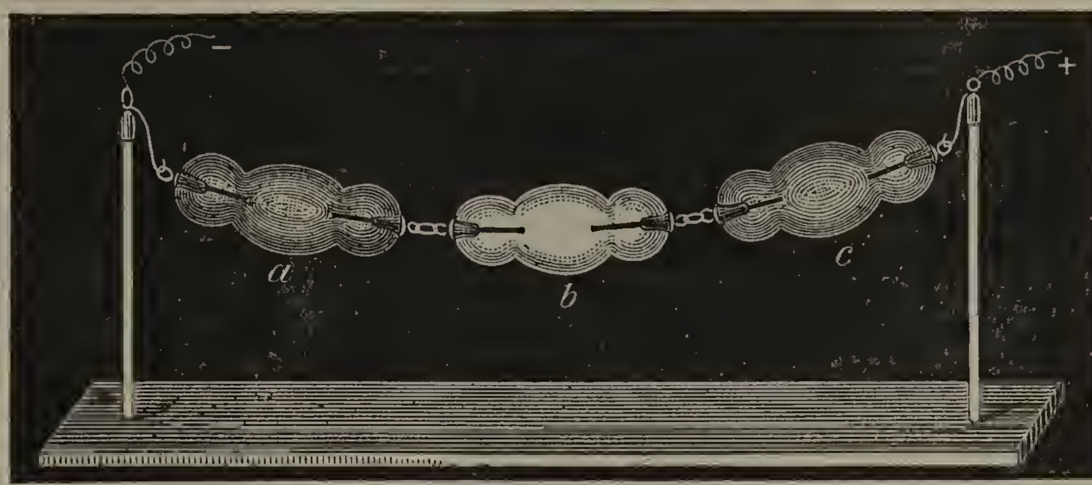

Fig. 2.

apparatus before you is made—which phosphoresces of a bright apple-green.

My earlier experiments were almost entirely carried on by the aid of the phosphorescence which glass takes up when it is under the influence of the radiant discharge ; but many other substances possess this phosphorescent power in a still higher degree than glass. For instance, here is some of the luminous sulphide of calcium prepared according to M. Ed. Becquerel's description. When the sulphide is exposed to light—even candlelight—it phosphoresces for hours with a bluish white colour. It is, however, much more strongly phosphorescent to the molecular discharge in a good vacuum, as you will see when I pass the discharge through this tube.

Other substances besides English, German, and uranium glass, and Becquerel's luminous sulphides, are also phosphorescent. The rare mineral Phenakite (aluminate of glucinum) phosphoresces blue ; the mineral Spodumene (a silicate of aluminium and lithium) phosphoresces a rich golden yellow ; the emerald gives out a crimson light. But without exception, the diamond is the most sensitive substance I have yet met for ready and brilliant phosphorescence. Here is a very curious fluorescent diamond, green by daylight, colourless by candlelight. It is mounted in the centre of an exhausted bulb (Fig. 3), and the molecular discharge will be directed on it from below upwards. On darkening the room you see the diamond shines with as much light as a candle, phosphorescing of a bright green.

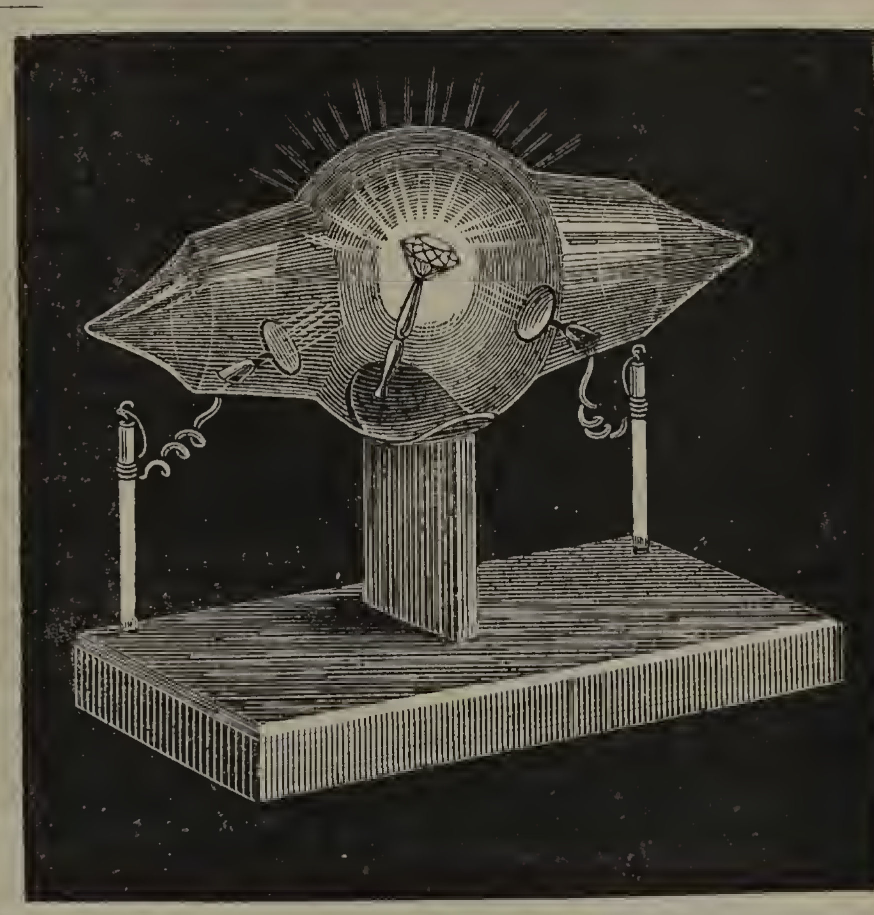

Fig. 3.

Next to the diamond the ruby is one of the most remarkable stones for phosphorescing. In this tube (Fig. 4) is a fine collection of ruby pebbles. As soon as the induction spark is turned on you will see these rubies shining

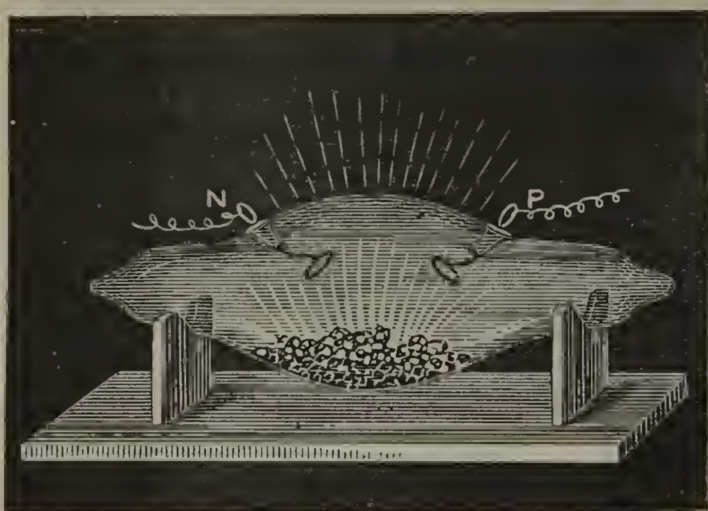

Fig. 4.

with a brilliant rich red tone, as if they were glowing hot. It scarcely matters what colour the ruby is, to begin with. In this tube of natural rubies there are stones of all colours—the deep red and also the pale pink ruby. There are some so pale as to be almost colourless, and some of the highly-prized tint of pigeon's blood; but under the impact of Radiant Matter they all phosphoresce with about the same colour.

Now the ruby is nothing but crystallized alumina with a little colouring-matter. In a paper by Ed. Becquerel,* published twenty years ago, he describes the appearance of alumina as glowing with a rich red colour in the phosphoroscope. Here is some precipitated alumina prepared in the most careful manner. It has been heated to whiteness, and you see it also glows under the molecular discharge with the same rich red colour.

The spectrum of the red light emitted by these varieties of alumina is the same as described by Becquerel twenty years ago. There is one intense red line, a little below the fixed line B in the spectrum, having a wave-length of about 6895. There is a continuous spectrum beginning at about B, and a few fainter lines beyond it, but they are so faint in comparison with this red line that they may be neglected. This line is easily seen by examining with a small pocket spectroscope the light reflected from a good ruby.

There is one particular degree of exhaustion more favourable than any other for the development of the properties of Radiant Matter which are now under examination. Roughly speaking it may be put at the millionth of an atmosphere.† At this degree of exhaustion the phosphorescence is very strong, and after that it begins to diminish until the spark refuses to pass.‡

I have here a tube (Fig. 5) which will serve to illustrate the dependence of the phosphorescence of the glass on the degree of exhaustion. The two poles are at *a* and *b*, and at the end (*c*) is a small supplementary tube

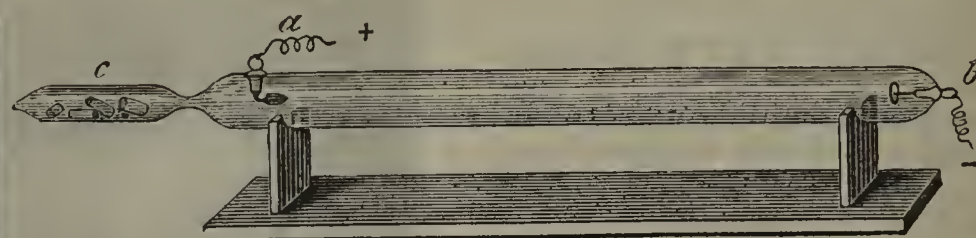

Fig. 5.

connected with the other by a narrow aperture, and containing solid caustic potash. The tube has been exhausted to a very high point, and the potash heated so as to drive off moisture and injure the vacuum. Exhaustion has then been re-commenced, and the alternate heating and exhaustion repeated until the tube has been brought to the state in which it now appears before you. When the induction spark is first turned on nothing is visible—the vacuum is so high that the tube is non-conducting. I now warm the potash slightly and liberate a trace of aqueous vapour. Instantly conduction commences and the green phosphorescence flashes out along the length of the tube. I continue the heat, so as to drive off more gas from the potash. The green gets fainter, and now a wave of cloudy luminosity sweeps over the tube, and stratifications appear, which rapidly get narrower, until the spark passes along the tube in the form of a narrow purple line. I take the lamp away, and allow the potash to cool; as it cools, the aqueous vapour, which the heat had driven off, is re-absorbed. The purple line broadens out, and breaks up into fine stratifications; these get wider and travel towards the potash tube. Now a wave of green light appears on the glass at the other end, sweeping on and driving the last pale stratification into the potash; and now the tube glows over its whole length with the green phosphorescence. I might keep it before you, and show the green growing fainter and the vacuum becoming non-conducting; but I should detain you too long, as time is required for the absorption of the last traces of vapour by the potash, and I must pass on to the next subject.

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* *Annales de Chimie et de Physique*, 3rd series, vol. lvii., p. 50, 1859.

† 1·0 millionth of an atmosphere = 0·00076 milm.

1315·789 millionths of an atmosphere	=	1·0 milm.
1,000,000· ,, ,, ,,	=	760·0 milms.
,, ,, ,, ,,	=	1 atmosphere.

‡ Nearly 100 years ago Mr. Wm. Morgan communicated to the Royal Society a Paper entitled "Electrical Experiments made to ascertain the Non-conducting Power of a Perfect Vacuum, &c." The following extracts from this Paper, which was published in the 'Phil. Trans.' for 1785 (vol. lxxv., p. 272), will be read with interest:—

"A mercurial gage about 15 inches long, carefully and accurately boiled till every particle of air was expelled from the inside, was coated with tin-foil 5 inches down from its sealed end, and being inverted into mercury through a perforation in the brass cap which covered the mouth of the cistern; the whole was cemented together, and the air was exhausted from the inside of the cistern through a valve in the brass cap, which producing a perfect vacuum in the gage formed an instrument peculiarly well adapted for experiments of this kind. Things being thus adjusted (a smal wire having been previously fixed on the inside of the cistern to form a communication between the brass cap and the mercury, into which the gage was inverted) the coated end was applied to the conductor of an electrical machine, and notwithstanding every effort, neither the smallest ray of light, nor the slightest charge, could ever be procured in this exhausted gage."

"If the mercury in the gage be imperfectly boiled, the experiment will not succeed; but the colour of the electric light, which in air rarefied by an exhauster is always violet or purple, appears in this case of a beautiful green, and, what is very curious, the degree of the air's rarefaction may be nearly determined by this means; for I have known instances, during the course of these experiments, where a small particle of air having found its way into the tube, the electric light became visible, and as usual of a green colour; but the charge being often repeated, the gage has at length cracked at its sealed end, and in consequence the external air, by being admitted into the inside, has gradually produced a change in the electric light from green to blue, from blue to indigo, and so on to violet and purple, till the medium has at length become so dense as no longer to be a conductor of electricity. I think there can be little doubt, from the above experiments, of the non-conducting power of a perfect vacuum."

"This seems to prove that there is a limit even in the rarefaction of air, which sets bounds to its conducting power; or, in other words, that the particles of air may be so far separated from each other as no longer to be able to transmit the electric fluid; that if they are brought within a certain distance of each other, their conducting power begins, and continually increases till their approach also arrives at its limit."

(*To be continued.*)

The Pharmaceutical Journal.

SATURDAY, OCTOBER 11, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

REGISTRATION UNDER THE DENTAL ACT.

THE letter which appeared in this Journal some weeks since from Mr. MUSGRAVE, was not, in our opinion, either timely or judicious; but, having regard to the character of affording full opportunity for the expression of opinion, which we seek to merit by the insertion of letters in our correspondence columns, we allowed that influence to overrule the disposition to treat the letter in question as unsuitable for publication. As might naturally be expected the appearance of Mr. MUSGRAVE's letter has induced a number of correspondents to enter the lists with him for the purpose of controverting the opinions he has put forward. The publication of the letters which appear in the present number of the Journal has been unavoidably postponed, and since they were in type we have received many others, but as they are all very much to the same effect as those which have been published, it is unnecessary to occupy more space by inserting them also.

As regards the most prominent topic of Mr. MUSGRAVE's letter, viz., the claim of chemists' assistants to registration as dentists, we confess to having some considerable difficulty in coming to a decided conclusion whether or not chemists' assistants should be included among those who constitute the third class of persons described in the Act as entitled to registration under it. So far as concerns the present question, the persons who are there mentioned are such as were at the passing of the Act *bonâ fide* engaged in the practice of dentistry or dental surgery in conjunction with pharmacy. It may be contended that the common sense no less than the strict legal interpretation of those words should have reference only to those who were thus engaged in practice on their own account, and that consequently persons acting merely in the capacity of assistants to chemists and druggists who were engaged in the practice of dentistry would not be included in the terms of the Act and would not have the same right to registration as their employers. Certainly if this view of the matter were allowed to govern the admission to the Dental Register some very grave injustice would be done to many. It is quite conceivable that a chemist's assistant or apprentice may have acquired by application and experience in the dental operations that are usually performed by chemists, such skill and competence as to make him fit for registration in accordance with the spirit of the Act. As possessing the ability requisite for doing dental work, it would be a very hard case if such a person were denied registration upon the ground that his practice had not been *bonâ fide* because it had been carried on for someone else and not solely on his own account.

The hardship of such a case would be the greater, since the Dental Act does not contain any definite provision for admitting persons to registration by means of a modified examination, such as that provided to meet the case of chemists' assistants at the passing of the Pharmacy Act. One of our correspondents, writing from the same point of view as Mr. MUSGRAVE, lays great stress upon the significance of the term "*bonâ fide*," as being well understood by lawyers as one that, far from being lax or ambiguous, sweeps away all ambiguity. We fail altogether to appreciate in this way the import of the words "*bonâ fide*" as used in the Act, but on the contrary are disposed to regard these very words as constituting the difficulty to be encountered in reading the Act. The man who has by study and experience become skilful in the performance of dental operations and has carried them out successfully, as well as to the satisfaction of those operated upon, may well be said to have been "*bonâ fide*" engaged in the practice of dentistry. Whether he did this as a chemist in business on his own account, or whether he did it only as a pupil or assistant, does not much matter so far as the common sense view of the matter is concerned; nor do we think it much matters in regard to the true object and aim of the Dental Act.

We believe from what has been stated by some of our correspondents that many chemists' assistants who have had training and experience in dentistry in the way above mentioned, have sought and obtained registration under the Dental Act. Mr. MUSGRAVE's own inquiries have resulted in establishing the same fact. Of course we cannot undertake to say that in all cases the grounds upon which such registration was obtained were what they should have been, nor is it our business to attempt this; the settlement of any question that may be raised in regard to that point is in the hands of the Medical Council, by which body it will doubtless be conducted with just regard to all the circumstances of the case, rather than with the object of giving undue support to any attempted establishment of a monopoly in dental practice.

Meanwhile we would suggest to ardent reformers like Mr. MUSGRAVE that it is somewhat premature to talk and write so emphatically about "fraudulent registrations" and to flourish in such an aggressive manner the red flag of the 35th or penal clause of the Dental Act. We fully sympathize with them in their desire to make the practice of dentistry respectable by confining it to those who possess the requisite skill; it is but the other day such an undertaking was entered upon by our own body, and it would be ungenerous if we did not accord to dental reformers the same encouragement which pharmacists have been glad to receive from medical men. But these endeavours to effect reform must not be carried out with a high-handed disregard of antecedent conditions and their consequences. The first great work of the dental reformers is not to set up a graven image as the ideal standard to which all dentists must conform and to insist upon the immediate sacrifice of all that do not so. This achievement may be left for the dentistry of the future and present labour must be devoted to the making of a register. We cannot expect nor do we think dental reformers can hope that this will easily be made a satisfactory roll of persons entitled, in every sense of the word, to practise dentistry. It is in other ranks than those of chemists and druggists that are to be found the practitioners who have brought discredit upon the dental branch of the medical profession, and this is so well known that we are at a loss to understand the bitterness with which the dental practice of chemists has been fixed upon as a thing to denounce, and if possible to suppress.

Until dental practice shall have become, under the judicious administration of the Dental Act, a much better regulated occupation than it has been, we do not think there is much probability that Mr. Musgrave's idea of a dentist will correspond with more than a very small number of the registered persons who are legally qualified to practise dentistry and entitled to recover fees for so doing. We fully admit that from an ideal point of view the dentist should have been engaged in every branch of the dental art, able to undertake any operation and do any mechanical work that may be required for the mouth by the public; but there is no immediate prospect of the dental register being wholly occupied by such men. They must long be content to rank on a legal equality with many inferiors, just as the more accomplished pharmacist is still constrained to accept the legal level prescribed by the Pharmacy Act and trust to individual excellence for gaining greater recognition than that standard of qualification will afford.

As regards the general public and the existing order of things Mr. Musgrave's dentist is to a great extent, if not entirely, the dentist of the future, and as regards the dental practice of chemists, there is not a shadow of reason for accepting his definition of what a dentist should be in the eye of the law. He speaks of chemists that have been pointed out to him who have never done any dental operation beyond extracting a tooth, and he adds that they probably never saw the inside of a dental laboratory, know absolutely nothing of "dentistry" in his sense of the term, and he urges this is inconsistent with the fact that they are registered as having being in *bonâ fide* practice as dentists. We do not desire to question the good faith with which Mr. Musgrave puts forward this argument as an objection to the legal recognition of the chemist as a dental practitioner, and would only point out its fallacious nature by reference to the circumstance that drawing teeth is pretty well the extent to which dentistry has been practised by chemists, or to which they are generally called upon to practise dentistry. It was upon this ground that the Council of the Pharmaceutical Society applied for and obtained the insertion of a clause to enable chemists to continue as they had done mainly the extraction of teeth and some other operations of dentistry. But for that clause a chemist who drew teeth would have been to that extent practising as a dentist and by holding himself out as doing so by means of a notification on his window he would have been liable to a penalty.

In one and the same breath Mr. Musgrave expresses his contempt for this limited exercise of dentistry, and yet grudges the chemist the registration by which he is enabled to practise it lawfully. This seems to us unreasonable. The very limitation of the chemist's dental practice which he despises should be a reason for inducing him not to treat the tooth-drawing chemist as an opponent or a rival. At the same time drawing a tooth is a dental operation, and as the chemist who does it practises dentistry it seems irrational to leave him outside the operation of the Act by which it is sought to improve dental practice generally.

We understand the Dental Register has now been published and that the public, no less than the medical and pharmaceutical communities, will be able to know who is legally qualified to practise dentistry. That numerous amendments will have to be made necessitating the early publication of a new edition may be taken as certain, and if we may accept the intimation of some of our correspondents, the British Dental Association will soon be busy in its search for defective titles. That this should be done we admit is right; but judging from the spirit manifested in some of the letters we have received, it will not be at all less right to suggest that this work of purging the register should be conducted with discretion and justice, under the guidance of common sense rather than of high-flown ideas, and above all without a feeling of animosity against those members of the pharmaceutical body who have been brought into legal confraternity with dental practitioners more generally and exclusively engaged in the practice of dentistry.

The occasion of the retirement of Mr. G. S. Pedler, of Fleet Street, from the Court of Common Council of the City of London has furnished an opportunity to some of his fellow-citizens to show their appreciation of the services he has rendered to the ward and city generally during a period of upwards of forty years. The testimonial, which was presented on Monday week, took the form of a silver tea and coffee service and salver and a framed address, and was accompanied by a handsomely set gold ring for Mrs. Pedler.

Provincial Transactions.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION AND SCHOOL OF PHARMACY.

On Friday evening, September 26, a large number of pharmacists, assistants and apprentices, assembled at the Memorial Hall, Manchester, to hear a lecture on "Pharmaceutical Education," delivered by Mr. L. Siebold, F.C.S., under the auspices of the Manchester Chemists and Druggists' Association; Mr. G. S. Woolley presided.

Mr. Siebold, addressing himself chiefly to the younger members of the trade, who were present in large numbers, strongly urged upon them the necessity of making an early beginning with their scientific studies. He regarded their apprenticeship as pre-eminently the period for acquiring a sound fundamental knowledge of their calling, which they would then be in the best position to augment during their subsequent career, to their own immense advantage, and to the benefit of all they were called upon to serve. It was a mistake to suppose that their apprenticeship ought to be devoted solely to the acquisition of a practical knowledge of the trade, and that their scientific education should be reserved for a later period. Their practical training, no doubt was a most essential element, the importance of which he would be the last to underrate; but he did not see how it could be efficiently acquired without its being associated with a sufficient amount of scientific knowledge to impart life, thought, and intelligence to their daily work. Their practical and theoretical studies ought to be carried on together, and if this was judiciously and conscientiously done during a period in which learning was easier than ever afterwards, they would find themselves in a position when old enough to present themselves for the compulsory examination to satisfy all demands without any previous resort to cram, and by further exertions, under the guidance of competent and conscientious teachers, to obtain that higher distinction, which, he hoped, it would be the wish of most of them to attain. It was to him a matter of surprise that the apprentices in the larger towns, where courses of lectures were provided for their benefit, were so slow in availing themselves of the opportunities thus offered, and offered on terms which were certainly within the reach of the poorest of them. They would be in a position to attend such courses of instruction for several sessions during their apprenticeship, and if they were to do this, and to supplement the efforts of their teachers by a moderate amount of home work, they would obtain in a proper systematic manner an amount of knowledge which would benefit them for ever afterwards, and which would make their Minor examination a longed-for instead of a dreaded event. If it was then their intention to set apart an entire session for the acquisition of higher attainments, and for this purpose to enter the Pharmaceutical Society's school in London, as he most strongly recommended them to do, they would find their previous efforts still further rewarded, as the benefit they would derive from the great opportunities there afforded to them would be incomparably greater than if they entered unprovided with a sound foundation of knowledge. As it was, the majority of apprentices wasted much of their valuable time without any serious effort in a scientific direction, implicitly trusting to some future cramming process to make up for all. This process, however, despite all assurances and announcements to the contrary, failed in very many cases altogether, while where it succeeded in passing a man through the examination, it yet left him without the real knowledge required for the efficient discharge of his duties. He (Mr. Siebold) had the greatest faith in knowledge slowly and systematically acquired; such knowledge was permanent, and could be employed with advantage in the pursuit of one's calling. If, however, the earlier opportunity of the pharmacist had been neglected, and he had to face the necessity of gaining rapidly knowledge which would much better have been acquired by degrees, then it was all the more important that such a student should seek the aid of able and conscientious teachers, and avoid the unscrupulous crammer. There was this great distinction between learning and cramming, that the former process leads to a proper understanding of the facts committed to memory, enabling the student to make use of such facts for deducing other facts yet unknown to him, and to augment his store of knowledge, not merely by further additions from without, but also by his own reasoning and reflection; while the process of cramming (in the objectionable sense of the term) conveys to the students mere facts without any intelligible conception of their true meaning and the uses to which they may be applied. Such a system was intended not to impart real knowledge, but to get ignorant men through their examination; but he (Mr. Siebold) believed that in most cases it would fail to accomplish even that. He was quite aware of the fact that many passed their examinations after such a course of cramming; but he felt sure that in the great majority of such cases the success was due to previous honest efforts on the part of the candidates, and that the process would utterly fail with actual beginners. To those who did not wish to learn, but whose sole aim it was to endeavour by a show of sham knowledge to impose upon examiners—to those he had not a word to say. He trusted, however, that there would be an ever increasing number of young pharmacists anxious to obtain a sound scientific training, which he regarded as the surest means of winning for them the respect of professional men, and of raising them to a higher place in the social scale.

At the conclusion of the lecture,

The Chairman, in moving a vote of thanks to the lecturer, noticed with great satisfaction amongst the audience the large proportion of young men. He suggested to such of the latter as were engaged in study, that they might derive considerable inexpensive recreation from the formation of materia medica and botanical collections and the practice of qualitative analysis during a portion of their leisure time.

Mr. J. B. Payne seconded the resolution. He had listened to Mr. Siebold's remarks with great interest and very much pleasure. With reference to one of the remarks made by the lecturer at the commencement of his paper, in which he said that it was the duty of every employer to see that the apprentice committed to his care devoted some portion of his time to study, and which statement he cordially endorsed, Mr. Siebold did not tell them how that was to be accomplished in the case of those youths who showed themselves unwilling. He had had experience of both classes, those anxious to receive every assistance they could get, and those who utterly set it aside, and he must confess his inability to deal with the latter class. It was often a consideration with young men how to obtain possession of text-books and works of reference, and he took this opportunity of reminding those present that the Manchester Association had a good library, and that any youth on taking a note from his employer, who was a member of the Association, could have books for use at home by applying for them. He was sure also that the Council would whenever requisite be glad to make additions to the library, provided good use were made of the books.

Mr. Bostock, in supporting the motion, paid a tribute of respect to Mr. Siebold for his earnestness and enthusiasm in instructing his pupils.

The lecturer briefly acknowledged the thanks of the meeting, and the proceedings terminated.

Obituary.

Notice has been received of the death of the following:—

On the 30th of August, 1879, Mr. John Jackson, Chemist and Druggist, Northampton Street, Leicester. Aged 73 years.

On the 3rd of October, at Shanghai, China, of cholera, Mr. William Arthur Thirlby, Pharmaceutical Chemist, formerly of Ashby-de-la-Zouch. Aged 27 years. Mr. Thirlby had been a Member of the Pharmaceutical Society since 1874.

On the 7th of October, 1879, Mr. Thomas Croskell Blaymire, Chemist and Druggist, St. Ann's Square, Manchester. Aged 25 years. Mr. Croskell had been an Associate of the Pharmaceutical Society since 1871.

BOOKS, PAMPHLETS, ETC., RECEIVED.

Hospital Formulary and Posological Table for the Use of the Department of Public Charities and Correction of the City of New York. New York. 1879. From Mr. C. Rice.

Elements of Modern Chemistry. By Adolphe Wurtz. Translated and Edited from the Fourth French Edition by W. H. Greene, M.D., etc. London and Philadelphia. J. B. Lippincott and Co. 1879. From the Publishers.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[345]. Ought the following injection to be filtered or a "shake the bottle" label put on?—

℞ Zinci Sulphatis . . . . grs. v.
Liq. Plumbi Subacetatis . . . . . ʒj.
Aquæ . . . . ℥vj.
Misce. For injection.

Assistant.

[346]. When pigment. iodi. is ordered which should be sent out, the tincture or liniment of iodine?

"Juvenis."

[347]. I have had euonymin from several good wholesale houses. That which I get in Scotland is always distinctly green in colour, whereas that from London is as invariably a distinct brown, with slightly greenish tinge. Will some competent person kindly say which is as it should be, and by what tests it may be recognized?

Glasgow. Euryowie.

[348]. I had the following prescription handed me to-day. Will some of your correspondents give their opinion as to how it should be dispensed? Is the top ingredient meant for Ferri Am. Cit?—

℞ Ferri Ammoniæ Sulph. . . . . . . ʒj.
Syrupi Flor. Aurant. . . . . ℥v.
Aquæ Destil. . . . . ad ℥viij.
Cap ½ ter die.

Perhaps I may say I could not see the prescriber.

Mag. Carb.

[349]. The following prescription was presented to me a few days ago. Would some of your numerous readers inform me as to the best mode of dispensing it?—

℞ Ol. Copaibæ . . . . ♏ij.
Magnesiæ Ust. . . . . gr. ij.
Gum. Acaciæ . . . . gr. j.
M. Ft. pil. Mitte tales xxxvi.
Sig. Three pills to be taken thrice a day.

Junior.

[350]. How should the following be dispensed, and what appearance should it present?—

℞ Chloral Hydrat. . . . . gr. xx.
Pulv. Camphor. . . . . gr. v.
Syr. Tolut. . . . . ʒj.
Aq. . . . . ad ℥j.
M. ft. haust. Statim sd.

Tyro.

[351].

℞ Sodæ Bicarb. . . . . gr. x.
Pulv. Calumb. . . . . gr. x.
„ Zingib. . . . . gr. v.
M. Ft. pulv. j. capt. ter die.

℞ Potass Bromid. . . . . ʒss.
Acid. Tartaric. . . . . ʒiv.
Aquæ . . . . ad ℥vj.

A tablespoonful three times daily with one of the powders previously dissolved in two-tablespoonfuls of water, whilst effervescing.

Ought the mixture to be clear? It has been sent out turbid and bright, and with a heavy deposit (Pot. Bitart.), and still the patient is not happy.

"Country."

[352].

℞ Liq. Strychniæ . . . . ♏xxiv.
Ferri et Ammon. Cit . . . . . ʒiss.
Potass. Bromidi . . . . ʒj.
Magnes. Sulphatis . . . . . . ʒij.
Aquæ Flor. Aurantii . . . . . ℥vj.
M. Ft. mist.

The above produced a turbid mixture which was brought back by the patient the following day, who assured me that at Lucerne it had been dispensed a bright red and perfectly clear solution; moreover her physician had particularly requested to be allowed to see the first bottle before any was taken and expressed his surprise to find that it had been so scientifically dispensed. I made up another bottle in the presence of the lady, reversing the order in which I had mixed it the previous day, but with no better result. Afterwards I made several small quantities varying the *modus operandi* in every conceivable way, and testing the neutrality of the magnes. sulph., but without the success of my *confrère* at Lucerne. I would add that this is the second pharmacy in Paris in which it has been dispensed with a like result, and should be glad if some of your readers would explain the method of mixing, so as to obtain a perfectly clear and bright red mixture.

Paris. O. Rogers.

[353]. The following prescription was brought to me the other day and I had to make ten dozen of the pills. Should be glad to hear the opinion of some your correspondents on the best method of manipulation, and allowing for the difference in price of Howard's Quinine here (18*s.* 6*d.*) what they would consider a fair price to charge per doz.:—

℞ Quinæ. Disulph., Hwd's . . . . . ʒv.
Acid. Sulph. Dil. . . . . ♏xx.
Pulv. Phosphori . . . . gr. iss.
Strychniæ Sulph. . . . . gr. iss.
M. s. a. Ft. massa et divid. in pilul. LX. (in fol. auro involv.).

After finishing, the pills were of a large size but not larger than an ordinary six grains pill.

Orange, N. S. W. J. S.

[354]. Should this mixture be clear or turbid?—

℞ Potassii Iodidi . . . . ʒss.
Ferri Tart. . . . . ʒij.
Aquæ . . . . ad ℥viij.
M.

T. Brayshay.

[355]. Can a powder be made with these ingredients?—

℞ Pulv. Sodæ Phosphat. . . . . ʒiij.
Pulv. Zingiberis . . . . ʒij.
Potass. Citratis . . . . ʒiv.
M. Ft. pulv.

T. Brayshay.

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[356].

℞ Castile Soap . . . . ʒj.
Camphor . . . . ʒiij.
Opium . . . . ʒiij.
Flowers of Benjamin . . . . . . ʒiij.
Oil of Aniseed . . . . ʒiij.
Ft. mass.

Can any reader of the Journal inform me the best mode of forming this into a nice mass? It was presented to me the other day. After I got them mixed up (without the oil of aniseed), they turned to be as soft as treacle.

A Student.

Notes and Queries.

[625]. ANILINE COPYING INK.—Dissolve a few grains of methyl aniline violet in methylated spirit (as little as possible), then dilute with about five or six times as much water, and add few drops of mucilage to make it a proper consistency for writing with.

J. Need.

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[626]. TINCT. KINO. — Will some reader kindly state the best method of filtering tincture of kino? By means of filtering paper the process is exceedingly slow. A better method will greatly oblige

Minor.

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[627]. JAPAN.—Can some reader give me a good receipt for best black japan which shall not turn opalescent with a bluish or greenish tinge on being varnished?

M. P. S.

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[628]. STAINS FROM COCOA.—Would any of the readers of the Journal state their opinion as to the best mode of removing stains caused by cocoa on china, linen, etc.?

Ignoramus.

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[629]. ROOKE'S GOLDEN OINTMENT.—Would any correspondent kindly oblige me with the recipe for making Dr. Rooke's Golden Ointment, as given by him some years ago?

Inquirer.

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[630]. FERROUS OXALATE FOR PHOTOGRAPHIC PURPOSES.—Could some one through the medium of the Journal inform me how ferrous oxalate, suitable for photographic purposes, is prepared?

Hibernia.

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[631]. FRENCH SALVE.—Can any correspondent kindly inform me what is the formula for "French Salve," and if not, where the preparation can be obtained? It is used for scurvy.

Gaul.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Dental Registration.

Sir,—Having read with much interest the letters appearing in your columns about dental registration, I cannot refrain from adding a few remarks.

I think we shall all agree with Mr. Musgrave in doubting whether chemists' assistants or apprentices had any legal right to register, though if like "Lower Molar" they wrote to Mr. Miller asking the question and received the form of declaration in reply, we can hardly accuse them of a breach of common morality in thus registering, and that having been done, it would be rather unwise, despite Mr. Musgrave's solemn warning, to withdraw their names until the matter is legally decided.

Having had the advantage of a three years' dental training under an L.D.S., I can understand Mr. Musgrave's annoyance at seeing hundreds of men now legally entitled to claim all the advantages of the dentist with so little of the expense or trouble of a dental education, but the Act being now passed which renders their position perfectly legal, it would be better to recognize it with a good grace than show any perhaps natural jealousy.

All will agree with Mr. Musgrave that the Act was for the protection of the public; but how little he thinks of that when he says he would leave the operation of extraction, which he calls the least important part of the dentist's business, to the unregistered (dentally) chemist or his assistant, while he would reserve for the dentist the less surgical but more remunerative department of putting in reliable gold stoppings, etc.

I fear the public if they could speak on the matter would hardly appreciate Mr. Musgrave's kind consideration for them, but would prefer rather to be protected from the man who by a clumsy extraction fractures the tooth or the alveolus and causes them weeks of intense pain, than from him who puts in a gold stopping which proves unreliable.

In poor neighbourhoods, where the chemist and dentist generally does the most practice, the finer branches of the dental art (gold stopping, exposed pulp capping, etc.), are seldom or never required, the patients could not pay for even if they could understand the advantages of them; with them, if the tooth aches they go to the dentist with the firm determination of having it out, and they would have no faith in the man who recommended any other treatment. Mr. Musgrave may have his own definition of a dentist, but let me say that with the great majority of the public the extraction of the tooth is considered the primary and most important branch of the dental art, and if asked to describe their dentist they would say "the man who pulls out their teeth."

The chemist and dentist as a rule does not pretend to practise every branch of dentistry; if he has the knowledge he has not the time for it, but generally confines himself to the surgical part (extracting, stopping, scaling, etc.), getting the mechanical (artificial teeth, etc.) made for him by some working dentist, and Mr. Musgrave can hardly be astonished when he finds men who successfully perform most of the operations of dental surgery politely spoken of by the "professional dentist" as "dabblers in the art."

Unfortunately we have not all received Mr. Musgrave's kind advice in the spirit in which he says it was intended, and I am sure we shall all cordially hope that for the future he will have so much to do warming his irons in his own fire as to have no time for thrusting any into ours.

A. P. Penrose, *Ph. C. and Dentist.*

Amwell Street E.C.

Sir,—Mr. J. J. Musgrave in the Journal for September 27th, writes that the extraction of teeth is the least important part of a dentist's business.

In a lucrative sense it may be so, in a surgical and therefore dangerous sense it certainly is not so, and as regards skill I venture to think it requires to the full quite as much as that department of dentistry known as mechanical.

Something of the importance of purely surgical dentistry may be gathered from the reports of cases treated at the National Dental Hospital; thus for August 1st to August 31st, out of 1426 operations 995 are for extractions, 262 for stoppings, 119 for advice and scaling. I quote from the *British Journal of Dental Science*, September 15th.

York. Elevator.

Sir,—Neither Mr. Musgrave nor Mr. Clarke appears to be very certain on the points at issue, as to whether a chemist performing the simple extraction could claim to be put on the register; they evidently regard it as very questionable. Mr. Clarke speaks about the weeding out of the Dental Register by order of the Medical Council. I have never understood the Act gives them authority to demand legal evidence of fitness, else what is the declaration form for?

A weak point in that to my idea is the absence of a credible witness. My opinion is that a chemist actually in business performing the simple extraction before the passing of the Dentists' Act could legally claim to be registered, although perhaps not compelled to do so. I fail to see how either assistants or apprentices could conscientiously fill up the declaration form, however highly qualified they might be. It seems to me that a Dentists' Defence Association would be more likely to prosecute a chemist who was not on the register for extracting a tooth, rather than one who only performed the simple extraction, and had registered as a precautionary measure.

Respecting the capabilities of dentists, my experience is decidedly in favour of the chemist-dentist. I find as a rule they give more time and attention to their work, and in consequence the result is more satisfactory to the patient.

Walworth. F. W. S.

CREAM OF TARTAR.

Sir,—In commenting upon a prosecution for the sale of impure cream of tartar at Chertsey, you state that I totally ignored the fact that tartrate of lime is a natural ingredient of cream of tartar.

So far is this from being the case that I have invariably stated on my certificates given under the Sale of Food and Drugs Act, that a given sample of cream of tartar was a "good," "fair," or "inferior" specimen of cream of tartar (according to its quality), when the article consisted of acid tartrate of potash and tartrate of lime only. In no such case has a prosecution been instituted on my certificate. I must, however, point out that the B.P. in its description of cream of tartar gives a formula and a quantitative test, which distinctly contemplate an article which cannot contain more than a trace of lime salt.

Some months ago, I directed the attention of the surviving editor of the B.P., to the fact that the B.P. article was an impossible cream of tartar; and I also brought the matter under the notice of some of the leading firms in the drug trade.

Notwithstanding your strictures, I think that when a sample of cream of tartar contains a baryta salt, it is incumbent on the wholesale firm supplying the article to give some explanation of the presence of such impurity, other than mere accident. From the county of Surrey alone, I have, during the last three months, received seventeen samples of cream of tartar. Of these, no less than seven, or 41 per cent. contained sulphate of baryta in quantities varying from ½ to 4½ per cent. In other respects, the articles were of a very varied quality, and they were obtained from diverse sources—grocers as well as chemists and druggists. Surely some member of the drug trade can enlighten your readers as to the cause of this admixture.

THE ANALYST FOR THE COUNTY OF SURREY.

Sir,—I have read with much interest the report of the prosecution for the sale of cream of tartar at Chertsey, and also your leading article on the same subject. I shall be glad if you can spare me space for the following remarks.

It appears from the certificate of the analyst that the sample in question contained 11·7 per cent. of tartrate of lime and 0·6 per cent. of sulphate of baryta, and the case appears to have been dismissed chiefly owing to the evidence of Mr. William Hodgkinson that the above proportion of tartrate of lime was not abnormal. This witness stated that he had never heard of a sample of cream of tartar containing less than 7 per cent. of tartrate of lime, and that the usual proportion was from 10 to 20 per cent.

Mr. Hodgkinson's experience in cream of tartar seems to have been exceedingly unfortunate, and he cannot have gone very deeply into the matter or he would have found that the best authorities, Pereira among others, give amounts of tartrate of lime compared with which the minimum proportion he has heard of seems excessive.

According to R. Warington, a high authority on this subject, the proportion of tartaric acid existing as neutral tartrates in refined tartars varies from 1½ to 7 per cent. Taking these amounts as calcium tartrate, we may say that the proportion of that salt existing in cream of tartar is from 2·0 to 8·8 per cent.

In my capacity of public analyst, I have recently received from inspectors fourteen samples of cream of tartar, which have been considered genuine (in addition to an adulterated sample to be referred to subsequently). These were not all obtained in the same town or at places in the same neighbourhood, but at various small towns and villages in Derbyshire and the West Riding of Yorkshire, and their purchase has extended over some ten months. As one of the tests of purity I am in the habit of igniting a known weight of the sample, boiling the residue with water, filtering and again igniting the residue. This last product, when moistened with carbonate of ammonium, in the case of a pure sample, consists essentially of carbonate of calcium. It dissolves with effervescence in hydrochloric acid, leaving the faintest trace of residue. Evidently its amount represents the calcium in the original sample, and if its weight be multiplied by the factor 1·88, we obtain a very fair estimate of the proportion of calcium tartrate originally existing in the sample. Now in the fourteen samples referred to, the highest percentage of "insoluble ash" (= carbonate of calcium) found was 6·46 per cent., the next being 6·36, and no other above 4·68. The lowest amount was 2·60, and the mean of the whole fourteen was exactly 4 per cent. Multiplying these numbers by 1·88 we find that the highest amount of tartrate of lime met with was 12·14 per cent., the lowest 4·89, and the mean 7·52. Hence it appears that so far from commercial cream of tartar containing an average of 10 to 20 per cent. of tartrate of lime, as stated in evidence by Mr. Hodgkinson, in this part of the country at any rate the articles sold contain an average of only 7 or 8 per cent., and hence the cream of tartar commonly sold by country druggists and shopkeepers is equal in purity to the best specimen Mr. Hodgkinson ever heard of and is twice as pure as that commonly sold by his firm.

It appears to me that if it be admitted that cream of tartar is a preparation obtained by boiling crude tartar or argol in water, filtering, and crystallizing the salt from the clear liquid, the tartrate of calcium ought not to be present in more than a certain proportion, although it is true that it is far more soluble in solution of bitartrate of potassium than in pure water.

But it does not follow that because a high percentage of tartrate of calcium is present, that it is necessarily a legitimate constituent of the article. Any proportion beyond that readily soluble in boiling water cannot be regarded as proper. Now 20 parts of boiling water are amply sufficient to effect the solution of bitartrate of potassium, and any tartrate of calcium not soluble in this amount must be regarded with suspicion. Now, in the case of the two samples yielding 6·46, and 6·36 per cent. of "insoluble ash," I ascertained the amount of matter left on boiling the original sample with water, and found 3·15 and 3·35 per cent. respectively. These residues were soluble in hydrochloric acid, and, as far as my notes go, appear to have consisted of calcium tartrate. Hence if 3·15 be subtracted from 12·14 per cent., the total amount of calcium tartrate present, we have a residue of 9 per cent. legitimately present as a soluble constituent of the cream of tartar. This shows a close coincidence with Warington's highest result.

I am not prepared to stick at a difference of 1 or 2 per cent in the proportion of tartrate of lime, but when Mr. Hodgkinson states that 20 per cent. is a common and legitimate proportion, I would ask whether such samples are completely soluble in 20 times their weight of boiling water, and, if not, what right he has to regard them as genuine creams of tartar? (N.B.—Bitartrate of potassium is soluble in 15 parts of boiling water.)

But it may be asked, how does the excessive proportion of tartrate of lime get into the samples? In the case of crude tartars it is well known to be due to the addition of plaster to the wine, but this is not an explanation of an excessive amount in cream of tartar. In all probability such high amounts as are present in the samples known to Mr. Hodgkinson are due to adulteration of the specimens with compounds of calcium. Sophistication by chloride of calcium is said to have occurred, and there are authentic cases of adulteration by chalk and marble. In a cream of tartar sold near Pontefract, I recently found 20 per cent. of sulphate of calcium (probably as plaster of paris), and 2·3 per cent. of sulphate of barium. Of course, on treating such a sample with water a large quantity of calcium tartrate is formed. Hence it is clear that before we regard unusual proportions of tartrate of lime as normal, we must be quite sure that it is not a product of the decomposition of the tartrate of potassium with some adulterant.

How the barium sulphate occasionally gets into cream of tartar,—as in the sample which has called forth this letter —I am at a loss to imagine. It occurs too frequently for its presence to be the result of accident, as suggested by one of the witnesses for the defence. In a case at Huddersfield it was found in the form of crystalline heavy spar. Can any of your readers explain the occurrence of this curious impurity?

Sheffield. ALFRED H. ALLEN.

Sir,—With the view of preventing other pharmacists from occupying the unfortunate and unenviable position of Mr. Boyce, at Chertsey, whose case was reported in last week's Journal, and with whom I am sure we ought all to deeply sympathize, I should like to mention a simple and easy test whereby all may assure themselves of the comparative purity of this article when they receive it into stock. About 1 grain of the suspected sample should be shaken in a test tube with 6 or 8 c.c. of a 5 per cent. solution of potassic hydrate (the liquor potassæ of the official strength, provided it be free from lime, will answer every purpose); if the sample entirely dissolves barium sulphate is absent. The solution will, however, contain the calcium tartrate if any be present (and all samples of cream of tartar contain it to a greater or lesser degree), but on heating the solution to boiling, the calcium salt, being insoluble in hot solution of potash, will be thrown down, and its amount may be judged of comparatively by the bulk it occupies.* On cooling the solution the precipitate is again dissolved, so that for the purpose of comparing a number of samples I would recommend that after being well boiled they be kept hot in a water-bath, when, having been all allowed an equal time to settle, and using tubes of the same size, no difficulty will be found in estimating the comparative contamination. I merely put this forward as a rough test, and one which every pharmacist can quickly and easily employ. Of course, if it be wished to determine the actual amount of calcium tartrate present it will be necessary to take a weighed sample, incinerate and treat the residue with HCl, filter and add NH_4O and $(NH_4)_2C_2O_4$; the precipitated CaC_2O_4 may then be dried at 100° C. and weighed or ignited and weighed as $CaCO_3$; in either case its calculation into tartrate will be an easy matter.

It is unfortunate that the B.P., which should be our unfailing guide in this matter, is rather vague and ambiguous. We are told that cream of tartar, potassæ tartras acida and potassæ bitartras are synonymous, and that it is "an acid salt obtained from the crude tartar" (this crude tartar being evidently something quite distinct from cream of tartar). Among the characters and tests given is one which it has been stated provides for the presence of tartrate of lime. This runs as follows: "Heated in a crucible it evolves inflammable gas and the odour of burnt sugar, and leaves a black residue. This effervesces with diluted hydrochloric acid and forms a solution which . . . . when neutralized with ammonia is rendered slightly turbid by oxalic acid." It certainly does provide for a trace of tartrate of lime, but I think it will be admitted by those who know what a delicate test for lime oxalic acid is that the presence of only 1 or 2 per cent. would give something more than a slight turbidity when treated as above. But admitting for the sake of argument, that the presence of calcium tartrate is provided for by that test, what is the meaning of the next one? "188 grains heated to redness till gas ceases to be evolved leave an alkaline residue which requires for exact neutralization 1000 grain measures of the volumetric solution of oxalic acid." If it means anything it is that the sample shall contain 100 per cent. $KHC_4H_4O_6$ or absolute purity, and herein lies what I consider to be a contradiction. That cream of tartar does contain tartrate of lime is the experience of every one who has ever had to do with the examination of it, but that it should contain it in anything more than a trace I am by no means ready to admit. So far as my experience goes I have found samples to contain from 3 to 7 per cent., never so much as stated in your report last week, viz., 11·7.

If crude tartar is taken and ground and sold as cream of tartar, one can understand this large percentage, and this being the case it would be interesting to know how much tartrate of lime cream of tartar might contain and yet be still cream of tartar.

It has been a matter of some surprise to me that this article has not been selected by the zealous public analysts before now, and should some wholesale house consider it worth while to supply its customers with an article guaranteed to within, say, 5 per cent. of impurity, I have no doubt its efforts would be duly appreciated by pharmacists generally.

With regard to the presence of barium sulphate in the small quantity usually found, it cannot be looked upon as an intentional admixture, and the source of its contamination may possibly be from the stones in grinding

137A, *Aldersgate Street, E.C.* ALFRED E. TANNER.

* This is substantially the test I recommended when discussing this subject before the Liverpool Chemists' Association in November, 1877, and will be found with other remarks at p. 467, vol. viii., 3rd series, and I then ventured to predict that some unfortunate pharmacist would suffer prosecution for this impurity, and at the same time urged upon chemists the necessity of examining their stocks.

THE ADMISSION OF WOMEN AS MEMBERS OF THE PHARMACEUTICAL SOCIETY.

Sir,—I am one of those who consider the Council of the Pharmaceutical Society to be a representative body, and hence open to criticism by their electors; and I therefore venture to trespass upon your columns in order to express an adverse judgment upon the conduct of some of their number whom I voted for at the last election, trusting that they will take my remarks in the friendly spirit in which they are written. I shall not mention any names; but, sir, some of us who have advocated on principle the undesirability of the female (pharmaceutical) franchise will share the evident astonishment of some of our opponents at the "sudden conversion" of some in whom we had confidence at the last election as sound upon this question—a confidence supported by their speeches in and out of Council up to so late a date as the last Annual Meeting of the Pharmaceutical Society. What, then, has occurred between that time and the recent meeting of the Council to alter the opinion of these gentlemen on so important a question? There may, of course, be reasons not expressed in their speeches of Wednesday last; but, if so, I think we are entitled to know them, and the reasons there expressed for a charge they must really excuse my characterizing as shallow in the extreme.

I admit, sir, that it requires rather more courage to oppose two individual cases of application for membership than it does to advocate the broader question of the undesirability of the female franchise; and I feel quite to unite in the congratulations expressed in your leading article for this week, to these ladies upon the removal of a supposed grievance. But, sir, will it stop here? And will not the recent action of the Council weaken their own hands or those of some future-elected body in refusing admission to further application for membership from others of the fair sex, without drawing invidious distinctions? I am one of those who are sometimes accused of advocating a policy of "peace at any price," but not, sir, at the sacrifice of principle, and the action of some of these veteran Councillors reminds one too much of the conduct of the unjust judge in the parable (*vide* Luke xviii., 4 and 5), with this important difference that they were right in principle at the outset where he was wrong. Our venerable President seems to be the only man among them who holds to the courage of his convictions.

Scarborough. CHAS. FRYER.

Sir,—I was very much surprised to see by the *Pharmaceutical Journal* of Saturday last, that the Council at its meeting on Wednesday, had granted membership of the Society to two women, especially after having referred the question to the Annual Meeting, and that meeting had on two occasions voted by a small majority against their admission. True, the majority was small, still it was a majority, and I do not think the Council have acted wisely in thus ignoring the decision of the members.

If the Council did not mean to abide by the decision of the members they ought not to have sent the question to the General Meeting.

Probably the fact of the matter is that the Council were tired of the question, and (knowing it would in all probability be brought forward again at the next General Meeting) admitted the ladies rather than have any more trouble about it, notwithstanding the ladies have on two occasions been rejected by a General Meeting of the Members.

London, W. C. E. P.

THE COMPETITION OF CO-OPERATIVE SOCIETIES.

Sir,—Will you kindly afford me space in your columns for a few remarks on our position as druggists with regard to the competition of the co-operative societies? The competition of these societies to which we, in common with others, are exposed, and by which we are in many cases injured, makes it necessary that every means should be tried to lessen the evil. A great variety of suggestions have been made with this end in view, but the objection that has been fatal to most of them has been that they were impracticable. The evil still continues, and though in course of time I do not doubt that it will be greatly lessened, at present it rather grows than diminishes.

In combating this injurious competition the druggist finds himself somewhat handicapped; he does not stand on the same vantage ground possessed by those who deal in articles of food or clothing; he cannot in the case of the majority of articles in which he deals, by reducing the price offer an inducement to increased consumption. But I think he would by adopting more fully the leading principle of these societies, viz., cash payments, find himself in a better position to compete with them. There are certain practical difficulties in the way, which will occur to most; smallness of many of the transactions, for instance; but these would not, I think, prevent the general adoption of the system. There are very many articles in which the druggist deals which it would be easy to arrange for sale at two prices, viz., a cash and a credit price,—patent medicines, for instance. The customer would reap an advantage and the druggist would have the money in his desk to trade with instead of having it out at his customer's without interest; he would also have done something towards removing the manifest injustice under which the cash customer suffers in being called upon to pay as much for his purchase as the man does who has it booked for a twelvemonth or more. A great many of the articles in which the druggist deals might be listed without difficulty at cash and credit prices, and the adoption of the principle of distinguishing between the cash and the credit customer would, I feel sure, benefit both buyer and seller, and be the introduction of a sound principle into trade. The druggist could not supply medicines or dispense prescriptions at the prices charged at the "stores," nor should he attempt to do so. It is this part of his business that requires special qualification and is entitled to special remuneration; but even here the public would appreciate a move in the direction I have indicated, and with a difference between the cash and the credit price would be willing to pay something for the positive advantages offered by a personally conducted pharmacy as compared with the divided responsibility of the drug department of a general store.

I merely wish in this letter to bring the general question before your readers. The system may be carried out into practice by individuals, but I think it would be better if it became the subject of discussion among druggists generally, perhaps first through the pages of your Journal. By this means valuable opinions and much useful information may be obtained as to its probable working both generally and in particular localities. It is of no use to indulge in violent diatribes against co-operative stores, however satisfactory it may be to one's feelings to do so. Altered conditions of society and an overgrown credit system have produced them, and they can only be effectually checked by a return to sounder principles of trade.

K. K.

THE HEALTH OF THE DRUG TRADE.

Sir,—An interesting and important discussion has begun in your columns on the above subject, which would need to be handled with great caution. There is nothing so common as to draw sweeping conclusions from imperfect data, and I would warn your correspondents against making too hasty deductions from the meagre collection of facts at our command.

The statistics gleaned from the obituary of the Journal for three or four years will not justify any conclusion as to the healthfulness or unhealthfulness of our business throughout the United Kingdom. A satisfactory solution of the question can be determined only by a careful collection of facts gathered from a very large area. Speaking from my own experience and observation, extending over a period of more than forty years, I would decidedly deny that our business is more unwholesome than any other shop-keeping occupation. In my time I have had between fifty and sixty assistants and apprentices, and I do not remember a single instance of a breakdown traceable to the nature of our calling. On the contrary, boys somewhat delicate, have come to me who, under the invigorating influence of regular hours, and the frequent use of a sixteen pound pestle, developed into strong, active fellows. It is nonsense to say our well-known and gratefully-appreciated shop smell is unwholesome; as well say the blended odours of a flower garden will shorten life. Of course a dirty, ill-kept druggist's shop, where the inmates inhale nothing but a "villainous compound" of unsavoury smells, can neither conduce to comfort nor health; but that may be said of any place similarly circumstanced.

If a druggist's shop be properly ventilated and kept clean, and he himself be regular in taking out-door walking exercise, eschewing late hours and the use of tobacco in any shape, and as he sights forty or fifty years of age, using the milder stimulants, such as beer or wine moderately, I have no doubt his life will be of average duration and as enjoyable as that of any occupation. But our young men when they elect to follow pharmacy must not expect to go through life in a Pullman's car; like the rest of us, they must rough it in some shape, and as a result they will in due time exhibit the manly attributes of self-reliance and self-respect, and I hope men of experience who may have been soured by circumstances entirely unconnected with the business, will not darken the prospects of our young men by their gloomy and illogical deductions.

Montrose. GEO. BURRELL.

Sir,—I have read with much interest the correspondence appearing lately in your columns regarding the causes of the comparatively high percentage of mortality among chemists. The remarks made on the subject by "Sandford," in a recent issue, are very much to the point, and deserve careful perusal by every pharmacist who regards his health as something worth taking care of. A badly ventilated shop, the air in which has become impregnated with a heterogeneous mixture of foul odours and noxious gases, and where fresh air only admitted when the door is opened by customers entering and leaving, is not likely to produce an atmosphere best suited for respiratory purposes, during the greater part of the day. Undoubtedly impure air, coupled with insufficient bodily exercise, is a very important factor in bringing about the early fatal consummation so devoutly to be deplored.

Another reason hinted at by Mr. Nicol in drawing attention to the subject is also deserving of notice. It is the heavy strain which is daily imposed upon the mental faculties of the pharmacist by the peculiar nature of his occupation. The continual dispensing and handing of drugs, many of them demanding the concentration of all his faculties, and taxing his utmost ingenuity in their manipulation, impose a tax upon the brain, which, slowly it may be, but all too surely nevertheless, reacts unfavourably on the physical constitution.

The remedy in both instances is obvious. Let every possible means be employed to keep the air inside the shop pure and unadulterated, and instead of remaining on the rack for the space of ten and eleven hours out of the twenty-four, as is almost universally the case at present, let the number be reduced to nine at the very utmost. I have for a good many years been a strong advocate in favour of shorter hours being adopted by our profession, and have never yet discovered a single satisfactory reason why they should not be adopted. The petty jealousies and bad feeling which exist among ourselves are almost the only obstacles in the way of progress in this much desiderated direction, and so long as these obstacles remain, the present long hours system must remain also, and the high rate of mortality among chemists obtain as it has obtained in the past.

Edinburgh. OMNES MORIEMUR.

Sir,—On reading Mr. Nicol's remarks on the early death of chemists, and also the other correspondents on the subject, I felt a desire to make a few remarks. No doubt the locality in cities have much to do with our health, but I think our mode of living has more to do with the longevity of our lives than situation. As an instance, one chemist in this town carried on his business in a dense and low locality, and was never out of his shop from early dawn till very late at night; he is now retired, and if living he must be over eighty. Myself I am always at my post from soon till late, and have not been a day out of my shop for nearly twenty years, have never a day of sickness, and am now sixty-two years of age. Of course I always have plenty of air, both by door open, and also fanlight, and in winter very seldom close the door unless extremely cold. I think by constantly harping on the short lives of chemists, parties will imagine the calling is unhealthy for a young man. "Nothing of the sort;" essential cleanliness and the requisites for inducing health are all that are required to prolong our lives to the "allotted span."

VERUS.

Sir,—I notice a letter in the Journal of Saturday, September 6, by J. K. Nicol, regarding the health of the drug trade, in which he states that nearly 80 per cent. of chemists and druggists die at an early age.

Should this statement be correct it calls for serious consideration.

Impure air and close confinement are seemingly the two great evils.

We find a great many assistants with limited means starting business on their own account, and having recourse to long hours and assiduous attention to work to eke out a livelihood, and thereby utterly destroying their own constitution.

I would therefore suggest as reasonable business hours from 8 a.m. till 7 p.m., and should these hours be strictly kept sufficient time would be allowed for recreation, and doubtless the percentage of premature deaths would gradually decrease.

T. S. W.

How to Reduce our Death Rate.

Sir,—Allow me to throw out a few simple remarks on this subject. That our death rate is high, we can all easily believe, and we can as easily understand the reasons. Whether the percentage of those who die in their prime be quite up to what Mr. Nicol has found it, we may not be able exactly to determine; but certain enough it must be deplorably high. The reasons for it are plain, and the chief ones are these three: The comparatively stagnant nature of our work; the undoubtedly bad air we breathe, and, worst of all, the general long hours of the trade. If we are to reduce our high death rate, the great thing we must aim at is shorter hours, or more recreation and rest in one way or another. The nearer we can get, in fact, to that golden rule of eight hours to work, eight to play, and eight to sleep, the happier will our lives be, the lower our death rate. What each of us seems to be driving at in this go-ahead age is ever making a good business,—making money. In our zeal for these we forget health, or we give it but a third place in our thoughts. This must not be if we are to live longer lives. The order must be health, first, business, second, money, third. But the question will be asked, "How can chemists act up to this rule of eight hours to work, or where is the ordinary chemist who can carry it out?" I confess he is a *rara avis*, and in my travels of a dozen years, I have only met with two who had the good sense and courage to do it. One was a chemist in a small provincial town, the other was the chief of a large establishment in an important manufacturing town. I had noticed that the former took a great deal of recreation, and one day, about six years ago, I asked him how he was able to do it. He replied that he had simply made it a rule, almost from the first year he went into business, that he should not work more than eight hours a day on the average. He had stuck to this rule up to that time, and, I believe, he does so still. He did not work exactly eight hours each day, but between frequent holidays and short hours while he was at business, he made certain that his average was not more than that for each day of the year. It may be asked, and how did his business fare? He had always an assistant who was left in charge to do the best he could, and when the chemist returned from a holiday, the assistant got out to have his turn. He was always sure of getting more recreation time than the most of such assistants get.

In this way did this small chemist enjoy life, and keep himself healthy, while he also gave the health of his assistant a due amount of consideration, and in this way he also kept his business going at a fair pace. No doubt, had he stuck as closely to it as most chemists on his level do, he might now have had a better business, and a little more money saved for his old age (that is if he had lived to see it); but was it not wiser of him to enjoy life as he went along, to keep himself healthy, and to be content with a smaller business? I have always thought this man one of the most sensible chemists I ever met, and he certainly was one of the jolliest and healthiest. This, then, is one good model for chemists to go by, and it is happily one from the humble rank. The other I referred to was a noble specimen in every sense of the word. He had, I believe, made it a rule during the most of his business life of nearly fifty years, to work only about eight hours a day, going to business at 10 a.m., and leaving at 5 or 6 in the evening. He lived in vigorous health almost to the last week of his life, and died beyond the three score and ten, leaving a large business and a large fortune. He also thought of his assistants, the hours for ten out of twelve of them being from 10 a.m. to 8 p.m., with a break of three quarters of an hour for dinner. This made the day's work fully nine hours, but as each assistant got a fortnight's holiday in the year, that reduced the average day's work to little over eight hours, which was all that could be desired. This man was one of Nature's noblemen.

Chemists may be divided into three classes. First, those who are not able to keep an assistant and who can do little more than make a living; second, those who keep from one to four assistants and who make an income of from £300 to £600 a year; third, those who are able to employ half a dozen assistants or more and whose income is beyond £600. It is, no doubt, the first class who do most to swell up our high death rate. We have pity for these men in their lives and we regret their fate if they go to the ground in their prime on account of the confined life they have led.

I would, I think, prefer the life of Mr. Barnaby's niggers, for in all likelihood they would have the free pure air to breathe and work in and companions to toil beside, which would do much to brighten and lengthen life, slave life though it might be called. I would, however, recommend the chemists of this class, who must remain in the business they have chosen, to live as carefully, economically and contentedly as they can, doing their best to improve their condition; and wherever it can be done, let them shorten the day's work by an hour or two. Let them take what little exercise and recreation they can; a day or two, or a week or two occasionally in the country, according as their circumstances will admit, by getting a temporary assistant to take charge. They should see well to the proper ventilating of their shops. A current of air should always, if possible, be allowed to go right through the shop during the night, especially in winter time, when the air must be foul with the burning gas and closed doors. Rather let a fanlight remain open that might allow a burglar to get in, than entirely shut up that vicious air, to have to go into it again in the morning; for the burglar, if he go in, can at best but steal away a few shillings or pounds, while the other will assuredly steal a few years of life.

As men of this class have so little exercise, they should, during winter, wear a good layer of lamb's wool from neck to toe, which will help greatly to keep heat in and cold out, and it will enable them to do with less gas stove or fire heat. This is an important matter though it may be lightly thought of; and those who want proof of it will find it in Combe's 'Constitution of Man,' in which work many other valuable hints may be got for the preservation of life. Hufeland's 'Art of Prolonging Life,' is another book from which many good hints may be got. It would be well for chemists who aspire to long lives to give a little more attention to such books as these and less to their chemistries.

The second class of chemists can have almost no excuse if they do not keep near to this rule of the three eight hours. Instead of admiring men of this class for their industrious ways, or, in other words, for making slaves of themselves to business, we should look upon them with contempt. If such men die in their prime, we should have little sympathy for them; we should rather be thankful they have gone, o that others like them, working as they done, may take warning and do otherwise.

Little requires to be said about the chemists of the third or highest class. If any of them die in their prime, we know well what we should style them. It is to this class we look for the example of shorter hours, and it is very gratifying indeed to notice that some of the principal London houses are closing much earlier than they did a few years ago. Assistants in these houses, I have also observed remain much longer, and work more contentedly than they did when the hours were longer.

One word to assistants: They must not imagine that they are to do nothing and masters all to bring about this short hour system, and to reduce this high death rate. They must make up their minds to take a moderate salary for a situation in which the hours will be short, and be certain to ask for the highest where the hours are long.

Shorter hours throughout the trade, and a lower death rate we certainly will have as we get more enlightened. Chemists will not always be such fools as to sell their lives at such a rate for the mere glory of business or money; a happy and healthy long life they will look to first. There are signs of better times coming, now that the doors of some good west end houses begin to close at 7 o'clock; but if 80 per cent. are still dying in their prime, we may well raise a cry for the rest to lower their hours as far and as fast as they can, and let it ring right down to the poorest of the line.

A Sawney.

Nitrate of Pilocarpine.

Sir,—I acknowledge to have overlooked part of Mr. Martindale's remarks at the Sheffield Conference on the purification of nitrate of pilocarpine; therefore, I will set aside my letter published in the Journal on September 20, and start afresh with a desire to be strictly accurate and give credit to whom it is due.

The process spoken of by Mr. Martindale was first made public by M. Petit, in the *Répertoire de Pharmacie,* for August 25, 1877, and no matter how long previously Mr. Martindale may have used the same process, he must know he is not justified in claiming it as his own discovery two years after its publication by another.

The merit of the process is due to M. Petit and to him it must be given.

University College Hospital. A. W. Gerrard.

Gelatinization of Tincture of Kino.

Sir,—In respect to Mr. Bamford's remarks, and those of others, on the difficulty of keeping this fractious tincture from "jellying," it is a curious fact that during my forty years' experience with drugs, etc., I have always found the above tincture very difficult to keep, but I have now in my possession some obtained from Messrs. Evans, Sons, and Co. five or six years ago, and still it is as good as ever. The bottle has been several times opened, it is placed behind others, and is perhaps shifted and dusted every week, and it is as perfect and liquid as the day it was made. How it is I cannot pretend to say, but it is the only tincture of kino that I have seen in my forty years' experience that has *not* "jellied."

Catechu.

Tincture of the Resin of Podophyllum Peltatum.

Sir,—This tincture is now ordered a good deal, and in the absence of an official formula we would take the liberty of suggesting that the following strength should be observed:—

Podophyllin (Resin)	gr. j.
Alcohol	ʒj.
M.	

Fifteen minims will thus represent one-fourth of a grain of the resin, and this when taken on lump sugar is quite a nice dose.

Only this morning a medical man was inquiring the usual strength of the tincture, and although we believe many houses prepare it of the strength indicated, yet we have found that others make it widely different, and as the drug is an active one it is of considerable importance.

35, *Baker Street, W.* Young and Postans.

Pharmacy in the Transvaal.

Sir,—Can any of your readers kindly favour us with any information respecting pharmacy in the Transvaal, the number of chemists, prices obtained, and mode of doing business? Are examinations compulsory, or is there any association whatever of chemists and druggists? How are assistants paid, and what are the hours of business? Any information respecting our profession either in Natal or New Zealand will greatly oblige.

An Emigrant.

"*Epsilon*" (who should have sent his name and address).—There are two alternate whorls, which really answer to the calyx and corolla, but in consequence of their being btoh of the same colour are termed the perianth.

"*Epipactis.*"—If you send such plants to the Journal Department, after you have yourself done what you can towards naming them, we shall be willing to help you. The works mentioned are of about equal authority.

M. P. S.—We understand that the firm in question has recently promised to discontinue the use of the title. Information respecting the sale of vermin killer containing strychnia by unregistered persons should be forwarded to the Registrar.

F. H. Fairweather.—(1) *Hypnum tamariscinum.* (2) *Hypnum triquetrum.* (3) *Hypnum loreum.* (4) *Neckera complanata.* (5) *Ramalina calicaris.* (6). *Usnea florida.*

W. H.—See the paper on "Pills and Pill Coatings," by Dr. Symes, in vol. viii. of the present series of this Journal, p. 461. Several other papers on the same subject may be found by reference to the Index. There is also one in the present number.

"*Acid.*"—The addition of borax with and without glycerine and other salts, to promote the solubility of salicylic acid has been recommended, but probably in all these cases new compounds are formed not possessing properties identical with the original one. See *Pharm. Journal* [3], vol. vii., pp. 103 and 429.

A. B.—We do not quite understand your question, as tincture of iodine is itself of a red-brown colour.

X. Y. Z. is recommended to communicate with the officer appointed by the local authority under the Explosives Act.

"*Orchid.*"—*Spiranthes autumnalis.*

J. H. Dingle.—(1) *Scirpus palustris.* (2) *Senebiera Coronopus.* (3) *Silene maritima.* (4) *Arenaria serpyllifolia.*

"*Fraxinus.*"—(1) *Poa annua.* (2) *Lolium perenne.*

"*French.*"—An advertisement in one of the French pharmaceutical journals would probably secure what you require.

"*Lindum*" is referred to the rule respecting anonymous communications.

"*Medical*" should address his question to the Secretary of the Royal College of Surgeons.

"*Bill.*"—We are not acquainted with a mineral answering to your description.

"*Sarniensis*" should examine the Calendar of the University of London or apply to the Registrar of that institution.

"*Fons et Origo.*"—"Crabs'-eyes" are concretions of carbonate and phosphate of lime found in the craw fish when about to cast its shell. They were formerly used as an absorbent and antacid remedy.

M. Leigh.—The Secretary of the Institute of Chemistry, Mr. C. E. Groves, Somerset House Terrace, W.C.

B. J. Kent.—A copy of the *Pharmaceutical Journal* containing all the information yet published on the subject has been forwarded to you.

Erratum.—On p. 265, col. ii., line 31, in the list of Associates elected, *for* "Goodall, Thomas Torby, Derby," *read* "Goodall, Thomas Sorby, Derby."

Communications, Letters, etc., have been received from Messrs. Pollard, Swenden, Young, Turner, Edwards, Lawon, Thresh, Quinæ Sulph., Theta, Epsilon, C.E.P.

ACONITUM HETEROPHYLLUM, WALL.*

BY DR. M. DUNIN V. WASOWICZ.

Some years ago the attention of European physicians resident in India was directed to a nodular root which was known to the natives under the names, "utees," "atees" and "atis," and was used in fevers on account of its antiperiodic effects. Closer examination showed that although the name "utees" was also applied to several other drugs, for instance, the root of *Convallaria Polygonatum*, Solomon's seal root, or a tasteless and inert root considered to belong to *Asparagus sarmentosus*,† and in Kunawar to the root of *Aconitum Napellus*,‡ which is there eaten on account of its tonic effects, still this name was principally to be understood as referring to that species of aconite which Wallich called *Aconitum heterophyllum*. This root is said to have no poisonous properties,§ and to be, in fact, a very valuable remedy for intermittent and other fevers. It is administered in ordinary intermittent fever in the form of powder in doses of 20 grains and as a simple tonic in doses of 5 to 10 grains three times a day.|| No information respecting this drug is extant, although, according to O'Shaughnessy,¶ it has long been famous among Indian drugs on account of its tonic effects.

Professor Von Schroff, sen.,** was the first to communicate some cursory observations upon this drug in 1866, which were supplemented in 1871 by Schroff, jun.,†† in regard to its pharmacognosy.

Professor Flückiger, in 'Pharmacographia,' made known that Broughton had succeeded in obtaining from the root an alkaloid which he had not closely examined. Upon the basis of a platinum salt analysis Broughton assigned to it the empirical formula $C_{46}H_{74}N_2O_4$, and he called it "atisine." In the same year Broughton published a note on this drug in which he stated that the amount of alkaloid was exceedingly small and that the hydrochlorate was the easiest preparation to obtain. At the end of the year, T. B. Groves, in preparing aconitine nitrate from German *Aconitum Napellus*, found that after separating that salt crystals were formed in the mother liquor differing in form from aconitine nitrate and not poisonous. On the basis of polarization experiments and similarity of reactions he came to the conclusion that these crystals contained a base identical with the atisine obtained by Broughton.‡‡ At the time Hanbury expressed a doubt as to the identity of the two substances and shortly afterwards§§ C. R. A. Wright showed that Groves' inactive base more probably had the formula $C_{31}H_{45}NO_{10}$, or $C_{30}H_{45}NO_{10}$, than that of Broughton's atisine.

Subsequently, Professor Flückiger succeeded in obtaining a quantity of this root and he entrusted to me the examination of it.

Aconitum heterophyllum, Wallich, grows in the mild districts of the Western Himalayas, in Simla, Kashmir and Kumaon, at a height of 8300 to 13,300 feet above the sea level. The finest and largest samples grow upon the mountains Choor, Shalma and Kadarkantar. The plant is from 1 to 3 feet high, with heart-shaped, acute, indistinctly 5-lobed,

Fig. 1.—Leaf.

or sometimes incised, radiate-veined, leathery leaves and racemes of large dirty yellow purple-veined or entirely blue flowers arranged in a panicle. The calyx is furnished with a semicircular ascending pubescent helmet; the spur is ovate and obtuse; the limb long and bent downwards; the stamens are arrow-shaped and winged; the five carpels and the bracts roundish or rather long.

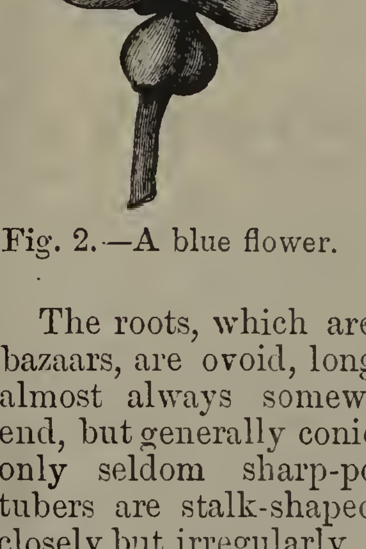


Fig. 2.—A blue flower.

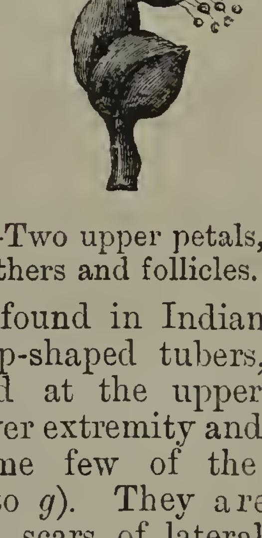


Fig. 3.—Two upper petals, with anthers and follicles.

The roots, which are only to be found in Indian bazaars, are ovoid, longish or turnip-shaped tubers, almost always somewhat flattened at the upper end, but generally conical at the lower extremity and only seldom sharp-pointed. Some few of the tubers are stalk-shaped (fig. 7 *a* to *g*). They are closely but irregularly covered with scars of lateral roots and here and there small remains of leaves are to

* *Archiv. der Pharmacie*, vol. xi., p. 193.
† *Pharm. Journ.* (1875), p. 181.
‡ Hooker and Thomson, 'Flor. Ind.' (1855), p. 58.
§ 'Pharmacopœia of India' (1868), p. 434.
|| 'Pharmacographia,' p. 15.
¶ 'Bengal Dispensatory' (1842), p. 167.
** 'Wochenblatt der k. k. Gesell. d. Aerze,' Vienna (1866), p. 165.
†† 'Beitrag zur Kentniss d. Aconits v. Dr. C. V. Schroff, jun. Vienna, 1871, p. 65.
‡‡ *Pharm. Journ.* [3], vol. v., p. 170.
§§ *Pharm. Journ.* [3], vol. vi., p. 189.

be found at the upper end of some roots. Externally the roots are pale yellowish grey, in some parts

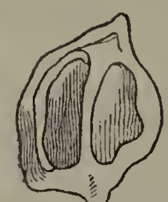


Fig. 5.—Seed.

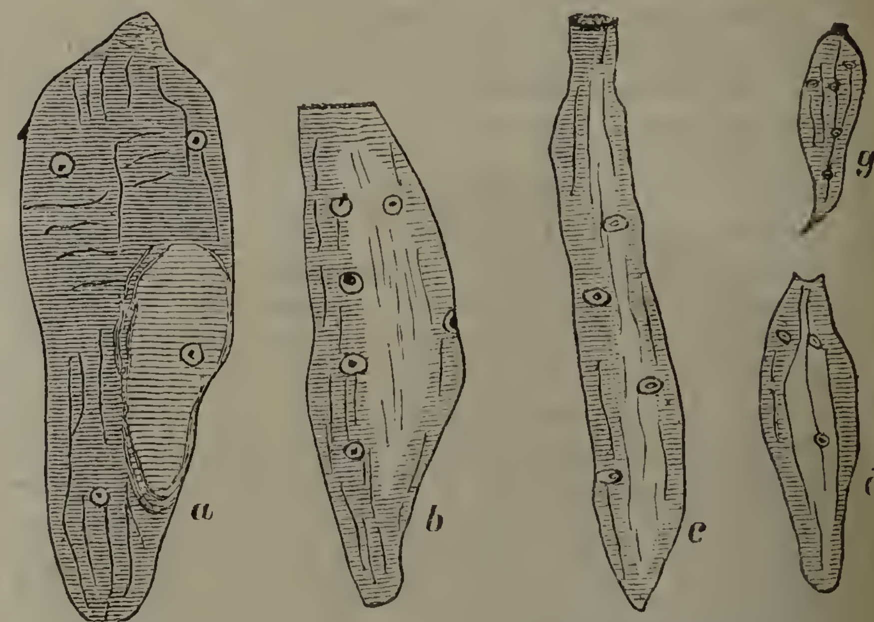
Fig. 4.—Capsule.

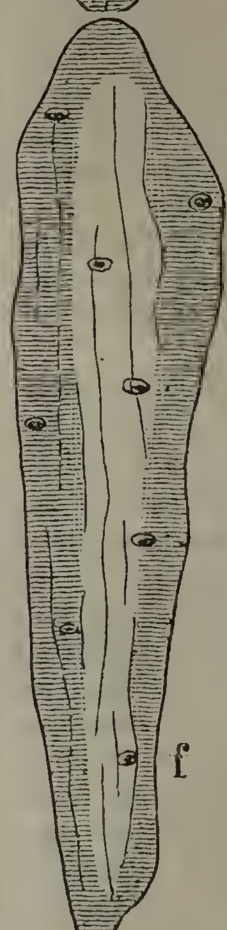
Fig. 6.—Portion of the stalk with tuberous roots.

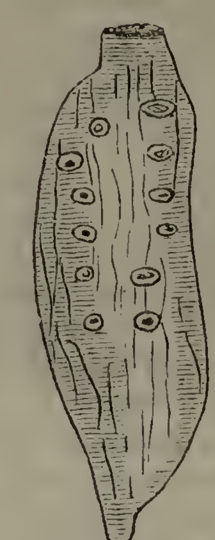
almost white, with numerous longitudinal wrinkles, and at the upper end from two to five transverse wrinkles, though only in some of the roots. In some cases there is a furrow or channel-shaped depression extending the whole length of the root. The roots are from $\frac{3}{8}$ inch to 3 inches long. The thickest diameter is from $\frac{1}{4}$ inch to nearly an inch, and they weigh from 7 grains upwards, the weight of most of the tubers varying between 38 and 90 grains. The fracture is almost even; within the tubers are clear white. The taste is mealy, somewhat mucilaginous and bitter, without any biting or acrid aftertaste. Digested in cold water for some hours the tubers swell up and after perfect drying become hard and horny. This is also the case when they are digested with hot water.

Under the microscope the pure white transverse section presents an almost uniform tissue, intersected with from three to seven rather yellowish coloured irregular bundles of vessels, situated in a scattered manner and enclosing an apparently large meditullium. Concentrated sulphuric acid colours the sectional surface reddish; solution of iodine in iodide of potassium colours it at first violet and then a dirty bluish black. Millon's reagent colours it only slightly reddish, and perchloride of iron does not alter it at all. Thin fragments, perfectly freed from starch by treatment with dilute acids and careful washing, give with alkaline solution of cupric tartrate, or with Millon's reagent, no reaction to indicate the presence of solid protein substances.

Fig. 7 *a* to *g*.—Roots, natural size.







Under the microscope the outer rind of the roots appears to be formed of four or five or six rows of somewhat rounded tabular cells crowded together and having their walls slightly brown-coloured. Next to this comes a rind consisting of five to twelve rows of elongated collenchymatous cells of uniform size and slightly thickened. This rind is separated from the rest of the tissue by a distinctly yellow-coloured zone. The cells of this zone are thin-walled and distinguished only by the yellow colour from those of the central portion of the root. The latter are rounded slightly thickened polyhedral cells of a parenchymatous nature of which the whole general mass of the tissue is formed. In this tissue there are generally very irregularly distributed vascular bundles, to the number of three or seven, which seldom consist of single vessels, but more frequently of three to nine, arranged in rows or groups. The latter are mostly scalariform, less frequently spiral, and their walls are yellowish, but much lighter coloured than those of the yellow zone. Round these vascular bundles the cells of the principal tissue are the smallest. These bundles surround a medilullium, which is almost always in the centre of the transverse section, but is not so big as it appears under the microscope. It consists also of rounded polyhedral cells, having only very small intercellular spaces and exceeding in size three or four times those of the principal tissue. The form of this tissue, consisting of large cells, varies very much; sometimes it is triangular, sometimes square, sometimes a circle or almost an ellipse, according to the number and situation of the vascular bundles above mentioned. Among the many transverse sections that I have examined from different parts of the root, by far the most of them presented the appearance shown in fig. 8. At the upper part of the root, where it is almost always flattened, the transverse section also presents such an appearance as is especially to be seen in the large-celled parenchymatous tissue. A closed cambium-ring was not to be detected either in the upper parts or at the ends of the roots. To-

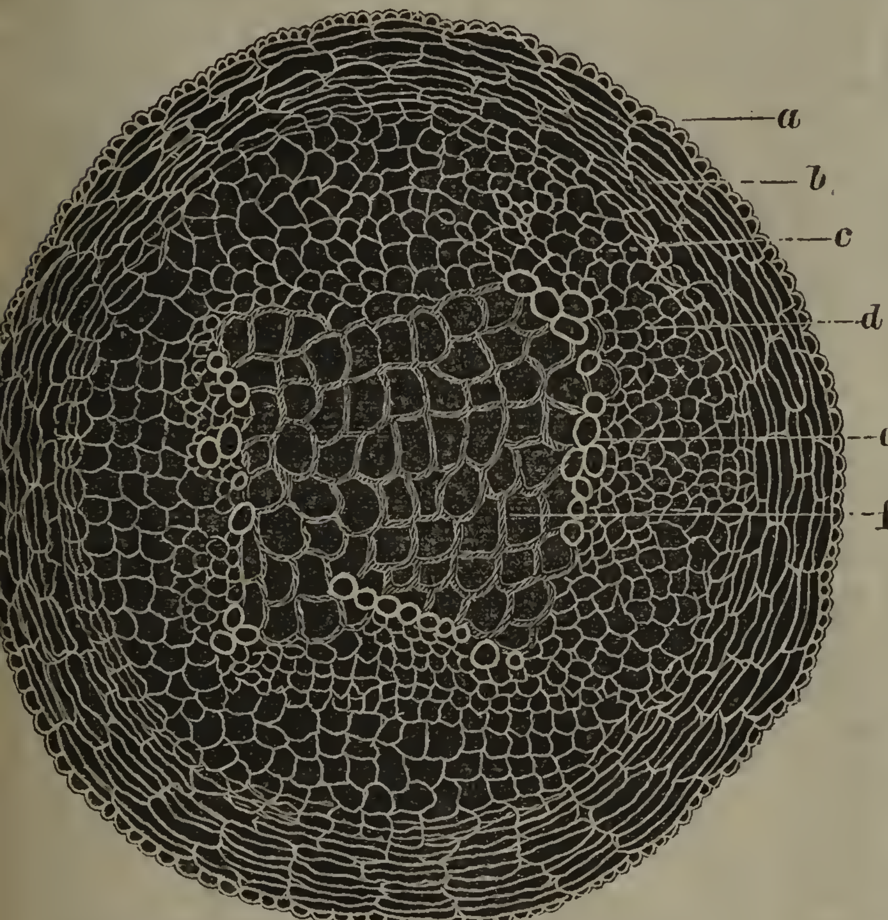


Fig. 8.—Transverse section of middle of root.

wards the conical-shaped end of the root the transverse section appears regularly arranged, and in almost all the sections presented the appearance shown in fig. 9. In the longitudinal section the

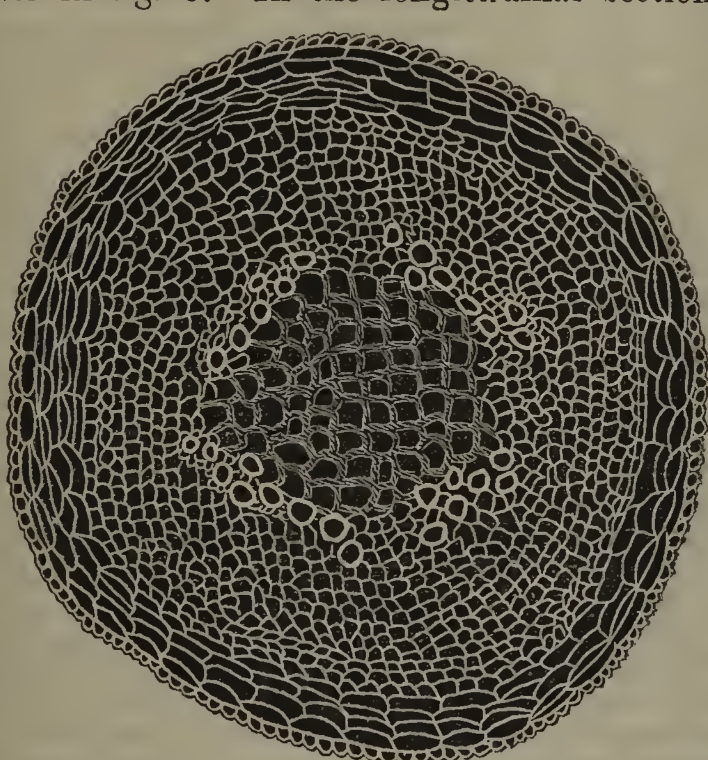


Fig. 9.—Transverse section towards end of root.

vascular bundles, or more correctly the single vessels, extend from the scars of the stalk to the opposite pointed end of the root, and though bent and curved, are always separate, and never anastomosing, and only here and there extending into a lateral root. Some vessels originate first in the centre of the root, as shown in fig. 10 *a*.

The lateral roots, so far as I could judge from their remains, have a comparatively thicker rind, consisting of longitudinally extended cells, which are rounded at both the narrow ends. The yellow zone appears distinctly also, as in the principal root, and separates the rind from the other tissues. This, as well as the vessels and the parenchymatous tissue, are formed in the same way as the corresponding parts of the principal root; but frequently the central tissue is not

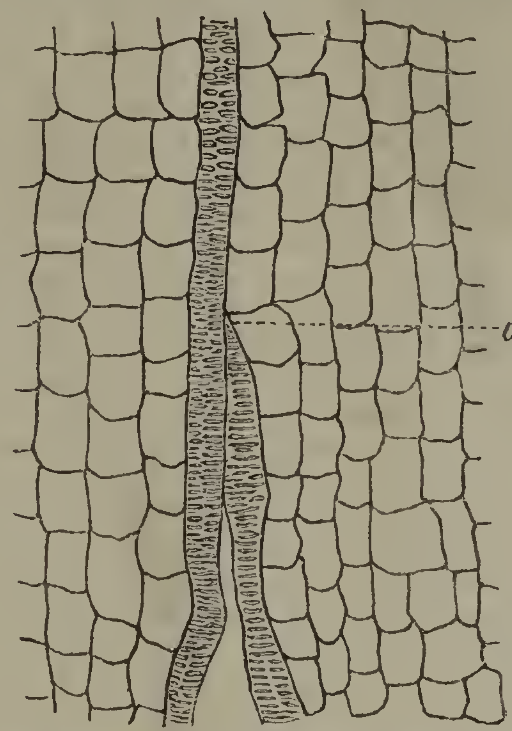


Fig. 10.—Longitudinal section: *a*, vessels originating almost in the middle of the root.

visible. Its place is then occupied by a bundle of seven to sixteen vessels. Frequently it is also comparatively very elongated longitudinally, and bounded by two vascular bundles which consist of several rows of vessels. Stony cells are altogether wanting both in the principal and the lateral roots. The contents of all the parenchymatous cells (with the exception of the empty collenchymatous rind cells) consist of single, simple or compound, or merely aggregated starch granules. The number of the parts of the granules amounts to from two to seven, more frequently from two to three. The appearance of the starch granules resembles sometimes the starch of *Phaseolus* and sometimes that of *Colchicum* (fig. 11). Some of them closely resemble the 4-partite granules of *Crocus* starch. They are comparatively small, about 15 to 18 m.m. at the most, and always somewhat larger than the granules of *Aconitum Napellus*. The starch granules of the principal are always bigger than those of the lateral roots.

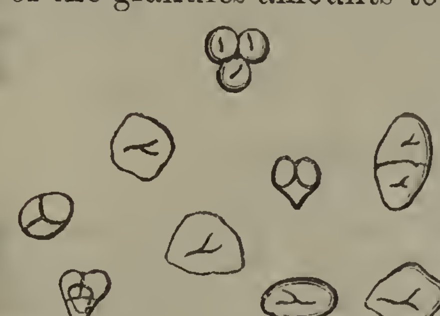


Fig. 11.—Starch grains.

(*To be continued.*)

PRELIMINARY NOTICE ON TEUCRIUM FRUTICANS.*

BY A. OGLIALORO.

This labiate plant, which is employed as a febrifuge, is called "olivetta" by the Italian peasants, from the resemblance of its leaves in colour to those of the wild olive. The fresh plant collected in June soon after flowering gave no essential oil when distilled with water; it was therefore dried in the sunshine, and treated with boiling alcohol in a continuous displacement apparatus for two days. On cooling, the extract deposited a deep green granular pasty substance. The partly exhausted plant was then treated for other two days with fresh spirit, and on cooling, a nearly colourless crystalline substance was deposited from the solution.

* From the *Gazzetta chimica italiana*, 8, 440—446. Reprinted from the *Journal of the Chemical Society*.

The green deposit from the first extract consists of two substances mixed with a large quantity of chlorophyll. When treated with boiling alcohol, a white crystalline substance is left undissolved, identical with the crystalline deposit from the second extract. The other compound, which is readily soluble in hot alcohol and in benzene, can only be freed from chlorophyll with difficulty. It is a nearly white somewhat soft substance, insoluble in water, and melting at about 80—85°. As it does not crystallize, and constant analytical results could not be obtained, the author is inclined to consider it as a mixture.

Teucrin.—The nearly colourless crystalline substance obtained from *T. fruticans* dissolves but very sparingly in any of the ordinary solvents, with the exception of glacial acetic acid, which affords the best means of purifying it. It crystallizes in slender prisms of a yellowish colour, which melt at 228—230° with decomposition. The results of the analyses accord best with the formula $C_{21}H_{24}O_{11}$, but the author reserves his opinion on this subject until he has more thoroughly investigated the nature of the substance. Teucrin is decomposed when heated with dilute nitric acid, leaving a residue of a red colour; on cooling, the solution deposits yellow crystals, which may be purified by recrystallization from boiling water. The new substance is thus obtained in long silky prisms (m.p. 180°) of a golden colour. It is of an acid nature, and yields a silver salt, rather soluble in water, but which is thrown down in splendid golden-yellow plates on adding alcohol or ether to a mixture of the ammonium salt with silver nitrate. The analysis of the acid itself and that of the silver salt points to the formula $C_8H_8O_3$ for the acid, which is that of hydroxytoluic acid; its fusion point also is nearly the same as that of Fittica's β-hydroxytoluic acid (*Ber.*, 7, 927). The nitric acid mother liquors, from which this acid crystallizes, contain oxalic and tartaric acids, indicating that the substance is a glucoside. Teucrin is decomposed when boiled with dilute sulphuric acid, leaving a yellow residue of an acid nature, the quantity of which was too small to establish its identity with the acid obtained by the action of nitric acid; the solution contains a substance of the nature of glucose, so that there can be no doubt that teucrin is a glucoside. Three 0·5 gram doses of teucrin administered to a dog caused a lowering of the temperature of the animal.

STATICE CAROLINIANA.*

BY EUGENE L. REED, PH.G.

Marsh rosemary is considered by Nutall, Torrey and other botanists as a mere variety of *Statice limonium*, of Europe, while others regard it a distinct species. It is indigenous to the Atlantic coast of the United States, and has a perennial root, sending up annually tufts of leaves, which are obovate or cuneiform, entire, mucronate, smooth and on long foot stalks. They differ from the leaves of *S. limonium* in being flat on the margin, while the latter are undulated. The flower-stem is round and smooth, from a few inches to a foot or more in length, sending off near its summit numerous subdividing branches, which terminate in spikes, and form altogether a loose panicle. The flowers are small, bluish-purple, erect, upon one side only of the common peduncle, with a mucronate, scaly bract at the base of each, a five-angled, five-toothed caylx, and spatulate obtuse petals. The meadows in the vicinity of Atlantic City are made beautiful by the marsh rosemary when in flower. The delicate bluish-purple of its blossoms, which appear in August and September, produce a pleasant relief to the eye from the varying shades of green of the salt grases. It is the forerunner of the bright yellow and crimson tints of the pickle-weed, which later in the fall gives to the meadows such richness of colour. The marsh rosemary, or meadow lavender, is highly prized by those who collect grasses to ornament their homes in winter, and is placed above picture frames and in bouquets as one of their most attractive features. The root collected in October possesses medicinal properties in a higher degree than that collected later in the season. It is large and spindle-shaped, branched, fleshy, compact, rough and of a purplish-brown colour. Its length depends upon the nature of the soil, which varies from dark muddy to light sandy in numerous localities over the meadows. If found in sandy soil, the root is short and of a branching character, while that obtained from muddy soil is long, straight and less branching. It is bitter and very astringent to the taste, and in the fresh state is without odour, but a decoction kept in a warm place for several days ferments and has a molasses-like odour.

The fresh root is tough and not easily bruised except after the addition of a little alcohol. The tincture obtained with a mixture of one part of alcohol and two parts of water yielded a precipitate with acetate of lead, the filtrate from which contained sugar, gum and extractive matter. The precipitate was dissolved in alcohol, the solution decomposed by sulphuretted hydrogen, and the filtrate evaporated; it yielded 17½ per cent. of residue, consisting chiefly of tannin, which gives a greenish-black colour with solution of chloride of iron. Statice is powerfully astringent. In domestic practice it is freely used in some parts of the coast line as a remedy for diarrhœa and dysentery, to restrain morbid discharges from mucous surfaces, as a gargle in sore throat and aphthous condition of the mouth and fauces, and as a styptic in passive hemorrhages. If it were necessary to pay the cost of importation, statice would probably be held in as high estimation by the medical profession as kino and catechu. It can be tinctured and employed for all the purposes for which these popular remedies are given; it may also be given in decoction or infusion. Its abundance and valuable properties should cause it to be brought before the medical profession and to be more generally used.

* From the *American Journal of Pharmacy*, Sept., 1879.

CHLOROFORM AS AN ANÆSTHETIC.*

BY J. REGNAULD.

The purity of chloroform for anæsthetical purposes being very important, the following simple tests are recommended by the author.

If chloroform is dropped on paper and allowed to evaporate, the last portion on being inhaled has a characteristic pleasant smell, and leaves the paper perfectly dry and odourless; impure chloroform however possesses a disagreeable irritating odour, which it imparts to the paper.

Pure chloroform does not redden blue litmus or give even a cloudiness with silver nitrate. If it should do either, it contains hydrochloric acid or the products of decomposition of some other chlorides.

Pure chloroform remains perfectly colourless when boiled with potash; the presence of aldehyde causes a brown coloration.

When shaken with concentrated sulphuric acid and allowed to stand for half an hour, the two liquids should separate into two colourless layers. The presence of alcoholic chlorides produces a brown coloration.

The purity of chloroform may be judged by its constant boiling point, 60·8°. Impure chloroform may boil above or below according to the impurities it contains.

The sp. gr. of chloroform can hardly be used as a criterion of its purity, since its determination has been attended with conflicting results. Liebig has found the sp. gr. of pure chloroform to be 1·48 at 18°. Souberain shows that this number is too low, the sp. gr. at 12° being 1·496. Again, Remys (*Arch. Pharm.* [3], 5, 31) points out that the sp. gr. of pure chloroform is 1·5 at 15°, and moreover the presence of $\frac{1}{800}$ of alcohol lowers the sp. gr. ·002.

The purity of chloroform may to a certain extent be judged by the complete insolubility of Hofmann's violet in it: if it contains a trace of alcohol, the solution is coloured a beautiful purple.

* From the *J. Pharm.* [4], 29, 402—405. Reprinted from the *Journal of the Chemical Society*, September, 1879.

The Pharmaceutical Journal.

SATURDAY, OCTOBER 18, 1879.

THE "SODA WATER" OF COMMERCE.

THE weakness that is indicated by the popular application to anything of the term "milk and water," seems to be still the prevailing characteristic of the proceedings of public analysts, and almost involuntarily they appear to be influenced by some verbal connection between the articles which first engaged their attention as a body and those which they from time to time undertake to inquire into now. From the milk of the cow they went on to "milk of sulphur," and from that have since advanced to "cream of tartar," as though subject to some kind of fascination. Though to a great extent the examination of water is outside the duty of a public analyst, the kind of aerated water known as "soda water," and commonly used as a beverage, has on several occasions been taken as the material for investigation and last week the Newport magistrates were occupied in hearing a case of prosecution under the Food and Drugs Act arising out of this exercise of the public analyst's skill.

The case we refer to is fully reported at page 312 of the present number of the Journal, and it was based upon the certificate and evidence of the Newport public analyst to the effect that a certain article called "soda water," supplied by Mr. DAVIS, a chemist, of Newport, was not of the quality and nature required by the purchaser, inasmuch as it did not contain bicarbonate of soda. According to that official, water charged with carbonic acid would not have the effect of neutralizing acidity in the stomach in the same manner that the soda water of the British Pharmacopœia would do, and apparently under the belief that soda water was drunk only by persons afflicted with acidity in the stomach, the Newport analyst followed the example of many of his brethren in arriving at the conclusion that the British Pharmacopœia furnished a standard for the composition of soda water,—that if it did not contain in the half pint 15 grains of carbonate of soda it was not of the nature and quality of "soda water."

In some form or other this mischievous delusion of regarding the British Pharmacopœia as a standard for the nature and quality of articles of ordinary daily consumption, has misled many public analysts, and has been a source of considerable unnecessary vexation to individual traders. We have on various occasions endeavoured to impress upon the minds of these official analysts that the British Pharmacopœia relates, like the Pharmacopœia of any other country, solely to the composition and strength of articles to be used as medicines, that it is intended simply to afford to the members of the medical profession and those engaged in the preparation of medicines, one uniform standard and guide, whereby the nature and composition of substances to be used in medicine may be ascertained and determined. In certain of the cases of prosecution where the public analyst has sought to make the British Pharmacopœia the standard by which to gauge the nature and quality of articles that it does not in fact refer to, the soundness of the principle we have sought to impress on the consideration of public analysts has been repeatedly endorsed by the magistrates or judges before whom the cases have been tried. But still the endeavour goes on to treat the chemist and druggist as though he never sold anything but physic, and hence we have such prosecutions got up as the one just disposed of at Newport.

Fortunately for Mr. DAVIS some of the magistrates before whom the case was brought were in the habit of drinking "soda water." They seem also to have had such a knowledge of the virtues of bicarbonate of soda and such a wise regard for the soundness of their internal economy, that they took care the soda water they drank contained no soda at all, and would not drink it if they knew it contained any soda. That is to say they would not think of drinking as a daily beverage the effervescing solution of soda of the British Pharmacopœia, notwithstanding the fact that this preparation may be very beneficial for persons with acidity in the stomach. In short, they drew a distinction between medicinal soda water and that ordinarily used as a beverage. Upon this ground they dismissed the summons, but as is usual, they refused to allow costs to the defendant, since the prosecution, however mistaken, was undertaken for the public benefit.

For our own part we regret that the defence of this case was not based upon an outspoken assertion of the principle by which the magistrates were spontaneously guided in deciding it, for in our opinion there is ample reason for the opinion that "soda water" for ordinary drinking purposes is far better when made, as it generally is, by merely charging pure water with carbonic acid gas, than it would be if it contained some bicarbonate of soda.

CHEMISTS' ASSISTANTS' ASSOCIATION.

ON Wednesday next, the 22nd inst., the Chemists' Assistants' Association will hold a Conversazione at St. James's Hall (Regent Street entrance), at which all interested in pharmacy are invited to be present. There will be an exhibition of microscopes, spectroscopes and other scientific apparatus of general interest, as well as the performance of a musical programme. Tickets (to admit lady and gentleman) may be obtained by letter from the Hon. Sec., 32A, George Street, Hanover Square, W.

THE HOWARD MEDAL.

THE subject chosen by the Statistical Society for the HOWARD Medal to be awarded in November, 1880, is "The Oriental Plague in its Social, Economical, Political and International Relations; special reference being made to the labours of HOWARD on the subject." This prize was instituted in the year 1873, the centenary of the appointment of JOHN HOWARD as High Sheriff of the county of Bedford. It consists of a bronze medal, and is adjudged by the Council of the Statistical Society for the best essay on some subject in Social Statistics. On this occasion a sum of £20 will be given in addition. The competing essays must be sent in on or before the 20th of June, 1880, and should not exceed in length 150 pages of the *Journal of the Statistical Society.*

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The first general meeting of the thirty-first session was held at the Royal Institution on Thursday evening, October 9. The President, Dr. Charles Symes, in the chair. The minutes of the previous meeting having been read and confirmed, Mr. J. McCaig was elected a member; Messrs. T. Blyton, H. Edwards, J. Hallawell, A. Hughes and P. C. Williams were elected associates.

The President then delivered his inaugural address.

Inaugural Address.

After an interval of five years you have again done me the honour of electing me your President. When some few months since I consented to act in this capacity, my official duties were fewer than they now are, otherwise I might justly have hesitated in taking this further responsibility; nevertheless, seeing that those who have most to do, do the most, I am hopeful that with the support which I can fully rely on from the Council and from the members generally we shall have a successful session. This society has now an established position, a history extending over nearly one-third of a century, a dignity to maintain, a useful work to perform. It is a proverb of antiquity that "no man lives unto himself," and what is true of the individual is equally so of the body corporate. As individual members of this society we have helped to swell its numbers and have contributed to its funds; but we have done more, we have entered a brotherhood where the common weal should be our first thought, we have virtually pledged ourselves (one and all) to contribute to the common fund of information, to impart as well as to receive, to cull from our every day experience, from the work or reflections of our leisure, something, however small, which will help to add interest and profit to our evening meetings. As a society we represent the progress and interests of chemistry and pharmacy in this town and neighbourhood, and have our relations to the other scientific societies which meet in this institution and elsewhere. We are one (and I venture to think not the least important) of the societies established throughout the country for the fostering and development of these sciences, so that it requires but a moment's reflection to see how great is our joint responsibility, how necessary for us to maintain in its integrity the work of the founders and of those who have reared and brought the society to maturity. Passing from the society itself to the branches of science which it represents, and the relation of these to the numerous other branches, the mind of the most profound thinker is unable to grapple with the whole of the facts, deductions and theories which rise up before it, some real and substantial, others semi-ideal, some with so much of truth about them that they cannot be lightly dispensed with, others having barely a claim to recognition.

A connecting thought here, a missing link there, this clear exposition, that conflicting evidence, passing from arguments of solidity through the various grades of attenuation to the most ideal theories of the imagination. An interminable network of ramifications embracing all, from the commonplace things of every day life to the borders of infinity. But if the gravest philosopher is incapable of grasping the whole of this and of arriving at satisfactory generalizations, can it be expected that we, men of average minds and capabilities, shall be able to deal with them? Presumably not, but you will agree with me that it is well that we should dip sufficiently deeply into these things to enable us to realize the earnestness and reality of life and to penetrate beyond the mere surface of existence.

This probably will be best accomplished by limiting our sphere of inquiry and regarding more especially the chemist and pharmacist, and his environment, not in the broadest possible acceptation of the term; but contemplating more especially his surroundings, the accomplishments of the present and the work of the immediate future. Next to what Carlyle calls "the vestural tissue," around the chemist are his chemicals, balances, burettes, beakers, to an almost endless list; his laboratory. Around the pharmacist his measures, mortars, medicines, an ever increasing multitude; his pharmacy. These are the surroundings within which he, as a rule, gains experience and acquires the means by which he is sustained and enabled to impart energy to the mind, that mind by which he is or should be judged as regards his social position and capabilities for usefulness to mankind.

It is not however the mere possession of, but the practical application of knowledge which determines the environment outside that already mentioned, and chemistry provides abundant scope for this, seeing that it is at the very foundation of our knowledge of things.

Professor Allman, in his recent presidential address to the British Association, pointed to the conclusions of Max Schultze, which are now generally accepted as being correct, viz., "that the *same* protoplasm lies at the base of all the phenomena of life, whether in the animal or vegetable kingdom," and further, that although in all probability *chemically* the same, it differs in some unknown physical property. Here, then, chemistry is called on to decide a most important question, a fundamental principle in biology, and this single illustration will suffice to show the importance of and necessity for exactness in the results of its operations. Great as this exactness already is, workers in this field are constantly aiming at new or improved methods for the acquirement of greater accuracy, and while this work is steadily progressive, the facts or subject matter of chemistry remain constant and immutable to all time. Not so the theories by which these facts are explained; within comparatively few years these have undergone a complete revolution, and the student who twenty years ago took special pains to ground his knowledge thoroughly in the principles on which chemical phenomena were generalized, has, if desirous of keeping pace with the times, been compelled to unlearn and consider erroneous much of what he then regarded as incontrovertible fact, and to begin *de novo* to acquire the modern system.

The work of the professional chemist is not materially affected by these theoretical considerations, but inasmuch as he seldom enters this profession simply on account of the amount of remuneration it yields, but rather because his taste lies in this direction; because he takes pleasure in his occupation, and delights in unravelling these mysteries surrounding the primary and complex conditions of matter, he will be induced at every step to go beyond the mere requirements of his work. Chemical occupation has considerably increased in modern times; within a comparatively short period a small army of public analysts has been created, which, with its vassals, is pledged to guard the public against the baneful influences of adulteration, a very desirable object and one in which undoubted good has already been accomplished. That some unqualified, over officious and even unprincipled men should have entered the ranks is not at all surprising, seeing that the demand sprang suddenly into existence without the years of necessary preparation for supplying it efficiently, but the position is becoming elevated and the evil which has existed in some localities (happily not in ours) viz., where the public analyst has been a terror equally to the unjust and the just, will doubtless soon cease; a consummation greatly to be desired and by none more so than by the conscientious and efficient members of the body. In addition to the various chemical works throughout the country there are many manufactures, the conduct of which involves some chemical knowledge, and in some instances this is sufficient to justify the employment of one or more chemists on the premises. This is a growing occupation for chemists and one which must necessarily increase in direct proportion to the enlightenment of the age. I have in my mind at the present moment one or two large manufacturing firms who, to my personal knowledge, by using their laboratories as guides in their operations, are enabled even in these trying times to compete successfully with what would otherwise be overwhelming competition. Belonging to this department of technical chemistry are certain manufactures in which huge chemical processes are involved.

Those of us who attended the recent meeting of the British Pharmaceutical Conference at Sheffield had an opportunity of witnessing one of these in the Bessemer process of manufacturing steel, the grandeur of which produced an effect on the minds of many which will not readily be effaced. The Hollway process of rapid oxidation and the use of sulphides as fuel is of so recent a date as to be scarcely perfected, at least as regards working details, but it is a grand conception, the ultimate effects of which cannot at present be estimated. Ores so poor as not to be worth working on account of the cost of the fuel which would be consumed, are by this process made to produce their own fuel and can be worked at a profit. These are two instances of applied chemistry, but many others might be quoted if time permitted.

Beyond this we have the more attenuated environment of chemical physics, in which we gradually pass from experimental demonstration to deductions, theories and hypotheses; here rapid strides have been made during the last few years, and still there is room for work. Quite recently we were startled by the announcement that oxygen, hydrogen and nitrogen had been liquefied; but the other day it was more than hinted that chlorine had been dissociated, and now Mr. Crooks opens up a new field of inquiry into the chemistry of "radiant matter." So far he finds that even in this attenuated condition the molecules retain their chemical characteristics; if, however, the character of the molecules can be modified by physical influences, or if it is possible for the atom to exist in a free and uncombined state, it seems probable that the most favourable condition for such existence will be found in this direction.

Having thus gone over in outline some of the surroundings of the chemist as a professional and scientific man, let us contemplate shortly but more especially the environment of the pharmacist. I have already mentioned the close proximity of the pharmacy, its medicinal contents and the instruments and utensils by which the latter is dispensed; but seeing that drugs, etc., have to undergo selection and certain processes of manufacture before they are fitted for use in the pharmacy, some amount of skill is required to enable the operator to accomplish these things satisfactorily. But comparatively few years since only one school of pharmacy (to the best of my knowledge) existed in this country, now there are probably a score or more. Books and other facilities for education have been multiplied, all of which are, or should be, healthy signs; and I think it cannot be denied that the pharmacist of to-day is a decidedly more accomplished man in his calling than he was even twenty years ago. But whether pharmaceutical education has kept pace with the provisions made for it is somewhat doubtful; if young men trust too much to the "short cuts" so temptingly provided and neglect systematic training and home study, the knowledge gained will be exceedingly evanescent and will be of little real use to them; it might perhaps suffice to enable them to pass an examination or two, but it should be borne in mind that examinations are not the aim and end of our existence, they are but the portals through which it is necessary to pass in order to enter into the real business of life, first as assistant and then as principal, during which transition views of things often undergo considerable modification. The chemistry of the pharmaceutical laboratory is not so exhaustive as that previously referred to; many of its operations are mechanical and can be performed in detail by less skilled labour, but that both knowledge and judgment of no mean order are involved in the direction of these, no one with personal experience in the matter will doubt. But chemistry does not stand alone; some knowledge of botany, a sound knowledge of materia medica and of the various operations and requirements embraced by the broad and comprehensive term of pharmacy are absolutely necessary, and if these are faithfully acquired it is not at all surprising that those who conduct a business involving proficiency in such sciences should lay claim to a professional status. Many, however, find it impossible or inexpedient to conduct their business on a purely professional basis; hence we have the existing state of things well known amongst us, viz., pharmacy as a combination of profession and trade. The social position of the pharmacist has been so recently and so ably dealt with by the President of the Conference that very little from me on this point will suffice.

There can be no doubt but the public regard pharmacy as something above an ordinary trade, and the pharmacist as a man of superior intelligence; but he is a shopkeeper, and with the superficial portion of society this militates considerably against him. Yet if my experience is worth anything, it indicates that those who have the most substantial claims to position themselves, readily accord to us our proper status. Still, an anomaly does exist, and this social environment of the pharmacist is a problem not easily solved.

It has occurred to me in this relation, as it probably has to others, that there is something in a name, and if we, after continental fashion, were to educate ourselves and the public to speak of our places of business as *Pharmacies*, and to regard our charges for dispensing—however small or large—in the light of fees or payment for professional work—*which they really are*, and added to this, if we put forth a general effort to improve the tone of our business, we shall have done, not all, but something toward the accomplishment of our aim, which must necessarily be a work of time. Progress will of course be less rapid in times of general depression than it would in those of prosperity, and far as I am from believing in the perpetuity of "bad times," if only half one hears is true, it would be useless denying their existence at present. But as a picture cannot consist entirely of background and shadows, but must have its high lights and half tones, so the evil cannot exist without some attendant good; the refining process rarely fails to produce better metal, and I believe these trying times have their salutary influences, inasmuch as they are calculated to stimulate our capabilities, to test the strength of our mental resources and to develop our best energies. Our latent powers are doubtless greater than we should ever be aware of but for the necessity which calls them into action, and if we add to these fortitude and patience, there can be no doubt but the end will be worthy the means. The present time is one in which we should most thoroughly appreciate an association like this, which brings us together for friendly intercourse, for mutual help by the exchange of ideas, tending to render more perfect the sciences we profess, and to make us better capable in our respective spheres of serving our day and generation, so that when called on to give place to others, we may leave Chemistry and Pharmacy something better than we found them. There is much uncultivated ground to work; much that remains to be done. Truly, at first sight, it appears as though every atom of the universe, every molecule of which it is built up had been twisted and turned by scientists in every conceivable or possible direction; but going somewhat more deeply into our subject we find that so vast is the prospect which opens up before us that we are overcome by the contemplation of how little it is possible for one individual in a lifetime to accomplish. The amount of partially developed ideas and unfinished work by which we are surrounded is very considerable; versatility of talent and the wide range of operations seem to tempt workers to pass on to new subjects and new inquiries, and to leave the old ones with still much to be done for their completion.

There are still many vacant places in the tables of homologous substances. Synthesis of the alkaloids is merely commenced, inasmuch as with only two or three has it been accomplished. Not until within a few weeks since were we furnished with reliable information on the chemistry of so common a substance as ginger.

Perusal of the blue list published by the British Pharmaceutical Conference, and of the list of queries given by the American Pharmaceutical Association, at once suggests the incompleteness of our knowledge in many chemical subjects and pharmaceutical processes, and reminds us that there is more work than there are workers.

Gentlemen, let us, as members of this Association, resolve that during the present session we will do something toward working out the numerous problems which lie around us for solution, and so contribute something to the common stock of chemical and pharmaceutical knowledge.

One word to the students now entering on a new session, and I have done. Let your work be *thorough*. You have examinations to pass and must of necessity work in a direction to acquire the requisite education; but if you work solely for this, with no higher or broader aim, then, however successful you may be in passing, you utterly fail to accomplish the object for which examinations exist. It is not by spasmodic efforts, but by persistent study—*Nulla dies sine lineâ*—that you can gather in a rich harvest of knowledge and thereby gain the approval of your own consciences and are enabled more thoroughly to serve the interests of your fellow men.

A cordial and unanimous vote of thanks, proposed by Mr. R. Sumner, seconded by Mr. Davies and supported by Mr. Mason, having been accorded Dr. Symes for his able and instructive address, the meeting terminated.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION OF GREAT BRITAIN.

A meeting of the Law and Parliamentary Committee of the Association was held at the office of the Association, 23, Burlington Chambers, New Street, Birmingham, on October 8, 1879, at 1 p.m., Mr. Thomas Barclay, President, in the chair. Present—Messrs. Andrews (London), Churchill (Birmingham), Cross (Shrewsbury), Hampson (London), Holdsworth (Birmingham), Jones (Leamington), Symes (Liverpool) and the Solicitor of the Association. The minutes of the previous meeting of the Committee were read and confirmed.

The Secretary said that in compliance with the instructions of the Committee he had issued circulars to influential members of the trade asking for well-authenticated instances in which fatal results had followed the sale of scheduled poisons under cover of the patent medicine stamp, with a view to obtain information and suggestions that would prove to the satisfaction of the Legislature that the present system of unregistered persons vending poisons under cover of the patent medicine stamp was dangerous to the general public.

A large number of replies to this circular were laid on the table, and extracts from some read.

The President said the Committee at its last meeting spent a considerable amount of time in endeavouring to devise some means of carrying out the wishes of the Executive in procuring information to aid them in dealing with that question. As had been seen from the minutes of that meeting, several suggestions had been considered, and a resolution passed instructing the secretary to issue a circular. They had to consider whether the replies to that circular contained adequate information or whether it would be advisable to adopt other means to that end.

Mr. Hampson said they had heard in one of the letters read by the Secretary a statement to the effect that it made little difference who sold patent medicines containing poisons, as they were not supposed to know the contents of such medicines. Such remarks had from time to time been applied to poisons sold uncovered by the stamp, but he was of opinion that it did make a considerable difference in whose hands the sale of such poisons was placed. He believed that the fact of the public being compelied to go to particular shops for the purchase of poisons was in itself an advantage to the trade. The public knew that they must go to registered persons to obtain poisons; if those poisons were obtainable at every shop they would be ranked with groceries and such like goods. It was thought wise—the Legislature thought it wise—to restrict the sale of certain poisons to registered persons, and he failed to see any distinction, or any very important distinction, between the sale of poisons covered by the patent medicine stamp and the same poisons sold uncovered by the stamp. He considered that the sale of all scheduled poisons covered or uncovered by the stamp should be restricted to chemists and druggists, and he thought the efforts of the Association should be directed to that end, and that it was their duty to aid the Executive in accomplishing that object.

Mr. Symes said he supported Mr. Hampson's views; it was an opinion he had long held. If the sale of patent medicines containing scheduled poisons were placed in their hands exclusively, it would, to a certain extent, increase their responsibilities, but he thought in the present state of affairs they must be prepared to accept those increased responsibilities.

The President said it had been already decided by the Executive to endeavour to restrict the sale of poisons under cover of the patent medicine stamp to chemists and druggists.

After further discussion it was unanimously resolved:—"That the Secretary be empowered to take such steps as he deems expedient, by conference or otherwise, to collect information and suggestions on the sale of patent medicines, with a view to bring about modifications in the Pharmacy Act, 1868, to restrict the sale of scheduled poisons under cover of the patent medicine stamp to registered chemists and druggists."

The case of a member of the Association, against whom proceedings had been taken under the Sale of Food and Drugs Act, for the sale of soda water, was discussed at considerable length, and after mature deliberation, it was unanimously resolved:—"That the Solicitor be instructed to defend a member of the Association prosecuted for the sale of soda water, under the Sale of Food and Drugs Act, and to employ the services of Professor Attfield and Mr. Stoddart."

The Secretary reported that in compliance with a resolution passed by the Committee at its last meeting, he had taken out summonses against three illegal traders for infringements of the 17th section of the Pharmacy Act, 1868, and that a fine was in each case imposed by the magistrates. He said they would probably have observed from a leader in the last number of the *Pharmaceutical Journal* that the Editor attributed that action on the part of the Association to an intimation furnished by the Solicitor of the Pharmaceutical Society at the hearing of a recent case of prosecution under the same section of the Act, undertaken by order of the Pharmaceutical Council. The Editor had, he presumed, forgotten that the Association carried to a successful issue three cases, proceedings in which were taken under that section so long ago as June, 1877.

The Secretary further reported having forwarded to the Secretary and Registrar of the Pharmaceutical Society particulars of eight cases of infringements of the provisions of the 15th section of the Pharmacy Act, in which he had collected evidence. Communications were read from the Secretary and Registrar of that Society acknowledging the receipt of that letter, and detailing the course he had adopted in dealing with each particular case.

A letter was read from a member of the Association stating that there were ten or twelve illegal dealers in poisons carrying on business in and around the town in which he resided.

It was unanimously resolved:—"That the Secretary be instructed to take proceedings from time to time against illegal traders under the 17th section of the Pharmacy Act, 1868, in such cases as in his opinion, and that of the Solicitor, it is expedient."

EDINBURGH CHEMISTS' ASSISTANTS' ASSOCIATION.

The first meeting of the second session of the above Association was held in the rooms of the Pharmaceutical Society (North British Branch), 119A, George Street, on Wednesday evening, October 8.

The minutes of the final meeting of last session having been read and adopted,

The President, Mr. D. McLaren, proceeded to read the opening address. In thanking the members of the Association for the honour they had conferred upon him in electing him as their President, he assured them of his willingness to do his utmost in furthering the interests of the Association; but remarked that it was the exertion of individuals alone which would constitute the *sine quâ non* in carrying out that end. In referring to the relationship existing between the medical profession and chemists, he argued that while it was the care of the physician to ascertain the nature and seat of disease and to prescribe the appropriate remedies, it was the province of the chemist to collect, compound and dispense these remedies. While the exercise of the duties of a physician demanded a much higher standard of qualification than was requisite to the discharge of the duties of a chemist, yet the application of much care and dexterity, as well as a considerable acquaintance with scientific knowledge, was demanded of him also. In speaking on the subject of counter prescribing, he discountenanced the practice of chemists assuming to themselves on all occasions the responsibility of properly qualified practitioners, but maintained that on many occasions, and more especially where the poorer classes were concerned, it was necessary, if not incumbent, upon the chemist to give advice in the treatment of minor ailments. Admitting that there was thus a tendency on the part of the chemist to encroach upon the rights of the doctors, yet the keeping of an open shop by doctors, was, he affirmed, no less an encroachment on the rights of the chemist. After briefly noticing the various essays to be delivered during the session, as stated in the syllabus, he expressed his opinion that members would derive not only much pleasure, but also valuable information from their attendance on these meetings.

At the close of the address, a discussion was entered into as to the best means to be adopted for the shortening of business hours in those shops which remained open later than 8 p.m. A Committee, consisting of the President, Vice-President, Secretary and Treasurer, was finally appointed with powers to take such steps in the matter as might be thought desirable.

A very cordial vote of thanks was awarded to the President for his interesting and instructive address, to which, having briefly replied, the meeting was brought to a close.

Proceedings of Scientific Societies.

AMERICAN PHARMACEUTICAL ASSOCIATION.*

The twenty-seventh annual meeting of this Association was called to order in the Supreme Court Room, in the city of Indianapolis, Ind., on Tuesday, September 9, at 3 p.m., by its President, Mr. George J. Luhn, of Charleston, S. C.

President Luhn read the annual address which is usually expected from the retiring President. The address was replete with information as to the work, objects, and success of the Association in the past, as also the present attainments of pharmacy, made necessary through the working of the laws relative to pharmacy in many of the States, and the examinations of the Boards of Pharmacy under these laws. This advance is being greatly aided by the formation of State Pharmaceutical Boards, and of these several have been established during the past year. Allusion was made to the work of the officers, as also the several committees authorized by the Association. Among the other subjects commented upon were the time at which the meeting was held, the finances of the Association, and the centennial fund. The President advised that the meetings should be held earlier in the year; when in the Southern States, it should be as early as April or May, and when in more northern latitudes, not later than August. Regarding the finances, he named some plans for the relief of the debt the Society owed, and said that definite measures should be adopted at this meeting for that purpose. The centennial fund, which had now held over for two years, had made slow progress, as but one-third of the necessary amount had as yet been collected. At the conclusion of the address it was, on motion, referred to a committee.

The Committee of Credentials reported that they had received the credentials of delegates of various associations.

Invitations to attend the meetings of this body were extended by the Business Committee, on behalf of the Association, to the following:—The Governor and State Officers, Judges of the Supreme Court, Mayor, Medical College of Indiana, Central College of Physicians and Surgeons, and the Marion County Society of Microscopists.

The names of fifty-four persons were read, and of these fifty-two were elected, two names being withdrawn for the present. At subsequent sessions, other members were elected, including the two names temporarily withdrawn, making eighty-five new members elected at this meeting.

Some discussion arose as to qualifications for membership, as to time of service in the business, and the following resolution was offered by E. H. Sargent, of Chicago:—"That a committee of three be appointed to report at our next session what changes may be desirable in our bye-laws to make definite and uniform the balloting for members, and also to report on the requisite qualifications of candidates for membership in this Association."

The Chairman of the Executive Committee, Mr. G. W. Kennedy, read his report. The main facts may be briefly stated as follows:—Total number of members at present, 1106. This is a decrease from last year, as the number of members elected at Atlanta in November last was exceeded by the number lost by various causes, of which 8 were by death, 13 by resignation, and 61 from other causes; total 82. The report was accepted and directed to be published.

The delegates present then named one from each delegation, and to this the President added five others, and these gentlemen were constituted the Committee to Nominate Officers for the ensuing year.

The President appointed a Committee on Exhibits; and, after this, the Secretary called the roll of members present.

The Association then adjourned until 9 o'clock Wednesday morning.

SECOND SESSION.

The meeting was called to order shortly after 9 o'clock, when the Secretary read the minutes.

T. Roberts Baker, of Richmond, Va., then read the report of the Nominating Committee; immediately after which followed the election of all the gentlemen named by the Committee. The principal officers were as follows:—President, George W. Sloan, Indianapolis;

* Abstract of the report in the *Druggists' Circular and Chemical Gazette*, October, 1879.

First Vice-President, T. Roberts Baker, Richmond, Va.; Second Vice-President, Joseph L. Lemberger, Lebanon, Pa.; Third Vice-President, Philip C. Candidus, Mobile, Ala.; Treasurer, C. A. Tufts, Dover, N. H.; Permanent Secretary, John M. Maisch, Philadelphia, Pa.; Reporter on the Progress of Pharmacy, C. Lewis Diehl, Louisville, Ky.

The Committees appointed included the Executive Committee, Committee on Drug Market, Committee on Papers and Queries, Business Committee, Committee on Prize Essays and Committee on Legislation.

The retiring President then introduced Mr. G. W. Sloan, of Indianapolis, the new President, who briefly acknowledged the honour conferred upon him.

Prof. Maisch then read his report as Permanent Secretary. The topics discussed were mainly the expenses incurred in publication of proceedings, and suggestions as to where in future there might be some retrenchments as to expenses, as also how it might be possible to increase the income. Alluding to the delay in issuing the last volume of proceedings, it was stated that it was due in part to the delay in obtaining the wood-cuts to illustrate the work as desired. The total expenses of issuing the volume were 3,823.42 dollars. The expenses of various years were compared, showing that, considering the increased volume of the proceedings, it has cost the Association much less, proportionately, than in the past six years. Although the organization is practically in debt, the Reporter did not favour an assessment, but rather decreased expenses and an effort to largely increase the membership. A resolution was passed some years ago that the subscription to the various papers and periodicals received for the Reporter on the 'Progress of Pharmacy" is thought to be an unnecessary tax on the body, and it was suggested that it be left discretionary with the Executive Committee and the Permanent Secretary. It was also suggested that in localities where more than three or four members reside, authorized agents of this Association be appointed to extend its interests.

The report was accepted, and subsequently referred to committee.

The Treasurer, Charles A. Tufts, M.D., of Dover, N. H., then read his report. The total receipts for the year are 4,849.12 dollars; the disbursements were 4,730.45 dollars, and a cash balance on hand of 980.98 dollars. This balance of cash on hand represents in part dues of members paid in recently, while there are some heavy bills still due for the publishing of last year's volume. The Association has actually incurred expenses in the past more rapidly than it has provided ways and means for their payment.

The report was received and referred to an Auditing Committee, named by the chair.

After some considerable discussion relative to the finances, and the two reports just read, it was, on motion, referred to a Special Committee appointed by the chair.

The subject of the Centennial Fund was brought to the notice of the members, and on motion of Prof. Diehl, the chair named three members to act with the Chairman of the Executive Committee to endeavour to secure the balance of the amount necessary.

The Committee appointed at the previous session to suggest such revision of the bye-laws as might be thought desirable relating to membership and election of new members, made a report recommending alterations in the bye-laws, adding to the duties of the Executive Committee, by requiring that the names of candidates shall be read at one session and balloted for at the next session, and that a vote of two-thirds shall elect; the Executive Committee to hear and decide upon any objections that may be offered to any name presented; and no names to be balloted for until they have been approved by the Committee.

The Committee suggested the advisability of so changing the bye-laws that all matters relating strictly to business be brought before a Business Council, and thus devote much more time to the reading and discussion of papers than is now possible under the present rules.

The consideration of the proposed changes was laid over till the next session, when the resolutions offered by the Committee were adopted, and the necessary alterations of the bye-laws will be made in accordance therewith.

It was stated by the President that it was now in order to receive suggestions as to where the next annual meeting should be held.

Prof. Maisch read an invitation signed by the druggists of Kansas City, Mo., and Prof. Bedford read an invitation signed by the druggists resident at Saratoga Springs, N. Y., as also one signed by the proprietors of the several mineral springs of Saratoga.

Prof. C. L. Diehl then read the introductory to his report on the progress of pharmacy.

The Association adjourned shortly after the reading of the introductory of this report.

THIRD SESSION—WEDNESDAY AFTERNOON.

Soon after 3 o'clock the meeting was called to order by the President, the minutes of the previous session read, and then, in accordance with a motion previously offered, Prof. Remington was named as the reader for the Association.

Prof. Maisch read the report of the Committee on Legislation. The principal new facts related to the minor modification of the law of New Jersey, and the fact that a law has been enacted which relates to the sale of medicines and poisons in King's County, N. Y.

The remaining portion of the afternoon was occupied by the reading of scientific papers, after which the meeting adjourned until Thursday morning at 9 o'clock.

FOURTH SESSION—THURSDAY MORNING.

The Association was called to order at 9.30 by the President, Mr. George W. Sloan.

The Committee appointed to examine the reports of the Secretary and Treasurer, with a view to ascertain what changes may be recommended for the advantage of the Association, reported the following recommendations:—

1. That local agents be appointed in all places where more than three members reside.
2. That delegates from the various bodies be in future required to pay initiation fees.
3. That the volume of proceedings be reduced in size, as the judgment of the Executive Committee may determine.
4. That the Secretary be empowered to sell such of the pamphlets which are used for the Committee on the Progress of Pharmacy, as in his judgment are of no further use.
5. That the Treasurer present annually a tabulated statement of all receipts and expenditures.
6. That the fiscal year begin with January 1, instead of September 1.

The report, after a very brief explanation, was adopted, and Prof. Remington was requested to alter the bye-laws accordingly.

In the absence of Mr. Charles Rice, the Chairman of the Committee on the Revision of the U. S. Pharmacopœia, Prof. Diehl, one of the Committee, read the introductory report offered by Mr. Rice.

The report was a very voluminous one, and well represents the untiring industry of the Chairman of the Committee and his efficient co-labourers. The desire of the Association, as expressed in the resolution by which this Committee was reconstructed in 1877, was that at the present meeting the Committee should have their report completed and ready to present at the meeting of the Pharmacopœial Convention in May next. This seems to be an absolute impossibility; the most that can be hoped for is to publish as much as can be prepared by that time. The various members of the Committee have taken up departments of the work, and others have aided liberally in giving valuable time for careful experiments.

FIFTH SESSION—THURSDAY AFTERNOON.

The Association met at 3 p.m.

The Business Committee then called up an amendment to the constitution proposed by Mr. Joseph T. Remington to strike out the words "the United States," and insert in place thereof "America," so as to make the sentence read as follows:—"Its aim shall be to unite the educated and reputable Pharmaceutists and Druggists of *America* in the following objects." This was, with a brief explanation and discussion, adopted.

SIXTH SESSION—FRIDAY MORNING.

The meeting was called to order, and the usual business disposed of.

The President returned his thanks to the Association for their consideration, and then put the motion that the Association do now adjourn, to convene in Saratoga Springs, N. Y., on the second Tuesday (the 14th) of September, 1880, at 3 o'clock, which was adopted.

The following papers in replies to queries were read during the intervals of business:—

Eriodictyon Californicum is receiving attention for its action in lung diseases and bronchial affections. What is its therapeutical value, and to what is its activity due? Make a chemical examination of it. By Charles Mohr.

The writer made a very full examination of the plant, and the action of the various solvents in regard to the amount and quality of extractive matter. The properties are believed to be due chiefly to the resinous matter, which is best extracted by alcohol, to which it yields nearly 11 per cent. of its weight. It yields an ethereal extract of 15 per cent. and an aqueous of 19 per cent., but that which is taken up by alcohol seems more satisfactorily medicinal in its character.

Its apparent action is as an astringent and tonic to the bronchial tubes, but as a remedial agent in consumption the author thinks it no better than many other panaceas whose uselessness was long ago proved.

Fluid Extract and Syrup of Seneka.—Should it not be prepared with an alkaline menstruum? By George W. Kennedy.

The writer stated that for the past seven years he had used an alkaline menstruum in making both the fluid extract and syrup of seneka, and has never during that time noticed a single instance of gelatinization, and in but very few instances any precipitate whatever. It also furnishes handsome and brighter looking preparations, and is apparently more acrid and stronger. For 16 troy ounces of seneka root 3 fluid drachms of aq. ammonia are sufficient, and this amount is added to two pints of dilute alcohol. The finely ground drug is prepared for percolation, and after the first 12 ounces of percolate have been obtained, the percolation is continued to exhaustion. The second percolate is evaporated to $3\frac{1}{2}$ ounces, to which is added $\frac{1}{2}$ ounce of alcohol, and this is added to the reserved percolate of 12 fluid ounces. In making syrup of seneka, this alkaline liquid is used, but otherwise the process of the Pharmacopœia is followed.

Mr. S. Campbell thought a stronger alcoholic menstruum with glycerine answered as well. Mr. Lloyd spoke of the fact that seneka root yields both salicylic acid and oil of wintergreen under certain conditions, though in very small quantity.

Can any of the Decoctions or Infusions of the United States Pharmacopœia be satisfactorily prepared from the Fluid Extracts of the United States Pharmacopœia, and in what particulars do they differ from infusions and decoctions prepared in the prescribed manner? By William Saunders.

This paper gave many detailed experiments, and the results of preparing infusions and decoctions from fluid extracts. In the author's opinion when the fluid extracts are made with a menstruum of *dilute* alcohol, they may readily and satisfactorily be used to prepare both of the above weaker remedies; but when the solvent used is *stronger* alcohol, and this be diluted with water to make it the same strength as an infusion or decoction, the general result is a persistent cloudiness or milky appearance, rendering it objectionable in dispensing.

The affinity of Glycerin for water is well known; to what extent will officinal glycerin attract moisture on being exposed to a damp atmosphere? By George W. Kennedy.

The author exposed to the atmosphere of a damp cellar, glycerin of specific gravity 1·23 and 1·26 in vessels of broad shape, also in narrow mouth bottles, weighing the vessels at frequent intervals. In the first ten days the vessels of broad, open space had absorbed 4 per cent. of moisture, and this had continued until, at the end of ten months, the increase had amounted in the glycerin of 1·23 sp. gr., to $55\frac{1}{4}$ per cent., and in the denser variety to $57\frac{1}{2}$ per cent.

REVISION OF THE U. S. PHARMACOPŒIA.

Several papers were presented on this subject.

The introductory by Mr. Charles Rice was an admirable review of the subject, discussing the work already done and in process, and alluding to the changes in the character of the work itself. The proposition of the committee is to arrange the contents in alphabetical order, without any regard to the present division into materia medica and preparations; to do away with any mention of weights, substituting *parts by weight*, arranging these in the simplest ratios possible.

In preparing medicated waters, precipitated phosphate of calcium is proposed in place of carbonate of magnesia, for the purpose of diffusing volatile oils and similar materials for better solution in water.

Prof. J. P. Remington presented a very full report upon the tinctures, giving detailed formulas, some involving modifications, but all arranged upon the plan of simplifying processes as much as possible. The paper was accompanied by numerous specimens of tinctures made as proposed, as also by the residues of the exhausted drugs.

PHARMACEUTICAL EXHIBITION.

Masonic Hall, situated on the opposite side of the street from the Supreme Court Room, was the place selected for the exhibition of articles connected with pharmaceutical interests.

The large room was literally crowded to repletion with beautiful products of the art of the chemist, pharmaceutist, manufacturer, artizan and perfumer; and in many cases the crude materials from which they are prepared.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association was held at George Street, Hanover Square, on Wednesday evening, October 8.

The inaugural address was read by the President (Mr. F. W. Branson), who after alluding to the rise and progress of the Association and the large increase of new members, touched upon several topics of general interest, and concluded by noticing how useful a large and varied source of knowledge was to the pharmacist, and recommending as recreative studies a more intimate acquaintance with the vague separation of the animal and vegetable kingdoms and geology, which especially recommended itself by being a healthy as well as a scientific study.

A vote of thanks to Mr. Branson was proposed by Mr. Snow, and seconded by Mr. Naylor.

Mr. Ernest Cardwell, the late Honorary Secretary, was then presented with a complete set of Dickens's Works, together with an illuminated address, as a slight token of esteem on his severing his connection with the Association.

Mr. Branson then referred to the approaching Conversazione to be held at St. James' Hall, on Wednesday next, October 22, and expressed his opinion that it would be a great success.

Parliamentary and Law Proceedings.

The Nature and Quality of Soda Water.

IMPORTANT PROSECUTION UNDER THE SALE OF FOOD AND DRUGS ACT.

At the Newport (Mon.) Borough Police Court, on October 10, 1879, before Dr. Woollett (chairman), and Messrs. Charles Lewis and Henry Phillips, Mr. Eleazer Davis, chemist and soda water manufacturer, of 55, Dock Street, Newport, was charged under the Sale of Food and Drugs Act, 1875, for that he did in the said borough "sell a certain article, called soda water, not of the quality and nature asked for."

Mr. Line (Deputy Town Clerk) conducted the prosecution, and Mr. Henry Glaisyer, instructed by the Chemists and Druggists' Trade Association of Great Britain, appeared for the defendant.

Mr. Line said this was a somewhat important case, and the facts were these:—On the day in question, September 15 last, the public officer went to the defendant's shop and asked for six bottles of soda water, which were supplied to him. The ordinary course was adopted by the officer as to the division of the samples. Two of these bottles were sent to the borough analyst, whose certificate states: "I, the undersigned, public analyst for the borough of Newport, do hereby certify that I received on September 16, 1879, from Mr. T. H. Jones, a sample of soda water (bottle marked No. 125) for analysis, and have analysed the same, and declare the result of my analysis to be as follows:—I am of opinion that the same is a sample of water charged with carbonic acid gas, and I am of opinion that the said sample contained the parts as under, or the percentage of foreign ingredients as under:—Total solid residue, 14·63 grains per gallon; metallic impurity equivalent to $\frac{1}{20}$ grain of lead per gallon. Observations:—This sample is ordinary water charged with carbonic acid gas, and does not contain added bicarbonate of soda, and is not 'soda water.' The metallic impurity is not considerable, but care should be taken no lead pipes or solder joints containing lead are used in the apparatus employed in the manufacture. As witness my hand September 23, 1879. (Signed) J. W. Thomas, F.C.S., Mem. Inst. Chem." The question to be considered was whether water simply charged with carbonic acid gas and containing no soda is soda water within the meaning of the Act. The defence would perhaps endeavour to show that this article without soda was soda water, but he submitted that a person going to a chemist's shop would expect to get a different article from what he would expect to get if he asked for the same thing at a restaurant. Soda was a highly important medicine.

Mr. Glaisyer: You are not going into the question of a drug, I suppose. We are not summoned on that.

Mr. Line: I am not; it is a question of a food. It is not the article of food which a person going into a chemist's shop would expect to receive when he had asked for soda water.

Mr. Glaisyer: Why into a chemist's shop?

The Chairman of the Bench: Is it an article of food?

Mr. Line: It is an article of food sold by chemists, and I submit in this case the chemist is selling as soda water a water not containing soda, and that consequently the defendant has not supplied the article asked for and expected. We do not drag this person here as an ordinary malefactor. If you hold that in getting this particular water the inspector has obtained what he may have reasonably expected to get, then, sir, of course you will dismiss the summons; if, however, you hold otherwise, I shall be satisfied with a small penalty.

By the Bench: Have you selected Mr. Davis especially as being a chemist? You seem to dwell very much on the fact of his being a chemist.

Mr. Line: Soda water is, of course, a medicated water.

Chairman of the Bench: Then that takes it out of the category of its being a food: you would not go to the chemist's shop to buy a food?

Mr. Line: Chemists sell many goods that are not medicines or drugs; for instance, pomade, tooth-powders, and such like things.

By the Bench: We must shut our eyes to the fact that it is a chemist who is the defendant in this case.

Mr. Glaisyer: I am very glad to hear that remark from the Bench, as it has anticipated some observations I was about to make.

Thomas Henry Jones, called, sworn and examined by Mr. Line, said he was the officer appointed under the Sale of Food and Drugs Act in the borough. He went to the defendant, who is a chemist and druggist and soda water manufacturer, residing in Dock Street, on September 15 last, and asked for six bottles of soda water. He told defendant the soda water was to be analysed by the public analyst, and offered to divide it into three parts, which offer was accepted. Witness handed two bottles to the defendant and took two to Mr. Thomas, the public analyst, at Cardiff, the following day. Defendant said, "This is soda water, there are about three grains to each bottle." When he asked the defendant for soda water he expected to get water containing soda. Could not say what proportion of soda he expected to get in it. Did not expect to get a medicine of nauseous taste and highly alkaline, but should expect to get a soapy-tasting article. Knowing there were two kinds sold, he did not ask especially for any particular kind.

Mr. Glaisyer: The provisions of that section of the Act which relate to the division of the sample intend, that by such division a portion of the purchase shall be retained by the defendant, another portion shall be sent to the analyst, and a third shall be retained by the purchaser, and that all these portions shall be identical in their constituents. From the division which has been made in the present case this result is impossible, because by the process which the defendant adopts in the manufacture of his soda water each bottle necessarily contains a variable quantity of soda, from this simple fact, which I am prepared to prove, that the soda is introduced into each bottle separately; and consequently the only way in which the purchase in this case could be satisfactorily divided to meet the intention of the Act of Parliament would be by an actual division of each bottle of soda water.

By the Bench: According to your argument it would be impossible in any case to properly divide the samples.

Mr. Glaisyer: You could divide any article purchased into three parts.

Chairman of the Bench: Is it a matter of fact that the soda is put into each bottle separately?

Mr. Glaisyer: Yes; and I submit it is a point of law as to whether this sample has been properly divided or not.

Mr. Line: I submit the sample has been properly divided. The section referred to is the 14th section of the Act, which is as follows:—"The person purchasing any article with the intention of submitting the same to analysis shall, after the purchase shall have been completed, forthwith notify to the seller or his agent selling the article his intention to have the same analysed by the public analyst, and shall offer to divide the article into three parts, to be then and there separated, and each part to be marked and sealed, or fastened up in such manner as its nature will permit, and shall if required to do so proceed accordingly, and shall deliver one of the parts to the seller or his agent. He shall afterwards retain one of the said parts for future comparison, and submit the third part, if he deems it right to have the article analysed, to the analyst." Well, I say, sir, the article purchased by us consisted of six bottles. If we had made six distinct purchases, then each bottle must have been separately divided, but such was not the case. I think in this case it will be found that the only active principle in the soda water was the gas, which would have vanished had the bottles been opened.

Mr. Fox (Magistrates' Clerk): You must assume, then, that supposing there were three grains in each of these two bottles, and none in the others, you would then have had a portion of alkali in each bottle.

Mr. Line: There have been hundreds of cases in which the samples have been divided as in this case.

Mr. Glaisyer: This particular point has never yet been raised.

The Bench conferred and decided that the case had better go on.

Mr. J. W. Thomas, called, sworn and examined by Mr. Line, said he was public analyst for the boroughs of Newport, Cardiff, and the county of Monmouthshire. On September 16 last, he received from inspector Jones two bottles of soda water, No. 125. They were sealed with the official seal of the borough of Newport. He took particular notice that the rubber was not destroyed in any way; it was moist, and the wax did not adhere to it in the slightest. Both bottles were analysed, and his certificate referred to both. Soda water containing a reasonable amount of soda, if taken internally, would have the effect of neutralizing acidity in the stomach. Water charged with carbonic gas would not have that effect. 30 grains of soda to the pint was the Pharmacopœia standard, and a bottle of half-pint ought to contain 15 grains. In his analyses of soda waters he found they generally contained soda.

Chairman of the Bench: I must say that the soda water I generally drink contains no soda at all.

Cross-examined by Mr. Glaisyer: You say Pharmacopœia soda water contains 30 grains to the pint?—That is so.

But there is another kind of soda water?—Not to my knowledge.

Then whenever soda water is asked for the British Pharmacopœia preparation should be supplied?—I didn't say that.

Then there is more than one kind of soda water?—No; I did not admit that.

Will you explain your answer then?—It depends upon the quantity of soda added; I cannot say it differs in kind.

Well, if a half-pint bottle contains 15 grains of soda, what do you say that is?—Soda water.

Supposing it contains only 3 grains?—It would still be soda water.

Supposing it contained half a grain?—Then it would probably be an impurity in the water from which the soda water was made. I may say I think the standard of the Pharmacopœia is too high.

Would not Pharmacopœia soda water be dangerous if taken too frequently?—I cannot say.

Would it not be injurious if taken in large quantities? —That is a medical question I cannot answer.

You say you have examined many samples—with what result?—They contained soda—from 5 grains to 15 grains per bottle.

You have never had a sample containing less than 5 grains?—No.

Is the British Pharmacopœia soda water such a preparation as the public would drink?—It is not very palatable.

Is it not very nauseous?—Well, it is not palatable.

Have you had soda water submitted to you for analysis which contained, as you say this sample contained, no soda?—I have had samples submitted to me as soda water which I do not admit it to be soda water.

Your certificate is an analysis of both bottles submitted to you?—Yes, taken separately, and the analyses agree in every particular.

There was a trace of soda present?—No, not of added soda: it had an alkaline residue.

Is the residue of all water alkaline?—In the majority of instances it is.

Have you examined Newport Waterworks water?—Yes; the residue is slightly alkaline.

To what extent?—Only a very moderate trace; about the same as in this soda water.

Is the alkalinity due to soda?—To a certain extent it may be.

Do you know whether it is or not?— I am not absolutely certain.

Do you recollect from your analysis of Newport water what the amount was?—It is stated on my certificate that this soda water contained 14·63 grains of solid residue per gallon, and the town water contains from 13 to 15 grains per gallon, according to the state of the weather.

Have you frequently had samples to analyse?—No, not very frequently.

There may be only 13 grains of residue per gallon?—Yes, possibly.

And there may be one grain to the gallon of added matter in this soda water?—Yes, but not of carbonate of soda.

How so?—Because I should have been able to estimate it in the residue.

How did you estimate the alkalinity?—By the standard tests.

Did you test both bottles for alkali?—I tested both residues.

You say in your certificate that there was a metallic impurity amounting to one-twentieth of a grain of lead to the gallon: now would that amount be injurious to health?—No.

Perfectly innocuous?—No, I do not say that.

How do you test the water for lead?—By sulphuretted hydrogen.

How do you account for the presence of lead?—From the pipes in the manufacture.

Could it not have got in in any other way?—Well, I don't think it could.

By the Bench: Do you think it is likely to have come from the apparatus?—Yes.

Mr. Fox: What is the smallest quantity of bicarbonate of soda you could have traced in the soda water?—I could readily have detected half a grain.

By the Bench: Then if half a grain of soda had been added to the water of each bottle you would have detected it?—Yes, sir.

Mr. Line: That is my case.

Mr. Glaisyer: The case, as far as I am prepared to carry it, is this—that soda water has been largely manufactured for use as an agreeable beverage, and that as such it should be as free as possible from medicinal properties. It is well known that the article in general use is a very different article from that prepared according to the formula of the Pharmacopœia, and I think I shall produce evidence to prove to you that the Pharmacopœia soda water would be injurious to health if drunk constantly. The case seems to have shaped itself simply into the question whether the defendant did sell soda water with or without soda, and I think I may keep the Pharmacopœia preparation out of the question.

Chairman of the Bench: Quite so; what is soda water of commerce?

Mr. Glaisyer: Then I shall call the defendant and the boy that assists him in the soda water department of his trade, and they will tell you that the water is charged with carbonic acid gas, and that the soda is added to each bottle separately before being filled with aerated water. I shall call as witnesses Professor Attfield and Mr. Stoddart, both eminent analysts, and they will both tell you that soda was present in the samples they analysed, and, therefore, you will see the force of my objection which I previously urged as to the division of the sample, and I think in the end you will either be satisfied to dismiss the case upon the technicality I have raised—and which is really something more than a technicality in this case—or to dismiss the case upon the consideration that the defendant did actually supply the soda water of commerce.

Mr. E. Davis, called, sworn, and examined by Mr. Glaisyer, said: I am a chemist and druggist and a soda water manufacturer in the borough, and have been in business thirteen to fourteen years. I have manufactured soda water between four and five years.

Do you make the British Pharmacopœia preparation?—I made it once, one bottle for my own use.

Have you ever had it asked for?—Never.

What is your process of manufacture?—Whiting is placed in a leaden generator, sulphuric acid is added, and the carbonic acid gas evolved is conducted by means of piping into a gasometer; it is then pumped into a soda water machine and forced from thence through the bottling machine into the bottles. Previous to the bottles being placed in the machine for charging each bottle has a certain amount of bicarbonate of soda placed in it.

Is that done under your superintendence?—When it is not done by myself it is done under my immediate superintendence.

Describe the manner in which the soda is placed in the bottles?—Cases containing the bottles are arranged side by side along the bottling machine, the bottles are placed in rows consecutively, then the soda is added to one bottle after another.

By the Bench: Is that always done?—Yes, invariably. A little soda is taken on the point of a knife and dropped into the neck of each bottle.

Mr. Glaisyer: Is it not weighed?—No.

You use one make of bottles, I believe?—Yes, only one make—Codd's patent.

By the Bench: What is the smallest quantity you would put into each bottle?—Well, about 1¾ or 2 grains.

Would it be more than a grain?—Yes; I did not think it was necessary to be very distinct or definite as to the amount, so long as some was put in.

Cross-examined by Mr. Line: Witness said he considered it necessary, in order to comply with the provisions of the Act, to put some soda in. The generator in which he made the gas was of lead.

Chairman of the Bench: Then I would advise you to alter it, as lead is pretty sure to come over with the gas.

Albert Harvey, examined by Mr. Glaisyer, said: I assist the defendant in his business by helping him to make soda water. I put the soda into the bottles by means of a knife, putting a little into each bottle.

Professor Attfield, called, and examined by Mr. Glaisyer.

What in your opinion is soda water?—There are two kinds of soda water in trade now. There used to be three. First, medicinal soda water, and the present official strength of that is 15 grains of bicarbonate of soda to the bottle of half a pint, and it was this medicinal soda water that gave the name to the article. This medicinal soda water always contained carbonic acid gas, and was aerated soda water. This aerated soda water created a demand on the part of the public for "soda water" that had no "soda" in it; created a demand for aerated water, in fact. Created a demand for aerated water which the public always continued persistently to call soda water. To meet this demand for a beverage manufacturers used commonly to make soda water, so called by the public, without any soda in it, but some manufacturers put a dash of soda in it to warrant the name. But since prosecutions have been instituted about soda water nearly all, practically all, manufacturers put at least a dash of soda in it, just to warrant the name, and I may say to meet the requirements of officials under the Act.

Can you say anything as to the quantity of soda to meet this?—That varies very much.

By the Bench: Say how much?—It varies from a fraction of a grain to three or four grains per bottle. This is according to my experience as an analyst, and the reason of its varying is, in my opinion, because the boys and the work-people put the soda in, as has been described in this case, rapidly instead of with care. And it is important for commercial purposes that it should be done rapidly, in which case it is impossible for such boys to be very accurate as to the amount employed, that is to say, in the cases of those makers who adopt this rough-and-ready mode of adding the soda.

Mr. Glaisyer: Have you had an official sample?—I have. This is the label of the sample which I received on October 3, and it corresponds with that of the sample produced.

By the Bench: Then you have analysed one of the sealed samples?—Yes.

Mr. Glaisyer: Tell us the result of your analysis.—I found bicarbonate of soda in that bottle.

And what would you term the liquid you analysed?—There being soda there, it was of course soda water. There was enough soda to warrant the name.

By the Bench: Soda in what quantity?—It was about a quarter of a grain per bottle.

By the Bench: Was it added or was it in the water used?—I can only say from my knowledge of the waters in this district, which I believe to be mainly sandstone waters, that——

By the Bench: Some water here comes from limestone; many natural waters would contain soda in the quantity you have found, I take it?—Some waters would contain that quantity, others contain traces only, and others really none at all; and as such waters as are supplied to this district contain, practically, none at all, therefore, in my opinion, this quarter of a grain of soda I found was added carbonate of soda.

Mr. Glaisyer: Did you examine the bottle in which the water was sent to you?—Yes.

Now how do you account for the small quantity of soda found in that bottle of water?—On account of the rapidity of the manipulation of the work by the boy in putting the soda into the bottles, I should certainly expect the quantity to vary from, say, a ¼ of a grain to 3 or 4 grains. I have seen this work done by boys, and I am certain the amount of soda must almost necessarily vary in the bottles.

Is it also possible for a portion of soda to be forced out after being put into the neck of the bottle?—That question I have gone into, and have made experiments myself in bottling soda water from a machine. The soda dropped into one of these patent bottles falls on the glass ball—sometimes partly and sometimes mainly; and then, when the water charged with gas is driven by the machine into the bottle, air and gas escape from the neck of the bottle, and with that air nearly always comes out some spray, and with that spray might come a certain amount of the soda.

Did you make a further analysis of anything that came with the sample?—Yes. When I proceeded to open my sample I found it extremely difficult to get out the whole of the wax with which the bottle was sealed. I knew as a chemist that even if a fiftieth part of a grain of the colouring matter of the wax got into the bottle it might contaminate the water; and, although I took especial care, I found it impossible to get all the wax out. The fact of the pressure of the glass ball acting on the centre of the indiarubber ring in the neck of the bottle caused the inner edge of that ring to curl up and I found it utterly impossible to get all the wax from beneath, although I myself tried with a penknife, but I found I could not do so. I then pressed down the ball and got out the liquid, and found lead therein. I immediately examined the particles of wax for lead, and there found lead in considerable quantity.

By the Chairman of the Bench: Do you think the lead would get there from the lead generator?—I have examined many samples of soda water, the gas for which was made in a leaden generator. Some contained lead, others no lead. I have sometimes found that lead does come from the pipes; at other times I have been sure it could not have come from that source. Very minute traces of lead might come over with the gas, notwithstanding one or two washings of the gas. I am of opinion that it is just possible for lead to be present from that cause.

Mr. Glaisyer: Could any other substance be used instead of lead for the generator of the gases?—Makers of soda water apparatus are turning their attention to that subject now, but up to a short time ago lead has been almost universally used.

Do you consider the lead in this sample innocuous?—Perfectly; such a minute quantity must be.

Cross-examined by Mr. Line, witness said a large quantity of the soda water he had examined contained only small quantities of soda, which would not practically have any effect at all, but was put in to make it the so-called "soda water" of commerce; it was the fault of the public that this term is kept up. There was no question of cost in the matter. The contentions in these soda water cases were mere contentions about names. Some makers had called this beverage "aerated water," others "carbonated water," but the public did not take kindly to these names; they seem to prefer their old term, "soda water," and it practically caused no confusion, except to officials under the Act.

Mr. W. W. Stoddart, called, sworn, and examined by Mr. Glaisyer, said he was public analyst for the city of Bristol. He had had a sample of this water sent to him for analysis bearing the official seal of the borough. He found 1 and 1-10 grain of bicarbonate of soda in it. He had examined three samples of Newport water. In one he found total solids about 8 grains to the gallon, in another about 13 grains to the gallon, and in the third about 14 grains to the gallon. There was no soda in Newport water. If a quarter of a grain were found there it must have been added. He found a small trace of lead, which he thought came from the generator in which the gas was made. One-twentieth part of a grain of lead would not be serious.

Mr. Line, addressing the Bench: I would call your attention to the second section of the Act. "The term 'food' shall include every article used for food or drink by man, other than drugs or water." Soda water is neither a drug nor is it water, and therefore it is an article of food.

Mr. Glaisyer: I admit that.

Mr. Line: My point is this, that a person going into a chemist's shop——

Mr. Fox: I may say I have all my soda water from Mr. Young, a chemist, in quantities of six dozen at a time. I would not drink soda water if I knew it contained any soda.

Mr. Line: I submit that a large number of persons going into a chemist's shop for soda water would expect to get water containing soda.

Chairman of the Bench: The defence have proved that this water did contain soda.

Mr. Glaisyer: I admit that it is a food, which ends that point.

Mr. Line: I go still further.

Mr. Glaisyer: I must protest against this.

Mr. Line: I am arguing a question of law.

Mr. Glaisyer: What question of law?

Mr. Fox: It is admitted on all hands this should have soda in it; is that so or not?

Mr. Line: I say, sir, the Legislature never intended that the Act should be evaded by such a small quantity as a ¼ grain of soda being added to each bottle on the point of a knife.

Chairman of the Bench: When this Act was passed it was intended to apply to stronger drinks than soda water.

Mr. Line: If ¼ grain only was in the water it is nothing substantial, nothing material.

By the Bench: The defence have proved there is something material in the water.

Chairman of the Bench: I have drunk soda water for many years, and I must say if I thought there was any quantity of soda in it I should never have drunk it.

Mr. Line: It is ridiculous to argue that you can make soda water by putting ¼ grain of soda into the water, or that the water contains it as a natural constituent.

Mr. Fox: It makes no difference whether the soda be added, or whether it be present as a natural constituent of the water. In either case it will be soda water.

Mr. Line: Take the case of a member of the general public suffering from gout or rheumatism: he asks for soda water and expects to get some soda in it.

Chairman of the Bench: Then let him ask for medicinal soda water.

The magistrates conferred.

Chairman of the Bench: We think this soda water was the ordinary soda water of commerce, and we shall not inflict any penalty; in fact we dismiss the summons.

Mr. Glaisyer: Do you award costs?

By the Bench: This action was taken on public grounds; they are a public body who are prosecuting. No costs will be awarded.

Chairman of the Bench (addressing Mr. Line): Do you propose proceeding with the other two cases?

Mr. Line: No, sir. This case will govern the others, as the charge is the same in each instance.

Deaths from Chloroform.

On Monday last an inquest was held at Ashton-under-Lyne, by Mr. Price, the district coroner, on the body of a young lady named Mary Handford. The deceased had been suffering from a tumour upon her breast, and by the advice of her medical attendants, Dr. Gardiner and Mr. E. Lund, professor of surgery at Owens College, Manchester, she consented to have it removed. The two gentlemen named attended at her house on Saturday for this purpose, and Dr. Gardiner administered the chloroform in the form of vapour by means of an inhaler. She had inhaled the anæsthetic for only about two minutes, and had not passed into the second stage of narcosis when her pulse became feeble and she died. Both medical men had previously given it as their opinion that she was a fit subject to receive chloroform, and no blame was attributed to them by any person. The verdict was one of death by misadventure.

On Wednesday, also, Dr. Hardwicke held an inquiry at the University Hotel, Grafton Street, Tottenham Court Road, as to the death of Harry Knowlton, aged six years, son of a smith, living at 61, Bemerton Street, Islington, who died in University College Hospital on Friday while under the influence of chloroform. The evidence showed that for two years past he had been under treatment in different hospitals for contraction of the sinews of the legs. On the 6th inst. he was taken to the University College Hospital. On Thursday, Mr. Marshall, the senior surgeon, performed an operation on him, and the next day it was decided that splints should be placed on his legs. Chloroform was given to the child, and he was about to be operated on when it was noticed that he had ceased to breathe. Artificial respiration was resorted to, but without success. The jury returned a verdict of "Death from misadventure."

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[345]. I think that the injection mentioned ought to be filtered, as the precipitate (sulphate of lead) could not have been intended on the part of the prescriber.

NEMO.

[345]. "Assistant" should put a "Shake the bottle" on this.

J. C.

[345]. This injection should be sent out with a "Shake the bottle" label on. The ingredients must be carefully rubbed up in a mortar with distilled water.

ST. RULE.

[346]. In answer to "Juvenis," I beg to state that it is usual to give the tinct. iodi when pigment is ordered.

NEMO.

[346]. Liniment. iodi should be used.

J. C.

[346]. There are four formulæ for pigmentum iodi in Squire's 'Hospital Pharmacopœias.' I should be inclined to use "King's" ʒj. iodin. to ℥j. s. v. r.

W. WILKINSON.

[348]. I should use ferri ammon. cit. without troubling the prescriber, even if I knew him. It is evidently a slip of the pen.

W. WILKINSON.

[348]. Ferri ammoniæ sulph. is iron alum, and I should think that was meant.

J. C.

[348]. "Mag. Carb." will find that it will be as well to explain his difficulty to the patient and offer to dispense it with ferri am. cit., which I have no doubt was intended by the prescriber.

NEMO.

[348]. The top ingredient is ferri ammoniæ sulph. It is a double salt, frequently used in photography, very seldom employed as a therapeutic agent, but as such it acts as a powerful astringent in uterine cases. It is sometimes difficult to get from the wholesale dealers.

ST. RULE.

[350]. Rub the chloral and camphor together into a smooth semi-fluid paste; rub with this ʒss. to ℈ij. mist. acaciæ, then add the syrup, and afterwards the water gradually. This produces a milky looking emulsion in which the camphor is suspended; if the gum is not put in the camphor separates in the form of a greasy substance floating on the water.

W. WILKINSON.

[351]. In regard to this mixture my opinion is this, "that it should be filtered before sending out." Supposing the prescriber's intention be to order hydrobromic acid, which this mixture undoubtedly represents, we have the authority of Dr. Fothergill for removing by filtration the pot. bicarb. precipitate.

WM. LYLE.

[352]. I cannot understand how this recipe should produce a turbid mixture, and do not see any particularly scientific dispensing in producing a bright red or rather a dark reddish-brown and perfectly clear solution. There is no need for any especial care in mixing, for if the ingredients are all put into the bottle and the aq. aurant. added the result is just the same as if each is dissolved separately and afterwards mixed, viz., a clear dark solution.

Can the difference be in the French and English ferri am. cit.?

W. WILKINSON.

[355]. So far as an assistant's knowledge and experience direct me, I find no difficulty in dispensing this prescription, and am at a loss to discover grounds for Mr. Brayshay's doubts. Further than that, the salts are very deliquescent, it is a very good powder as a diuretic and aperient, and taken in doses of half to one teaspoonful. We send it out in W. M. bottles. I think Mr. Brayshay should have stated his difficulty.

W. LYLE.

[357]. The following prescription was handed to me the other day for dispensing. Will any of your correspondents inform me as to the best mode of preparing it? I digested two quantities with different pepsin of well-known makers, from ten to twelve hours each at 100° Fahr., but failed to get a clear mixture as ordered in the prescription.

Perhaps some one may have had a similar prescription and was more successful in preparing it, if so will he kindly give me particulars?

New Milk . . . . Oj.
Pure Pepsine . . . . gr. 100.
Dilute Hydrochloric Acid . . . . ♏ 80.

Mix and digest in a water-bath at a temperature of 100° Fahr. When the mixture has become quite clear, neutralize the acid with bicarbonate of soda.

T. E.

[358]. How should the following prescription be dispensed?—

℞ Quiniæ Sulph. . . . . gr. xxiv.
Sp. Ammon. Fœtid.,
Tinct. Aurantii. . . . . . āā ʒvj.
Aqua . . . . ad ℥xij.
Ft. mist.

Take a twelfth part three times a day.

QUINIÆ SULPH.

[359]. I shall feel obliged if any reader of the Journal will give me the correct mode of dispensing the following:—

Ol. Olivæ . . . . ʒij.
Ext. Belladonæ . . . . ʒij.
Ft. lin.

I endeavoured to mix in a mortar, but finding it, as I thought, impossible, I used lin. belladonæ instead. This not having the desired effect was sent back.

APPRENTICE.

[360].

℞ Codeiæ. . . . . gr. iij.
Acid. Carbolic. . . . . gr. ½.
M. Ft. pil. j. Mitte xxxvj.

What is the best method of dispensing the above so as to make the pills as small as possible?

A. W.

[361].

℞ Pulv. Calaminæ . . . . ʒiss.
Zinci Oxyd. . . . . ʒiss.
Glycerine . . . . ʒj.
Liq. Carb. Deterg. . . . . . . ʒj.
Ol. Olive . . . . ʒiss.
Aq. Calcis . . . . ℥ij.
Aq. Rosæ . . . . ad ℥vj.
M. Ft. lotion.

How can I dispense this elegantly? The way I proceeded to do it was to rub the calamine and zinci oxyd' together with the glycerine, then adding a little rose-water. I then mixed the oil and lime water, and lastly, the liq. carb. deterg. After standing a few minutes a thick white scum collects at the top, and is not dispersed by frequently shaking. It was dispensed in the same way at Apothecaries' Hall, but two other West End houses sent it out with a sediment only at the bottom. How is it done?

C. W. LAWTON.

[362]. Can any one supply information as to how the following should be dispensed? It comes from the pen of Dr. A. A. Biermann, L'Hiver, San Remo, and was last dispensed in that town:—

℞ Acid. Muriat. Conc. 2/0
Tr. Aurantii 18/0
M.S. 10—15 mma. 18·11·78.

NEMO.

[363]. A prescription of the following formula was dispensed by me the other day, and after standing forty-eight hours or so it changed from clear pale to turbid brick-red:—

℞ Sodæ Bic. . . . . ℈ij
P. Acid. Tart. . . . . ℈ij
Potass. Iod. . . . . ℈j
Potass. Brom. . . . . gr. x
Tr. Aconiti . . . . gtt. x
Sp. Camph.,
Ess. Menth. P. . . . . . . āā ♏ x
Aq. . . . . ad ℥vj

Can any one account for the difference in the mixtures? I have kept it for weeks, and it has not changed previously.

NEMO.

[364].

℞ Acid. Phos. Dil. . . . . ʒj.
Glycyrrhini . . . . ʒj.
Aquæ . . . . ℥ij.
Sig. One teaspoonful every two hours.

What is meant by the second article in above prescription?

PYRETHRUM.

Notes and Queries.

[626]. In answer to Mr. Elton's inquiry, coins can be quickly cleansed by immersion in nitric acid (fort.), then speedily washed with water. If very dirty, or corroded with verdigris, it is best to give them a rubbing with paste or with the following, which of course entails a little "elbow grease" and a little time:—

℞ Pu. Potass. Bichrom. . . . . . . ℥ss
Acid. Sulphuric.,
Aq. Fort. . . . . āā ℥j

Rub over, wash with water, wipe dry, polish with rotten stone or chalk.

W. LYLE.

[629]. This I believe to be merely the unguentum hydrargyri oxidi rubri (B.P.).

ST. RULE.

[630]. In answer to "Hibernia" the following is from the 'English Mechanic,' and is Captain Abney's process. To prepare the ferrous oxalate developer, make a saturated solution of neutral potassium oxalate, and in this dissolve as much ferrous oxalate as it will take up; allow it to stand and pour off the clear red solution, and dilute with one quarter its bulk of water. It should be kept in air-tight bottles with corks luted with paraffin.

J. C.

BOOKS, PAMPHLETS, ETC., RECEIVED.

A TREATISE ON CHEMISTRY. By H. E. ROSCOE, F.R.S., and C. SCHORLEMMER, F.R.S. Vol. II. Metals—Part II. London: Macmillan and Co. 1879. From the Publishers.

ANALYTICAL CHEMISTRY, a Series of Laboratory Exercises, constituting a Preliminary Course of Qualitative Chemical Analysis. By W. DITTMAR. London and Edinburgh: W. and R. Chambers. 1879. From the Publishers.

THE DENTISTS' REGISTER, printed and published under the Direction of the General Council of Medical Education and Registration of the United Kingdom. London: Spottiswoode and Co. 1879. From the Registrar.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE CREAM OF TARTAR OF THE PHARMACOPŒIA.

Sir,—In a letter from Dr. Stevenson, the analyst for the county of Surrey, and also in some other communications which appeared at the same time in your Journal, reference is made to the description of cream of tartar as given in the Pharmacopœia, and in the former of these it is said that my attention was some months ago directed to the fact "that the B.P. article was an impossible cream of tartar." I have no recollection of such remark, and have been somewhat puzzled to conceive what it should mean; but I presume the difficulty Dr. Stevenson may have experienced in interpreting the Pharmacopœia must have arisen from the way in which chemical names and formulæ are used in that work to represent commercial articles which are rarely or never in a state of chemical purity. Thus, the name acid tartrate of potash is given to the article formerly called bitartrate of potash, but more commonly known as cream of tartar, and this is followed by a chemical formula which precisely represents what the composition of the article would be if it were chemically pure. The definition thus far is such as would be given in a purely chemical work. But the subsequent description shows that the salt is not required or expected to be chemically pure. There is certainly some appearance of inconsistency in this, and it has been suggested that chemical formulæ might with advantage be omitted on account of their too great precision. The same objection, however, might be taken to the use of chemical names. But these objections, in my opinion, are greatly outweighed by advantages which the use of known chemical names and formulæ afford in defining the articles referred to. Chemical formulæ are used in the Pharmacopœia not only for explaining chemical names, but also for shortening and facilitating the description of products, while "characters and tests," when these are appended, serve further to define the nature of the substances named, and often to qualify what the name and formula, if used alone, would indicate. These must, therefore, be taken altogether, the context as well as the text. In the case of cream of tartar, the lime salt, the presence of which is indicated by the test, being variable in quantity, the specified indication of it is made to refer to a minimum rather than a maximum quantity, and it is probable that the average is greater now, since plastering wines has become so largely practised, than it was twelve or thirteen years ago, when the Pharmacopœia was constructed. Tartrate of lime has always been recognized as a legitimate, because necessary, constituent of cream of tartar, from which it could not be made perfectly free without augmenting the price to an extent that would practically prohibit its use. Pereira says, "as found in commerce it usually contains from 2 to 5 per cent. of tartrate of lime, and sometimes a little sulphate of lime. . . This is of no material consequence in a medicinal point of view."

For the presence of sulphate of barium, I know of no legitimate excuse; but it may possibly arise from the use, in plastering wine, of mineral matter containing both barium and calcium salts. I am informed by a large Spanish wine maker that in the district in which he lives they plaster wine by the use of earth found in the locality of the vineyards, without reference to its special composition. It is not known as gypsum, or by any name representing sulphate of calcium, but merely as an earth that answers the wine makers' purpose.

Some remarks made by Mr. Tanner on this same subject have surprised me. He thinks the description of cream of tartar in the B.P. is "rather vague and ambiguous," and as far as I can gather from his remarks, the ambiguity lies in the statements that cream of tartar is obtained from "something quite distinct from cream of tartar," namely the *crude tartar* which is deposited during the fermentation of grape juice; that this cream of tartar when tested gives evidence of the presence of what he calls *a trace* of tartrate of lime, and that the ash resulting from the incineration of 188 grains of the salt requires for its neutralization 1000 grain measures of volumetric solution of oxalic acid. He thinks this last test would prove that the salt was a pure potash salt! and he observes, "that cream of tartar does contain tartrate of lime is the experience of every one who has ever had to do with the examination of it, but that it should contain it in anything more than *a trace*, I am by no means ready to admit." He then suggests that it should be guaranteed not to contain more than 5 per cent. of impurity, which may be supposed to be what he represents as a trace. Surely all this indicates ambiguity somewhere else than in the B.P.

Again, I am at a loss to understand how anyone could suppose that crude tartar on being ground would form cream of tartar, or anything like it, as apparently assumed by Mr. Tanner. The cream of tartar alluded to by Mr. Hodgkinson, at the hearing of the case, was represented by Mr. Allen, the grinder, as having been obtained by a delivery order for "cream of tartar, in its crude state," which, of course, means the usual roughly crystallized cream of tartar, a very different thing from crude tartar or argol.

October 15, 1879. T. REDWOOD.

CREAM OF TARTAR.

Sir,—Now that the presence of a little calcium in commercial cream of tartar is being made a rock of offence by public analysts, it may not be out of place to direct attention to a point which appears to have escaped notice in the discussion which has arisen with regard to this subject.

In every prosecution which has occurred the adulterant has been reported to be so much "tartrate of lime." Is this statement a matter of fact, or of assumption? If the former, it is certainly a striking coincidence; if the latter, the cream of tartar has probably been credited with nearly twice the amount of impurity which it actually contained. Cream of tartar may, and not unfrequently does contain a small proportion of sulphate of lime. If, therefore, the estimation of the calcium is made (as is frequently the case) by solution of the bitartrate in hydrochloric acid, and precipitation by alkali, the whole of the calcium will be thrown down as tartrate, and its amount consequently largely over estimated

The same error would, of course, follow even if the calcium is precipitated as oxalate, and thus the presence of little more than 6 per cent. of calcium sulphate would figure in the report as 13 per cent. of "tartrate of lime." So seriously indeed does the presence of the former salt affect the analysis, that, according to Scheurer-Kestner, "in the presence of calcium sulphate only an approximation can be made of the relative amount of potassium bitartrate and calcium tartrate, and even this is not possible when the sample contains other acid substances besides tartaric acid."

For the homœopathic proportion of baryta, it seems to me that the "yeso," or the "Spanish earth," previously added to the wine may fairly be held responsible. Knop and others have found barium salts in Nile mud and in the ashes of plants grown therein. The conjecture, therefore, that the presence of traces of these substances in cream of tartar may result from one or more of the elegant processes adopted by the Spanish vintner is not more wild than is the supposition that six-tenths of a per cent. of sulphate of barium is wilfully added as an adulterant by the British wholesale druggist.

Holloway, N. F. W. FLETCHER.

THE RIGHT OF REGISTRATION UNDER THE DENTAL ACT.

Sir,—I scarcely know which to despise most, the select stupidity of all dentists in the way they have conducted their affairs, or the assurance of over two thousand odd chemists. Dentists first allow every one and any one to register, and then when the opportunity is taken, roundly abuse. But be that as it may, still I am a dentist of over thirty years' practice, yet was struck with amazement at the assertion of chemists that any man is a *bonâ fide* dentist, or was in actual practice at the passing of the Dentists Act as a dentist, who had extracted a tooth. Pray let me ask chemists to be just a trifle more consistent. Would, for instance, any man have been registered as a chemist, under the Pharmacy Act, simply and solely because he had made up a prescription? Certainly not! But surely, sir, if a man is a dentist simply because he has taken out a tooth, then it follows as logically that any one is a chemist because he has made up a prescription. Again there is no value in the Dentists Act or the necessity of registration, if extraction is the sole qualification of a dentist. The argument is rankly absurd on the very face of it. What then is a *bonâ fide* dentist? Why a man who can do with his hands whatever in or appertaining to dentistry he may be called upon or asked to do, viz., anything from lancing the gums to making an artificial set of teeth or palate. A dentist who cannot make a set of artificial teeth, palate, etc., with his own hands, though he can extract and fill, is not a true dentist, but a nondescript, or at the best a surgeon of a very limited order of surgery. Thus it is the ability to construct artificial teeth, palates, regulation plates with filling that constitutes a *bonâ fide* dentist; but there is a very wide difference between all this and extraction. I know four barbers, two farriers and a butcher's slaughterman, who are indeed first class extractors of teeth. But who would call them dentists? The truth is any simpleton can extract, that is pull, and in the majority of cases the tooth must come and without breaking. I should indeed despise my skill as a dentist if it consisted simply of extraction.

Permit me, sir, to further disprove the assertion of chemists, and show by their own acts and deeds, and also those of medical men, that they had no right on principle to oppose the Dentists Act, much less to register. Listen, sir. In 1814 the Medical Act came in force, but is there a word in it relative to dentists or dentistry? No! Later on came the Pharmaceutical Act, is there a word in it relative to dentists or dentistry? No! But why not if dentistry is a branch of medicine and pharmacy, as the opposition of medical men and chemists implied? But let us admit that dentistry is a branch of medicine and pharmacy; still how comes it that medical men after the Medical Act of 1814, and chemists after the late Pharmaceutical Act, permitted unqualified men by the hundreds to practise a branch of their several callings, if it be a branch. The truth is, not only were dentists after the passing of the Medical and Pharmaceutical Acts permitted to practise without any diplomas or qualifications whatever; but a Dentists Act was needed, years after the other two named, to legalize dentists themselves with medical men and chemists and to legalize dentistry as a profession. But surely no such Act was needed if dentistry be a branch of medicine and pharmacy. Also medical men and chemists having Acts of their own surely did not need another just to confirm a mere branch. The whole thing is highly absurd on the very face of it and proves incontestibly that dentistry—not the extraction of teeth, which was the actual right of both medical men and chemists—is a special and peculiar calling and has no more to do with medicine and pharmacy, or with with medical men and chemists, than electricity or photography, though the one is somewhat allied to medicine and the other to chemistry. In fact the very passing of the Dentists Act was proof positive that dentistry is not merely the extraction of teeth, but a profession special and distinct, or the Dentists Act never could have become law. It is sheer folly and nonsense to argue otherwise. Now the reason that it passed in the manner it did was owing to the gross incapacity, apathy, supineness and imbecility of dentists themselves in general and the late Dental Reform

Committee in particular. We dentists, sir, ought decidedly to take to Dr. Pangloss's last title, viz., the A.S.S., for we have really earned it. It is also far too late to scold and whine now the die is cast, and we must grin and bear it as best we can. In America there is a matchless dental profession, independent of medical men and chemists; in this United Kingdom it is—well a branch of medicine and pharmacy, a branch of anything in fact. In conclusion, let me humbly advise chemists, that advice is—*Ne sutor ultra crepidam*. Translate it, my brother chemists-dentists, and lay it to heart, for they are words of wisdom. Thus far more in sorrow than in anger that we dentists have so egregiously sold our dear profession and its independence. However, fools must pay for their folly.

185, *Oxford Street, W.* GEORGE WARD, S.D.

Sir,—As one who has lent his aid to the passing of the Dentists Act, I beg to thank you for your timely and temperate article on "Registration under the Dentists Act" in your issue of the 11th.

I believe I know the disposition and intentions of the promoters of this Act, and feel sure that their views are of the most liberal nature regarding the scope of registration privileges, and that nothing but the most urgent sense of duty towards the public—for whose protection the Act was primarily framed—and the dental profession will ever induce them to put the penal clause of the Act in force against anyone.

I feel sure of the support of every promoter of the Dentists Act when I say that I most heartily endorse the concluding sentence of your article, and I assure you, sir, that there is no feeling of animosity existing against "those members of the pharmaceutical body who have been brought into legal confraternity" with us. It is well known to all that many of those gentlemen are much more professional in their views and conduct than many who have come upon the register with the undoubted right to call themselves dentists pure and simple. Moreover, many pharmaceutical chemists and dentists have used their interest and freely given of their means to help the passing of the Dentists Act, and I think that such men, as well as all who can establish their *bona fides*, would have reasonable cause of complaint if the Dentists' Register becomes a refuge for those who cannot find a place on your own special register.

I do not think that a youth who has been engaged in bottle washing and in sweeping a chemist's shop, and who might have learned to do a little dispensing, could be considered eligible for the Pharmaceutical Register even at the most liberal period of its existence, and I may be permitted to doubt how far the Pharmaceutical Society has not had cause to regret past liberality, though it may have been more or less due to a want of power to be more strict.

You say truly that it is quite conceivable that a chemist's assistant or apprentice may have acquired such skill and competence in dentistry as to make him fit to register under the Act, and in such a case you recognize a probability of hardship. I submit that it is hardly possible to frame a law which in the commencement of its operations may not inflict hardship of a limited kind. From the alteration of the rules of an examining body up to an Act of Parliament such always has been and will be the case, and to legislate for what is conceivable is, I think, beyond the most comprehensive law-making intellect. But I would ask how far we are right in admitting this speculative ability of acquiring skill into our calculations. Such exceptional skill must be rare indeed, and the possessor, if his ambition be in that direction, will find little difficulty in attaining the position to which he aspires by means far more satisfactory than by taking advantage of a side door, supposed to have been left open by an Act of Parliament. If such skill be common, then the demands of the Pharmaceutical Society and of the Dentists Act in reference to apprenticeships are excessive, I do not speak now of Preliminary examinations, but if a youth, say a chemist's apprentice, be able to spare so much of his time from the period during which he has to learn the nature of drugs and the business of compounding them, and all the technicalities which belong to the practice of pharmacy, surely both pharmacy and dentistry are much more easily acquired than some authorities would have us believe.

From what I can gather, many chemists and druggists have registered from diverse motives. Some have done so not so much for the sake of practising dentistry as to avoie jury serving and such inconveniences. Others, and thesd are mostly young men, have registered so that they may have dentistry to fall back upon should pharmacy fail them; and others have come upon the register with a view to continue the practice of dentistry to the same limited extent as before the passing of the Act. With regard to this last class, it is a common thing to see announcements in the shop windows of chemists and druggists, to the effect that teeth are scaled or extracted or stopped as need be. Now I am perfectly sure that the framers of the Dentists Act never contemplated interfering in anyway with these most useful men. Hundreds have done so hitherto without calling themselves dentists, and there is not a word in the Dentists Act which seeks to interfere with their doing so still. I know that certain medical journals sent the chemists and druggists in force against the Dentists Bill on that ground. These journals knew how they had been embarrassed in their abortive attempts to prevent counter practice and they hoped to produce a like embarrassment for the promoters of the Dentists Act, but in doing so they were only trying to serve their own end and in no way to benefit the chemists and druggists. I repeat the Dentists Act only interferes with unqualified persons using certain titles; the chemist and druggist may extract or scale or stop teeth as heretofore, but he may not call himself a dentist. With regard to the other two classes named, I think it cruel to encourage young men to think that having the power to assume a title will ever enable them to successfully compete with the educated class of men who will arise along with them, and I can but say, regarding the third variety, that it is not fair to make the Dentists' Register a refuge for those who are unable to place themselves elsewhere.

Referring to the uncertainty of the meaning of the term *bonâ fide*, your correspondent who says it is designed to sweep away all ambiguity certainly gives the view of a very high legal authority. Whether his view be exact or no, is not for me to say. I can only as a layman repeat the opinion as laid down by those who are supposed to understand those matters.

There is yet another point which is worthy of the consideration of those who may have registered on rather slender claims, viz., what is the meaning of the term "in connection with medicine, surgery or pharmacy?" When a man wants to prove himself a doctor or a surgeon, he must appeal to the Medical Register, so I presume the same condition applies to one who wishes to prove himself a pharmacist.

In conclusion, sir, I am sure that the spirit in which the expurgation of the Dental Register will be carried out will be such as to meet with your approval, and that the confidence shown in the Dental Reform Committee by a large number of most excellent men who have practised dentistry in connection with pharmacy will not have been misplaced. I trust to your kindness to give this letter a place in your Journal if you think fit, and apologize for its great length.

A MEMBER OF THE DENTAL REFORM COMMITTEE.

FRIEDRICHSHALL WATER.

Sir,—We are in receipt of a communication from the secretary of the Apollinaris Company, the agents of the Hunyadi Janos Bitter Water, in which he complains that an advertisement of the Bitter Water of Friedrichshall, which appeared in the *Pharmaceutical Journal* of September 27, contains an erroneous translation of a testimonial of Professor Virchow. We herewith send you a copy of the certificate in the German language, with the rendering which should have appeared, and side by side with it, the misleading translation, which was inserted in the advertisement columns of the *Pharmaceutical Journal* through an oversight on our part.

German original.

"Auf ihre gefällige Mittheilung erwidere ich, dass ich das natürliche Friedrichshaller Bitterwasser seit Dezennien kenne und anwende und dass ich die vortrefflichen Eigenschaften desselben nach wie vor schätze. Es ist nicht meine

Absicht gewesen, indem ich mich über ein anderes Bitterwasser günstig aussprach, dadurch das Friedrichshaller herabsetzen zu wollen, und ich bezeuge daher recht gern, dass es mir fern gelegen hat, irgend ein anderes ähnliches Wasser als das unter allen Verhältnissen vorzuziehende und als das absolut beste zu empfehlen.

"*Berlin*, 8 *Juli* 1879." RUD. VIRCHOW.

Correct Translation.

"To your polite communication, I reply that for upwards of twenty years (seit Dezennien) I have known and employed the natural Friedrichshall Bitter Water, and that now, as heretofore, I appreciate its excellent qualities. In giving a favourable opinion of another Bitter Water, I did not intend thereby to depreciate the Friedrichshall Water, and I quite willingly affirm that it was far from me to recommend any other similar Water as that which is to be preferred under all circumstances and as the absolutely best.

"Signed RUD. VIRCHOW

"*Berlin*, 8 *July*, 1879."

Incorrect Translation.

"I have known and used the Friedrichshall Bitter Water for a long time, and experience has proved to me its many excellent properties. Although I do not wish to undervalue the merits of other Bitter Waters, I feel that in justice to the Bitter Water of Friedrichshall, I must record my opinion that it is the best and most useful of the Bitter Waters, and as such I can confidently and gladly recommend it."

We are, sir,
Your obedient servants,
J. AND A. CHURCHILL.

HEALTH OF THE DRUG TRADE.

Sir,—I was very much struck with the correctness of the statements made by "Junius," and consider that we may trace with ease the apparently short life of the chemist to those three causes—confinement, want of recreation, and the vitiated atmosphere in which he lives.

The greatest evil of the three is late closing, and one which is deserving of immediate attention.

Should we not, at a time when examinations are compulsory, endeavour to raise ourselves and the business to which we belong to something better and higher than what it was before such things were thought or heard of?

If chemists as a body would unanimously agree, we might without any difficulty close our respective shops at a reasonable hour, and by so doing I feel certain that it would tend to raise us in the estimation of the public, and be beneficial to the health of both assistant and master.

At a meeting held recently in our largest town, the question was very seriously discussed as to whether they might close at 10 instead of 11 p.m. When we know that such a miserable state of affairs exists, can we reasonably wonder that we are not men of strong constitution and long lives?

Bootle. CAMPHORA.

A SIMPLE STANDARD.

Sir,—It may perhaps be new to the majority of your readers, as it was to myself, when the advantages of this standard were first pointed out to me by a friend, and on this ground I have taken the liberty of troubling you with my few remarks, with the hope that they may prove useful to those, who, like myself, are in the habit of dispensing from solutions of various salts.

There can be no doubt whatever that in such cases where the salt does not undergo any change by being kept in solution, this practice is not only allowable, but preferable to weighing the dry salts, especially in such establishments where much dispensing is done and where time is necessarily valuable.

I have usually made my solutions ʒj ad ℥j, and this strength answered very well in most instances, but for simplicity it is not to be compared with that which I now desire to bring before your notice, viz., 1 in 6, the advantages of which will be quite apparent on a careful examination of the following examples:—

Strength 1 in 6.

No. of grains ordered.		No. of drachms of solution.
1 grain	equals	·1
2 grains	,,	·2
3 ,,	,,	·3
10 ,,	,,	1·0
12 ,,	,,	1·2
15 ,,	,,	1·5
20 ,,	,,	2·0
25 ,,	,,	2·5
40 ,,	,,	4·0
ʒj or 60 ,,	,,	6·0
ʒij ,, 120 ,,	,,	12·0 or ℥iss
ʒiv ,, 240 ,,	,,	24·0 ,, ℥iij
℥j ,, 480 ,,	,,	48·0 ,, ℥vj

On glancing at the above title it will be noticed that the figures in both columns are the same, with the addition of the decimal point (·) in the second column; thus the number of grains, ordered in a prescription, indicates the number of drachms of solution necessary to use, 10 grains requiring 1·0 drachm or ʒj, etc. It may be thought by some, that where an odd number of grains is ordered, the calculation will be difficult, but this need not be so, if the principle of the standard be grasped. ·1 drachm means $\frac{1}{10}$ drachm= ♏vj; ·2 must then = ♏xij; ·5 = ʒss, etc. The placing of the decimal point (·) it should be noticed is fixed by the number of grains ordered, 10 grains requiring 1·0 drachm or ʒj.

In conclusion, I trust that my endeavour to make known a simple remedy for a common want may be a sufficient excuse for me venturing to trespass so much upon your valuable space.

Sunderland. ROBT. H. MUSHENS.

TINCTURE OF YELLOW JASMIN.

Sir,—As the above tincture is frequently prescribed, I would respectfully ask, through the medium of the *Pharmaceutical Journal*, of what strength it ought to be? Every wholesale house has its "Tinct. Gelsem. Sempervirens" (in some instances the word "Special" or the maker's name follows), but the strength is seldom if ever given.

When large doses are prescribed it is absolutely necessary that we should know whether we are on the safe side or not, in dispensing them, as the drug is comparatively little known. I think it would be a good plan if every wholesale house stated the strength of the tincture and the dose, and abolished the favourite terms which follow the name, and which frequently have to be paid extra for.

ABERDAWE.

H. Waistell.—A recipe for stamping ink will be found on p. 80 of the present volume.

G. H. Morgan.—We do not think you should assume that the statement made by your customer is correct, but should communicate with the chemist and druggist in question.

R. Hardy should address his question to the editor of a medical journal.

R. Grant.—For a description of the way in which koumiss is made by the Tartars, see vol. v. of the present series, p. 325.

"*Fraxinus.*"—(1) *Holcus mollis.* (2) *Festuca gigantea.* (3) *Dactylis glomerata.*

F. Gale.—*Artemisia vulgaris.*

J. H.—The arms are the property of the Society as an incorporated body, and cannot be used legally by any individual.

"*Student.*"—(1) The question of the dispensing of "chloric ether" has been fully discussed recently in the "Dispensing Memoranda." See vol. viii., pp. 19, 38 and 67. (2) The swelling of the pills is probably due to the decomposition of the oxide of silver.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Rogers, Wills, Willmott, Deck, J. Squire, Siebold, Wilkinson, Swinn, Sub Umbra Floresco, Jek, Progress is Life, Forceps, Apprentice, T. E., R. H. R.

"THE MONTH."

"Chill October" well deserves its name this year, the cold but delightfully bracing north-east winds having effected a marvellous change in a few days and brought autumn so suddenly upon us that flowers are disappearing from our gardens and hedges all too quickly. At the Kew Gardens several families in the Herbaceous Ground still present a sufficient number of plants in flower to illustrate their characters. Among those which still linger thus are the *Leguminosæ*, *Compositæ*, *Scrophulariaceæ*, *Malvaceæ*, *Polygonaceæ*, *Boraginaceæ*, *Linaceæ*, *Geraniaceæ*, *Onagraceæ* and *Loasaceæ*. Of medicinal plants few remain in blossom. Several varieties of tobacco, the camomile, alkanet, melilot, and most beautiful of all, the colchicum, still remain in blossom. Several species of the last mentioned genus now present quite a bright appearance, while close by the rare British species, *Crocus nudiflorus*, which also flowers without the leaves, is scarcely to be distinguished by external appearance, and it is only when the inside of the flower is examined that the six stamens and the different character of the stigma is perceived. The shining black berries of the belladonna, the bright red ones of the woody nightshade and the prickly fruits of the thornapple, almost alone represent the Solanaceæ, just a few blossoms of *Solanum nigrum*, and some scattered panicles of the graceful *Solanum jasminoides*, being all that are left to represent this family at the present time. A species of *Datura*, to which the name of thornapple in this case is most inappropriate, for the capsule is quite smooth, may now be seen in fruit.

Among a few other Rosaceæ, the *Agrimonia odorata* still remains in blossom. Although by some botanists it is distinguished as a species, there are scarcely sufficient permanent characters by which to separate it specifically from large specimens of *A. Eupatoria*, the distinguishing features being that the stems are 3 or 4 feet high, the furrows on the fruit rudimentary or even quite undistinguishable, and the calyx wider at the mouth than in the other species. *A. Eupatoria* is occasionally used by herbalists in this country in affections of the liver, and in fact, it has had a reputation for complaints of that organ since the time of Dioscorides, who says it is "a remedy for them that have bad livers and for such as are bitten with serpents," and as Gerarde translates it "the leaves being stamped with old swine's grease and applied, closeth vp vlcers that be hardly healed." This reputation may perhaps explain a discovery recently made by Dr. Brinsley Nicholson, who, in a paper in the *Medical Times and Gazette*, speaks very highly of the value in scurvy and tapeworm of a plant called by the Caffres "Uhlinga," a species of *Agrimonia* (*Agrimonia Eupatoria*?), which has succeeded in his hands in the latter complaint even where turpentine failed. In eighty-six cases tried by the author the remedy acted effectually as a tænicide or tænifuge in nearly all.

The violet may almost be called an autumn as well as a spring flower, for almost every year a few blossoms may be found during the autumn where the plant grows freely, especially in sheltered spots in gardens. One of this genus has recently been examined by Dr. J. Konig, who finds as much as 21 per cent. of zinc oxide in the ash of the plant. This plant, which is by many botanists considered to be a variety of *Viola tricolor*, receives its name of *Viola calaminaria*, from the fact that it appears to be restricted to soil containing zinc, and thus serves to indicate the presence of the metal in the soil, where it might not otherwise have been suspected. Sufficient attention has perhaps not been paid to the influence of the chemical constituents of soil in producing variations in plants, nor to the value of such varieties in indicating the nature of the soil. Probably many of our readers have noticed with regard to the common violet, *Viola odorata*, how rare it is to find plants with blue flowers on a limestone soil, the prevailing colour being white. With regard to *Viola tricolor*, of which *Viola calaminaria* is probably a variety, Sowerby's 'Botany' makes the following statement:—"Some years ago a writer in the *Medical Journal* called attention to the heartsease as a valuable remedy for the cutaneous disease called *crusta lactea* in children. For this purpose half a drachm of the leaves or a handful of the fresh herb boiled in milk was to be given every night and morning and poultices made of the leaves, to be applied externally." When distilled with water it gives a volatile oil having an odour something like peach kernels, which may be also observed on chewing a leaf or portion of the stem. The possibility of the relation of this oil to the odour of violets, might be worth investigation.

An account of poisoning by fungi of a boy, three years of age, is given in the *Lancet* for October 11. The child had eaten some small fungi which he had gathered in Hyde Park, specimens of which were shown to the medical man by the child's sister. The child recovered next day. As the symptoms were somewhat peculiar and the name of the fungus or fungi eaten could easily have been ascertained at the Botanical Department of the British Museum, or by application to anyone of our numerous fungologists, it is to be regretted that such an opportunity of adding to our knowledge of the little-known properties of the plants of this interesting class was allowed to pass by. Four other cases of fungus poisoning during the first few days of October were admitted into Middlesex Hospital. In these cases the symptoms were those caused by a strong intoxicant, and in two cases accompanied by violent delirium. They all eventually recovered. In these cases also no mention is made of the species which produced these results.

Fungi probably possess properties as dissimilar in different groups, or even in species of the same genus, as those which are found in different species of aconite among the flowering plants; thus a species of *Amanita*, *A. rubescens*, which differs from the deleterious *A. muscaria* in having a pale drab-coloured cap, and flesh reddening when bruised, is edible. No opportunity of ascertaining the pecularities of poisonous species should, therefore, be neglected.

While speaking of fungi it may be mentioned that Dr. B. Crowther, of Hobart Town, calls attention, in the *Lancet*, to the use of hyposulphite of sodium in zymotic diseases, and states that it is a potent remedy in certain intractable acute and chronic ulcers, whose origin and continuance seem due to some local irritant of a fungoid or bacterioid nature. He further adds, "From the vast number and varied class of diseases over which it exercises a controlling influence, it is destined to hold the first position as a specific in our Pharmacopœia." It may be dded that it possesses the advantage over the bisulphite of having a less disagreeable taste.

A curious illustration of the fact that all knowledge is useful at some time or other has recently occurred in the discovery of diatoms in the gooseberry preserve of commerce. The study of the Diatomaceæ has generally been looked upon as comparatively useless, although the beauty of the forms of these plants renders it a very delightful one. M. Ch. Menier, professor of materia medica at the School of Medicine and Pharmacy at Nantes, in examining a specimen of gooseberry preserve from Paris, recognized that its gelatinous consistence was due to algæ, by finding in it a very beautiful diatom, *Arachnoïdiscus japonicus*, which is known to occur in "Japanese isinglass."* Probably the gelose came from the French colony of Cochin China. The colouring matter was due in part to cochineal, as determined by analysis, and in part to the petals of the Rose Tremière (a dark-flowered variety of *Althæa rosea*), as indicated by the pollen grains characteristic of the Malvaceæ, which in consequence of the union of the petals to the androphore would be almost sure to be present.

At the recent drug sales several packages of calabar beans were offered; these have been rather scarce for some months, and as this is about the time of year when they become ripe, an abundance may soon be expected. Zanzibar aloes, having an opaque appearance like Natal aloes, but as usual packed in monkey skins, was observed. There was also a quantity of fine-looking yellow bark, which would probably pass as Calisaya, but contains generally only traces of cinchonidine and a small percentage of quinine. Rose geranium oil from Algeria, Dalmatian insect powder, Siam benzoin in fine tears, Samovey book isinglass, German camomile flowers (*Matricaria Chamomilla*) and patchouli leaves were among those of less frequent occurrence.

At a sale, in London, during the early part of this month, a number of small gourds of curari were exposed for sale and labelled *aloes*! They were tasted by several people, who fortunately, owing to its bitterness, probably ejected their saliva immediately afterwards, for had the mucous membrane of the mouth been in any case abraded, the consequences must have been disastrous. It was well for the public that the gourds were of so small size, that they would, probably in any case, have been purchased merely as curiosities. As soon as the true nature of the drug was known it was immediately withdrawn.

According to Gehe's report curari is already going out of favour owing to its want of uniformity. Some time since, M. Preyer in the endeavour to obtain an active principle of definite strength from curari, prepared a crystallized sulphate of curarin; this substance, which was stated by the discoverer to be twenty times stronger than curari, was afterwards found by Theodor Sachs† to be composed of phosphate and carbonate of lime with a little adherent curari, sufficient only to produce a weak physiological action.

There now appears a possibility of a definite principle having the properties of curari being procurable at no distant date. An important discovery has recently been made by M. Jobert, whose investigation of the source of curari was noticed in this Journal on a former occasion,‡ and will probably call renewed attention to the drug. He has found that *Strychnos castelnæ* and *Strychnos toxifera* are by no means the only species which yield a poison similar to curari; but that so far as experiments have gone, the South American species are distinguished from the Asiatic by possessing properties resembling those of curari rather than strychnia. He considers that the most active of what may be called the curari-yielding species of strychnos is *S. rubiginosa*, Piauhy, and the least toxic, *S. triplinervia*, Gaertn; indeed in so slight a degree does the latter possess toxic properties that it is employed for fevers by the natives. In another number of the same journal, MM. Couty and De Lacerda give an account of the extraction of the active constituents of the latter plant and the physiological action of the extract. They found that the extract made from the bark of stems of moderate size was more active than that of the root, and although much less powerful than curari. M. Jobert states that the Peruvian Indians mix the juice of a menispermaceous plant which has a poisonous action on the heart with the curari, and that only the pure extract of the strychnos should therefore be used in order to obtain definite physiological results. In *Strychnos triplinervia*, we have, according to MM. Couty and De Lacerda, an agent which can easily be obtained of a definite strength and offers the advantages that the valuable physiological effects of curari can be obtained in a few moments and that the symptoms can be arrested at different periods as may be required.

Dr. W. Murrell, in an article in the *Practitioner* this month, states that he has found picrotoxin afford great relief in the night-sweating of phthisis, having had only one case of failure out of twenty, and even then the remedy did some good at first. The strength of the solution used in his experiments was at first 1 part in 180, but as some of the picrotoxin crystallized out a solution of 1 part in 240 of water was afterwards adopted. Of the former solution, 1 drachm in an eight-ounce bottle of water was prescribed, the dose ordered being in most cases a teaspoonful, or in other words, about one ninety-sixth of a grain.

In the severe diarrhœa which often occurs in the course of the same disease, Dr. J. B. Yeo has found that the fluid extract of coto bark in doses of 5 to 8 minims, arrests or checks it even in its severest forms, and he remarks that he is quite sure that coto bark is a valuable remedy which ought rapidly to come into general use. Dr. Yeo also calls attention to the very important fact that when administered in the form of pills or with the mistura cretæ, B.P., it appeared inert, and that he found a resinous element was precipitated in tough masses when the fluid extract was carelessly mixed with water, but that when given in combination with tincture of cardamoms and mucilage it was very effectual. He also makes the very pertinent observation that "this is probably the fate of many valuable medicines which appear to fail, not from want of virtue in themselves, but from want of patience and attention in their mode of administration."

In the *Indian Medical Gazette*, Mr. A. L. Deb recommends the root of *Hedysarum gangeticum* in dysentery. The fresh root is given three or four times a day in the form of pulp, ground down and mixed with water, to the extent of thirty or forty grains each time for adults. He considers it to stand next in value to *Ixora coccinea* and to be especially adapted for acute dysentery of moderate severity.

* Ser. [3], vol. ix., p. 1056.
† *Liebig's Annalen der Chemie*, 191, p. 255.
‡ Ser. [3], vol. viii., p. 581.

In the United States the bark of *Piscidia erythrina*, or Jamaica Dogwood, is being tried as an anodyne and soporific. Some years ago Dr. W. Hamilton, of Plymouth, called attention in the *Pharmaceutical Journal* to this drug. The strength used is 4 oz. of the bark to 16 oz. of rectified spirit, and the dose taken to ease pain and procure sleep is 1 drachm for adults.

Dr. L. Mann, of California, has recently been experimenting upon the Californian laurel (*Oreodaphne Californica*?) and finds that the odour of the leaves causes in some persons a severe frontal headache when they stand under a tree. Apparently this suggested a use of the remedy in nervous headache, in the treatment of which he has found the bruised leaves, used as an inhalation, very successful. The taste of the leaves is exceedingly pungent and to some persons disagreeable, and the plant seems to be one likely to possess some useful properties. The odour is said to be disliked by mosquitos and other insects.

During the last few weeks *Hamamelis virginica*, which is well known as the chief ingredient in Pond's Extract, has attracted some attention in the correspondence columns of the *Lancet*. The writers appear to be unaware that a formula for the tincture has already been published, and as uniformity in unofficial preparations is very desirable it may be useful to some of our readers to know that a formula may be found in the last edition of Squire's 'Companion to the Pharmacopœia.' Medical practitioners would obtain much more satisfactory and uniform results from the use of unofficial preparations than is sometimes the case if they would indicate in their prescriptions the strength of tincture intended to be used.

Dr. E. Schrader, in the *Chemiker Zeitung*, describes a new method of making varnish, which consists in causing ozone to act on linseed oil, by which it is bleached and brought to the proper consistence, without the aid of fire.

In the same journal, M. A. Tschirch calls attention to the fact that in almost all the bottles of magnesium sulphate and in some of calcium sulphate solutions in the laboratory of Berlin University, algæ belonging to the *Palmellaceæ* and developing chlorophyll have made their appearance.

Recently there was noticed in these columns an interesting announcement that Herr Ladenberg had succeeded in recombining tropic acid and tropin to form the alkaloid atropine of which they were the products of decomposition. It is now announced that a similar feat has been performed with respect to milk sugar by M. E. Demole (*Comptes Rend.*, lxxix., 481). Upon treating with boiling anhydrous acetic acid the mixture of galactose and lactoglucose into which milk sugar is converted in contact with dilute acids, an octacetyle ether is formed resembling that obtained by Schutzenberger with dextroglucose. An alcoholic solution of this ether poured into baryta solution and kept for a few minutes at a temperature of 90° gives off acetic ether, and after exact neutralization with sulphuric acid, evaporation to dryness, and re-dissolving in water, is by several recrystallizations aided by alcohol obtained as a crystalline body having all the properties of sugar of milk. "Octacetic saccharose" similarly treated with alkalies is said to have yielded cane sugar, but the crystallization was not successful.

Another investigator in this direction, M. A. Michael, has effected even more interesting results in the synthesis of two glucosides and has indicated a probable method by which a large numbers of others may be produced and investigated. Of M. Michael's two products the more interesting at present to pharmacists is undoubtedly "helicin," a glucoside described by Piria and produced by the action of dilute nitric acid upon salicin and reconvertible into salicin by the action of nascent hydrogen. The relation between these two glucosides is shown by the following equation:—

$$\underset{\text{Salicin.}}{C_{13}H_{18}O_7} + O = \underset{\text{Helicin.}}{C_{13}H_{16}O_7} + H_2O$$

The medium used by M. Michael for the introduction of the molecule of glucose is a compound called acetochlorhydrose obtained by the reaction of chloride of acetyle upon glucose. Equivalent quantities of acetochlorhydrose and salicylite of potassium were dissolved in absolute alcohol, mixed in the cold and left to stand; there was evolution of acetic ether and formation of a precipitate of chloride of potassium, the reaction being completed in about three days. After filtration the alcohol was allowed to evaporate spontaneously, when there was left an oily substance that solidified after ten days, and which when purified gave upon analysis the composition of helicin and was also identical in its other properties. Helicin so produced is slightly soluble in cold water, and very soluble in hot water, from which it is deposited on cooling in white arborescent crystals. Boiled with dilute sulphuric or hydrochloric acid it splits up into salicylic aldehyde and glucose, and the same decomposition is induced by the action of emulsin. The other glucoside was obtained by the reaction between acetochlorhydrose and phenate of potassium; it does not correspond with any known natural substance, and has been named phenol glucoside. Acetochlorhydrose appears to be endowed with considerable powers of substitution. It acts upon levulose with the evolution of gaseous hydrochloric acid and acetic acid and the formation of a small quantity of crystalline matter which may prove to be dextrolevulose (cane sugar). Other compounds have also been obtained by its use that have yet to be examined and described.

After a considerable amount of writing suggestive of the mythical there appears to be at last some prospect of the properties long attributed to the papaw tree undergoing scientific investigation. In the paper published in the Journal for the 11th inst. (p. 283), Messrs. Wurtz and Bouchut describe a substance having the properties of an energetic digestive ferment which they have separated by precipitating with alcohol an aqueous solution of juice from the stem of the papaw, and named "papaïne." Curiously enough almost simultaneously Dr. Peckholt, of Cantagallo, Brazil, has published in the *Zeitschrift* of the Austrian Apotheker-Verein a long and interesting account of the *Carica Papaya*, in which he describes under the name of "papayotin" a substance apparently identical with "papaïne." Dr. Peckholt's researches appear to have been carried out some ten years since, and only to have been published now because of the revived interest in the subject. Notwithstanding Dr. Peckholt's long delay in publishing, due probably to his residence in Brazil, and the fact that he disclaims any intention to claim priority, it would appear that he really is entitled to do so, since his paper appeared in the Austrian journal for the 20th of August, whilst M. Dumas' communication was not read in the Academy of Sciences until five days afterwards.

Last month there appeared in this Journal a letter from Messrs. Baildon and Son, stating that after following out Mr. Thresh's formula for making soluble essence of ginger (before, p. 193) they had failed to obtain a clear preparation. Mr. Thresh replied recommending a reagitation with silica and filtration. It may be useful to mention that a second letter has been received from Messrs. Baildon stating that upon carrying out the suggestion a bright preparation was the result. The wide-spread interest in this subject is illustrated by the fact that a few days since a letter was received from Jacksonville, Florida, U.S., attesting the practicability of Mr. Thresh's process.

It is now officially announced that the day on which this Journal is published is to be the day upon which the India Museum will be finally closed. Whatever may have been the circumstances which have induced the authorities to take this step—whether simply in consequence of the expense, or that in addition to other causes—only regret can be expressed at such a necessity having arisen. In distributing this fine collection among other institutions no doubt care will be taken to select the most fitting recipients, and it may be hoped that a large portion of the materia medica, including the essential oils, will find its most suitable resting place in the museum of the Pharmaceutical Society.

The annual report of the Director of Kew Gardens, which has just appeared, contains an unusually large amount of matter interesting from a pharmaceutical point of view. This includes information concerning the introduction of Columbian barks into India, the success of cinchona cultivation in Jamaica, African dragon's blood, lignaloes, or eagle wood, olibanum and myrrh. Extracts from this report will probably appear in future numbers of this Journal.

The Dentists' Register, which has appeared during the past month, has no doubt, ere this, been scanned through spectacles variously tinged according to the wearers' views of what such a Register ought to contain. It appears to be carefully compiled, and is prefaced by a "table showing the number and qualifications, with percentage of the total of persons registered." From this it appears that the total number of names on the Dentists' Register on the 1st of August was 5289. The Licentiates in Dental Surgery of different medical bodies who have been registered number 483. Of persons registered on their own declaration as having been in *bonâ fide* practice before the passing of the Act, 2707 have claimed to have carried on dentistry separately, 2049 in conjunction with pharmacy, 17 in conjunction with medicine, 11 with surgery, 20 with medicine and surgery, and two with surgery and pharmacy. There have also been two persons registered as doctors of dental medicine of the University of Harvard.

The third part of Dr. Dodel-Port's valuable 'Atlas der Botanik' will be published in a few days. It will contain figures of *Spirochæte Obermeieri*, the contagium of a certain typhoid disease; also the whole development of the carbuncle fungus, *Bacterium anthracis*, as investigated by Professor Nägeli and the author of the atlas; the development of the prothallium of the fern genus *Aspidium* from the spore to the formation of the embryo; the fertilization of *Polysiphonia subulata* by the aid of animalculæ, and other recent observations of great value.

Pharmacists will be glad to learn that a new and thoroughly revised edition of 'Pharmacographia' will be published during the coming season by Messrs. Macmillan. The first edition has been out of print for some time, and much additional matter has appeared since the date of its publication which will doubtless be represented in the clear and condensed manner for which the work is so remarkable.

"A little knowledge is a dangerous thing." The *British Medical Journal* of the 18th, in an editorial paragraph, refers to the paper of Mr. Fahnestock, on "The Valuation of Blistering Beetles," which was recently (vol. ix., p. 1038) reproduced in this Journal from the *American Journal of Pharmacy*. In doing so it credits the author of that paper with saying that the fresh powder of the "potato beetle" yields about $1\frac{1}{3}$ per cent. of pure cantharidin, and remarks that this is a large product, and that "no doubt these pests will be increasingly used as a source of this drug." But it further ventures to prophesy that mankind will hardly be prevailed upon to desist from vigorous efforts to exterminate the insect because it is now shown to be capable of acting effectually as a physical as well as a moral blister. Perhaps a taste of this insect's power in the moral blister direction will be realized by the writer if he turns to the original paper, where he will find that the author does not speak of the Colorado "potato beetle" (*Doryphora decemlineata*), but of the potato bug (*Cantharis vittata*).

The power of ridicule is acknowledged, and there is no doubt it may be utilized in making impressions upon the memory. In connection with the New York College of Pharmacy there is a conversational class, in which the office of "quiz" is a recognized institution. Banter appears, in fact, to have been so useful in correcting errors in past sessions that the Board of Trustees have at the commencement of the present one formally appointed two gentlemen to the office of "quiz masters."

The meeting of the American Pharmaceutical Association at Indianapolis, a report of which has appeared during the past month, seems to have been a success in point of attendance, but showed a marked falling off in the number of papers read. A large amount of time was taken up in considering the rules of the Association, whilst some reports in respect to the next edition of the United States Pharmacopœia naturally absorbed much of the attention of the men by whom that book will have to be used when it appears. One alteration in the rules, in which the word America is substituted for United States, throws open the eligibility for membership to Canadians, Mexicans, Chilians and citizens of other South American States. One little *contretemps*, whilst amusing, shows how easily the "best laid plans" may "gang oft agee" on such occasions. It appears that when assembling for the "banquet," the Secretary, Professor Maisch, four past Presidents of the Association, and about a score of old members stood on one side to give precedence to their juniors. These flocked in in such numbers, however, that the room was filled and the doors were closed, leaving still outside the seniors, who were fain to comfort themselves at a neighbouring restaurant.

As usual with the American Pharmaceutical Association, the reports were a good feature. In one of them Mr. H. S. Wellcome stated that he had not been able to find "any drugs now cultivated here which were formerly obtained from foreign countries," with perhaps the exception of valerian, now cultivated in Vermont. In another report upon the market of San Francisco, Mr. Steele gave an account of the manufactures of his section, one of the most remarkable among which was that of 25,000 gallons of castor oil per annum. A specimen of a new salt, salicylate of cinchonidia was exhibited by the secretary. It crystallizes in well defined prisms, is sparingly soluble in water, and dissolves freely in weak and in strong alcohol.

The extent to which colour blindness is prevalent amongst railway servants has been the subject of an official inquiry in Germany. It is reported that on the State lines 1 *employé* in 125 is colour blind, whilst on the companies' lines only 1 in 250 is so affected. Probably this difference in the figures is due to a difference in the standard adopted, and it is noteworthy that they approach closely to the numbers recently published by the English Board of Trade, of 1 in 230 partially affected and sent back for further trial and 1 in 150 finally rejected.

According to the *Pharmaceutische Zeitung für Russland* the Russian armies were well supplied with all manner of drugs during the recent war, as much as eighty waggonfuls of unused drugs having been brought back with the army from Bulgaria. Some of the quantities used by the armies on active service are given as follows:—cinchona bark, 1083 lbs.; quinine hydrochlorate, 2358 lbs.; quinine sulphate, 5083 lbs.; chloroform, 3088 lbs.; opium, 1546 lbs.; morphia, 52 lbs.; castor oil, 25,953 lbs.; rhubarb, 1138 lbs.; ipecacuanha, 1820 lbs.; carbolic acid, 5597 lbs.; camphor, 6771 lbs. It is further stated that in the years 1877 and 1878 the medical department of the Russian war office purchased altogether 260,350 ounces of quinine sulphate and 194,700 ounces of quinine hydrochlorate at an expenditure of two and a half millions of roubles.

"Physicians' prescriptions accurately prepared" is the dispenser's motto, but to accomplish this with neatness and facility certain requirements are almost essential in a pharmacy. The letter of Mr. Mushens in last week's Journal, page 320, on a simple standard for solutions of salts daily and hourly required in dispensing, directs attention to one series; others will in due course be referred to. Opinions may differ as to the relative proportions of the salt in solution, but there can be but one opinion as regards the value of the principle, and its application may be left to the judgment of each dispenser. An "endeavour to make known a simple remedy for a common want" needs no apology, and the readers of this Journal will be indebted to those whose efforts are successful.

The first prescription requiring notice is that of No. 343, where sp. chlorof., without any quantity being given, forms part of the prescription. Judging from the size of the mixture and from its dose, that it was for a child, ʒss. sp. chlorof. would be a fair quantity. The next article sacc. ust. is only a colouring matter and must be left to the dispenser's discretion.

No. 344 contains a solution of Cheltenham salts. The writer of a prescription sometimes severely tries a dispenser's resources. To confine a prescriber to the Pharmacopœia would tend to check therapeutic progress, but there should be some limit to erratic prescribing. A teaspoonful or a quarter of an ounce of Cheltenham salts is the dose recommended for occasional use; one ounce and a half, therefore, in the twelve ounce mixture would give that proportion to each dose. A dispenser is required to keep the preparations of the B.P. ready for use in his pharmacy, but the Cheltenham salts have not yet occupied that position. It may assist "Dispenser" to give him Beasley's formula for artificial Cheltenham salts, which would be supposed to represent the saline and tonic characters of the Cheltenham waters:—Sulphate of soda 16 oz., sulphate of magnesia 8 oz., muriate of soda 1 oz., sulphate of iron 8 grs. Dissolve in the smallest quantity of hot water, strain and evaporate to dryness.

It is not usual to filter an injection such as No. 345, neither should a "shake the bottle" label be put on. A decomposition takes place, acetate of zinc is formed and remains dissolved, whilst sulphate of lead is precipitated. The writer may wish the deposit to remain at the bottom of the bottle, as he does not direct it to be filtered, or he may not desire it to be used with the fluid, as would be indicated by a "shake the bottle" label. The deposit is not considered an essential part of the remedy or one that possesses any value; the dispenser therefore has nothing to justify him in ordering the bottle to be shaken.

Pigment. iodi is prescribed in No. 346, and "Juvenis" wishes to know whether tinct. or linim. iodi should be dispensed. There is no formula for a preparation of iodine with the name pigment. iodi in the B.P., but on reference to the formula of the Throat Hospital, for pigment. iodi, the linim. iodi is directed to be used. This circumstance will be a guide to the dispenser, and a sufficient justification for the use of linim. iodi when pigment. iodi is ordered.

The question No. 347 refers to the varying appearance of different samples of enonymin. For several of these remedial agents from the United States, and recently introduced into this country, there is no published form, and there being more than one maker, it is but reasonable to conclude that each has his own particular method of manufacture. On reference to some papers which have at different times appeared in this Journal on the preparation of podophyllin, it will be observed how the appearance of the product is affected by very slight differences in the process of deposition from its solution. From what has been stated the difficulty or rather impossibility of furnishing a safe test of quality, or a test by which one of these vegetable products, probably of a resinoid character, may be recognized must be apparent.

It is difficult to say what the writer of No. 348 meant when he wrote ferri ammoniæ sulph. If he cannot be referred to, the dispenser will be quite safe in using ferri ammoniæ sulph., a salt formerly much used in photography, but little known in medicine. The remarks of St. Rule, p. 316, are very much to the point, but he would have made them more valuable if the source of the information that ferri ammoniæ sulph. acts as a "powerful astringent in uterine cases" had been appended. It will be observed that many correspondents assume ferri ammoniæ cit. to have been intended by the writer, but this is by no means certain. "J. C." states that ferri ammon. sulph. is iron alum; this is an error, iron alum is a *ferric* sulphate with sulphate of ammonia or potash; ferri ammon. sulph. is a *ferrous* sulphate with sulphate of ammonia.

The pills in prescription No. 349, may be made by the addition of a very small quantity of soap to the ingredients ordered; with the assistance of the soap a satisfactory mass may be obtained, firm, and capable of being rolled into pills. "Junior" is referred to remarks on the combination of similar ingredients in some of the preceding "Months."

The chloral hydrate and camphor in No. 350 may be so combined as to form a milky emulsion by following the directions of Mr. Wilkinson, p. 316, on this prescription. Care should be taken to rub the chloral hydrate and camphor till they become semi-fluid, before the addition of the mucilage, or the emulsion may be imperfect and gritty from the presence of free camphor.

There will necessarily result, from the mixture of bromide of potassium and tartaric acid, ordered in No. 351, a deposit of acid tartrate of potash with a supernatant clear solution of hydrobromic acid. Of this decomposition the prescriber may not have been aware, or he may have been aware of the decomposition, but considered that on the addition of the deposited acid tartrate of potash to each dose of the sodæ bicarb. in the powder, a potassic tartrate of soda would be formed; the dispenser should therefore direct the mixture to be shaken so that each dose of it may contain a definite relative quantity of the sediment. The dispenser would do well, however, to suggest to the prescriber that a more elegant combination would result by combining the sodæ bicarb. with the potass. bromid., and then putting the acid. tart. into the powder. Effervescence would equally take place and there would be little, if any, formation of acid tartrate of potash; the result would be more elegant, and probably just that which was intended. Of course this would depend upon whether the prescriber intended to give his patient bromide of potassium or hydrobromic acid.

The turbidity resulting from the mixture, No. 352, is due to the presence of the magnesiæ sulph. On that salt being added there is a separation of brown, flocculent matter; without it, the other ingredients may be combined so as to form a mixture free from deposit, and tolerably bright. The alkalinity or otherwise of different samples of ferri et ammoniæ cit. may have a bearing on the change which with some samples certainly takes place. It is, of course, impossible to say how the mixture may have been prepared to show such different results.

The prescription, No. 353, contains pulv. phosphori, and from the dose being the same as that of the strych. sulph., it may be presumed that the amorphous variety was not intended. The combination is not suitable for retaining phosphorus in an unoxidized condition; however, it should be dissolved in a little bisulphide of carbon before being mixed with the other ingredients. and then probably the best excipient will be the glycerine of tragacanth. With regard to the price, that must be left to individual judgment, its discussion is not suited for these columns. A paper on the subject of prices charged for dispensed medicines, by the late Daniel Hanbury, will be found among 'Science Papers' (p. 453), and may be read with advantage.

The mixture, No. 354, will become turbid soon after being mixed, and there will be a considerable amount of deposit on standing.

The powder, No. 355, becomes moist, due to the water of crystallization of the sodæ phosphas. A better result would ensue if the phosphate of soda be deprived of a part of the water before being mixed with the potass. citrat.; but as written it will not retain its condition as a powder, and is not an elegant combination.

The ingredients of recipe No. 356, with the exception of the oil of aniseed, can be very well combined as a powder if each be in a dry condition, but the addition of the oil of aniseed makes the mass too soft. It is a piece of veterinary practice, and probably oil of aniseed quan. suff. would be more suitable to form the other ingredients into a manageable mass.

The prescription, No. 357, becomes difficult from the remark of the writer "when the mixture has become quite clear." The digestion of the ingredients at the temperature indicated will result in a curdling of the milk, and subsequent deposit of the clot, but the supernatant liquid will not be clear except in comparison with the milk. It is probable that this is the condition it is intended the mixture should be in when adapted for neutralization by bicarbonate of soda.

The quinine mixture with ammonia, No. 358, is in principle similar to others which have been previously commented on, so that "Quiniæ Sulph." must be referred to those. Mucilage should be used as there indicated, to retain the quinine in suspension.

The mixture of ol. olivæ with ext. of belladonna, as in No. 359, may be satisfactorily made by rubbing the ext. bellad. with a little water, on a warm slab, to a smooth paste, gradually adding the oil. If care be taken to reduce the extract with a suitable quantity of water, an elegant ointment may be made from this prescription, but lin. bellad. should not have been used.

The carbolic acid, No. 360, should be used in a crystalline state, and then there will be little or no difficulty experienced in making the pills. Reference may be made to carbolic acid in pills commented on quite recently.

In the lotion, No. 361, aq. calc. and ol. olivæ in equal proportions emulsify very satisfactorily, but if other water, or even more liquor calcis be added, there is a separation of some of the partially saponified oil, though on standing this is absorbed. Mr. Cairnie's process, in this week's Journal, is probably the best that can be adopted.

The prescription, No. 362, it is presumed, was intended to be dispensed just as written:—2 parts by weight, acid. muriatic conc. with 18 parts tr. aurantii, 10–15 minims for a dose; the subsequent figures most probably bear reference to the date of the prescription.

It is difficult to account for a change of colour in the mixture, No. 363; there is no reason why there should be one. Such a mixture may be dispensed with great uniformity of result. The decomposition alluded to can only be referred to impure iodide of potassium or careless dispensing.

The second ingredient in No. 364 is evidently intended for glycerine; but there would seem to have been some little confusion in the mind of the writer between the Latin of glycerine and that of liquorice.

In reviewing the prescriptions referred to in this "Month," it can scarcely be said that the inquiries are not fair and reasonable, and it will be observed that most of them owe their origin to errors or incompatibles on the part of the writers of the several prescriptions.

THE GLUCOSIDE OF LIQUORICE.*

BY F. SESTINI.

An aqueous extract of the root, on being evaporated to dryness after treatment with animal charcoal, yields a product from which absolute alcohol extracts asparagine. The residue dissolves in dilute spirit, and when burnt leaves an ash containing lime, alkalies, and a trace of sulphuric acid. From these results, it is evident that glycyrrhizin does not exist in the root in the free state, but in combination with bases, chiefly lime. An examination of the commercial extract, or "liquorice," shows that it contains free glycyrrhizin in small quantity, liberated, apparently, from its combination by the acids formed during the evaporation of the juice. Roussin (*Jour. Pharm.*, 1875) imagined that the glycyrrhizin existed in the root as an ammonium compound containing 0·14 per cent. nitrogen; but, as the author points out, the method by which he obtained this compound (precipitating the glucoside with sulphuric acid, and treating it first with alcohol and ether, and then with an alcoholic solution of ammonia), affords no evidence that it existed in the root as such, and moreover it is not very probable that the substance obtained by Roussin is a definite compound, as it would contain 26 or 27 molecules of glycyrrhizin to one of ammonia.

The glucoside dissolves in dilute potash solution, and is precipitated again unaltered by acids, but the potassium compound formed could not be isolated. Better success attended the attempts to prepare the calcium and barium compounds. *Calcium glycyrrhizate*, prepared by adding calcium chloride to a solution of the glucoside in the smallest excess of potash, washing the precipitate with water, and drying at 100°, forms a brown shining mass. By dissolving glycyrrhizin in milk of lime, filtering, separating the excess of lime by carbonic acid, and evaporating, a residue is obtained, which when treated with alcohol of 50 per cent. and evaporated, yields the glycyrrhizate in amorphous yellowish scales. This glycyrrhizate is hygroscopic, and has a sweet taste: it is almost insoluble in dry alcohol, but dissolves tolerably well in dilute alcohol.

It is only sparingly soluble in water, but more readily in presence of calcium hydrate, which points to the existence of a basic compound.

Dried at 110° and analysed, it gave numbers corresponding with the formula $3CaO + 5C_{24}H_{36}O_9$, adopting Gorup-Besanez' formula, $C_{25}H_{36}O_9$, for glycyrrhizin.

Barium glycyrrhizate, $3BaO + 5C_{24}H_{36}O_9$, obtained in a manner similar to the calcium compound by dissolving glycyrrhizin in baryta water, passing carbonic anhydride, and evaporating, forms yellowish scales. All the compounds of glycyrrhizin with bases have a sweet taste; glycyrrhizin itself when first placed on the tongue is insipid, but as it dissolves in the alkaline saliva, it acquires a sweet taste.

The ordinary method of preparing glycyrrhizin by exhausting the root with water and precipitating with sulphuric acid, gives very unsatisfactory results, as the product is small and highly coloured, and there is great difficulty in separating the adherent sulphuric acid. The author prefers to exhaust the root four or five times successively with boiling water and a little milk of lime, and to precipitate the concentrated extract with acetic acid. The brownish gelatinous precipitate, after being washed with water is dissolved in spirit of 50 per cent., decolorized by animal charcoal, and evaporated on the water-bath until the alcohol is expelled. On cooling, it solidifies to a gelatinous mass, which is dissolved in alcohol, mixed with twice its volume of ether, filtered and evaporated. The gelatinous glycyrrhizin is then pressed and dried over sulphuric acid. The author regards the crystalline substance obtained by Habermann (*Pharm. Journ.*, before, p. 46) as an alteration product.

In order to determine the amount of glycyrrhizin in the root, it is extracted eight times successively with boiling water rendered alkaline by calcium hydrate, and the solution concentrated to a syrup is precipitated with 10 per cent. acetic acid, which has been previously saturated with glycyrrhizin, as is also the dilute acid (2 per cent.), and water used for washing. The precipitated glycyrrhizin is then dissolved in alcohol, and the solution evaporated after treatment with animal charcoal. In this way the fresh root containing 48 per cent. water yields 3·271 per cent. glycyrrhizin, or 6·318 on the dry root.

* From the *Gazzetta chimica italiana*, 8, 454—462. Reprinted from the *Journal of the Chemical Society*, September, 1879.

ESSENCE OF ROSEMARY.*

BY M. BRUYLANTS.

The quantity of the essential oil yielded by the plant *Rosmarinus officinalis* depends on the latitude in which it is grown; that from the neighbourhood of Paris yielding only 1·4 to 1·6 grams per kilo., whilst that grown in the south of France yields 3 grams per kilo. When freshly prepared, it is a colourless liquid, but on keeping it darkens in colour and becomes thick; it is miscible in all proportions with alcohol of 85 per cent. It smells strongly of rosemary, its taste is hot and camphorous; sp. gr. at 12° is 0·885; it turns the plane of polarization to the left. It begins to boil at 150°, and the temperature gradually rises to 200°, where it remains stationary a short time, and finally rises to 260°. By fractional distillation, it may be separated into three portions, boiling from 150° to 180°, from 180° to 210°, and from 210° to 260°.

Fraction boiling between 150° *and* 180°.—By repeated distillation and rectification over sodium, a liquid is obtained boiling at 157—160°, which is lævogyrate. Its vapour-density corresponds with the formula for terpene, $C_{10}H_{16}$. This terpene combines with iodine, and on distilling the product, it decomposes into hydriodic acid and cymene, $C_{10}H_{14}$; by the action of nitric acid, it yields γ-toluic acid.

Fraction boiling between 180° *and* 210°.—By careful distillation, a liquid boiling at 200—205° is obtained, which on cooling deposits crystals melting at 176°, and boiling at 204°. They possess all the properties of laurel camphor. The mother liquor boils at a lower temperature, and on distillation yields a second crop of crystals and some terebene. Repeated distillation results in the complete separation of these two bodies.

Fraction boiling between 210° *and* 260°.—By cooling this fraction in a freezing mixture, a large quantity of borneol is separated, which when treated with phosphoric anhydride, yields a hydrocarbon of boiling point 160°, and having the vapour density 5·23 (Air = 1). This when treated with iodine, yields cymene and hydriodic acid. Amongst the products of the action of nitric acid are borneol, and a crystalline body which melts at the same temperature as camphor.

When distilled with acetic anhydride, the borneol yields a product boiling at 230°, which is decomposed by potash, with formation of a hydrocarbon, $C_{10}H_{16}$, and potassium acetate.

Essence of rosemary therefore contains—

A hydrocarbon (lævogyrate), $C_{10}H_{16}$	80 per cent.
A borneol camphor, $C_{10}H_{18}O$	4 to 5 „
A camphor, $C_{10}H_{16}O$	6 to 8 „

When acted on by concentrated sulphuric acid, essence of rosemary yields a mixture of cymene (b. p. 175°), and terpene (b. p. 16°), and on oxidation with chromic mixture, it yields a small quantity of camphor, some formic and acetic acids, and terephthalic acid.

The author gives no analysis.

* From the *J. Pharm.* [4], 29, 508—511. Reprinted from the *Journal of the Chemical Society*, September, 1879.

RADIANT MATTER.*

BY WILLIAM CROOKES, F.R.S.

(*Continued from page* 290.)

Radiant Matter proceeds in Straight Lines.

The Radiant Matter whose impact on the glass causes an evolution of light, absolutely refuses to turn a corner. Here is a V-shaped tube (Fig. 6), a pole being at each

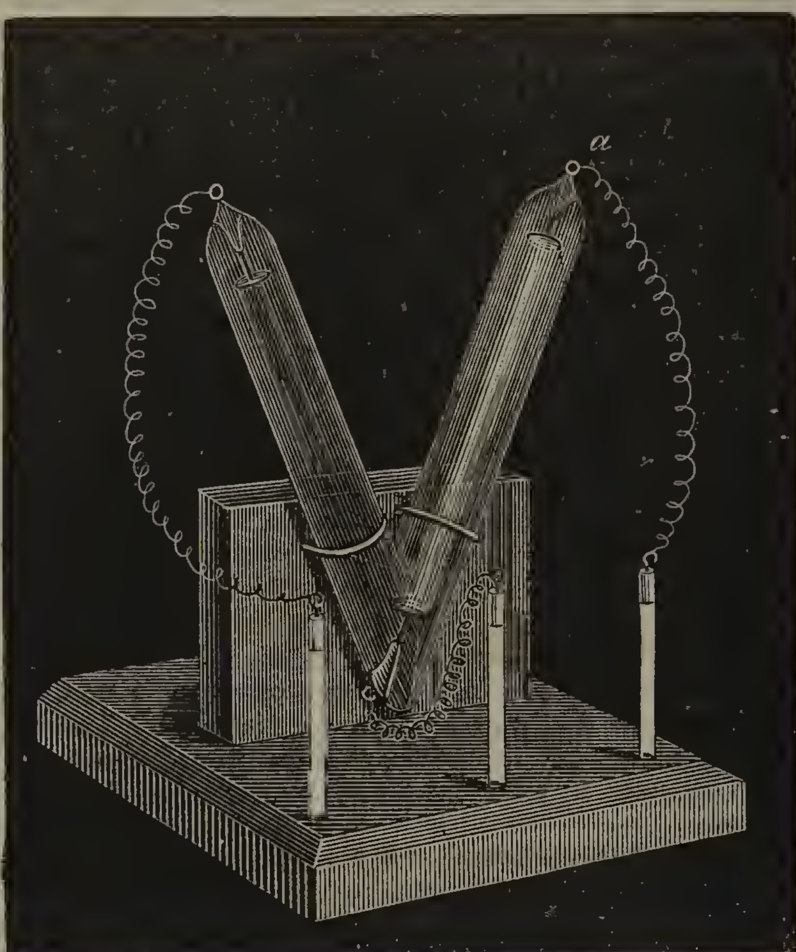


Fig. 6.

extremity. The pole at the right side (a) being negative, you see that the whole of the right arm is flooded with green light, but at the bottom it stops sharply and will not turn the corner to get into the left side. When I reverse the current and make the left pole negative, the green changes to the left side, always following the negative pole and leaving the positive side with scarcely any luminosity.

In the ordinary phenomena exhibited by vacuum tubes—phenomena with which we are all familiar—it is customary, in order to bring out the striking contrasts of colour, to bend the tubes into very elaborate designs. The luminosity caused by the phosphorescence of the residual gas follows all the convolutions into which skilful glassblowers can manage to twist the glass. The negative pole being at one end and the positive pole at the other, the luminous phenomena seem to depend more on the positive than on the negative at the ordinary exhaustion hitherto used to get the best phenomena of vacuum tubes. But at a very high exhaustion the phenomena noticed in ordinary vacuum tubes when the induction spark passes through them—an appearance of cloudy luminosity and of stratifications—disappear entirely. No cloud or fog whatever is seen in the body of the tube, and with such a vacuum as I am working with in these experiments, the only light observed is that from the phosphorescent surface of the glass. I have here two bulbs (Fig. 7), alike in shape and position of poles, the only difference being that one is at an exhaustion equal to a few millimetres of mercury—such a moderate exhaustion as will give the ordinary luminous phenomena—whilst the other is exhausted to about the millionth of an atmosphere. I will first connect the moderately exhausted bulb (A) with the induction-coil, and retaining the pole at one side (a) always negative, I will put the positive wire successively to the other poles with which the bulb is furnished. You see that as I change the position of the positive pole, the line of violet light joining the two poles changes, the electric current always choosing the shortest path between the two poles, and moving about the bulb as I alter the position of the wires.

This, then, is the kind of phenomenon we get in ordinary exhaustions. I will now try the same experiment with a bulb (B) that is very highly exhausted, and as before, will make the side pole (a') the negative, the top pole (b) being positive. Notice how widely different is the appearance from that shown by the last bulb. The negative pole is in the form of a shallow cup. The molecular rays from the cup cross in the centre of the bulb, and thence diverging fall on the opposite side and produce a circular patch of green phosphorescent light. As I turn the bulb round you will all be able to see the green patch on the glass. Now observe, I remove the positive wire from the top, and connect it with the side pole (c). The green patch from the divergent negative focus is there still. I now make the lowest pole (d) positive, and the green patch remains where it was at first, unchanged in position or intensity.

We have here another property of Radiant Matter. In the low vacuum the position of the positive pole is of every importance, whilst in a high vacuum the position

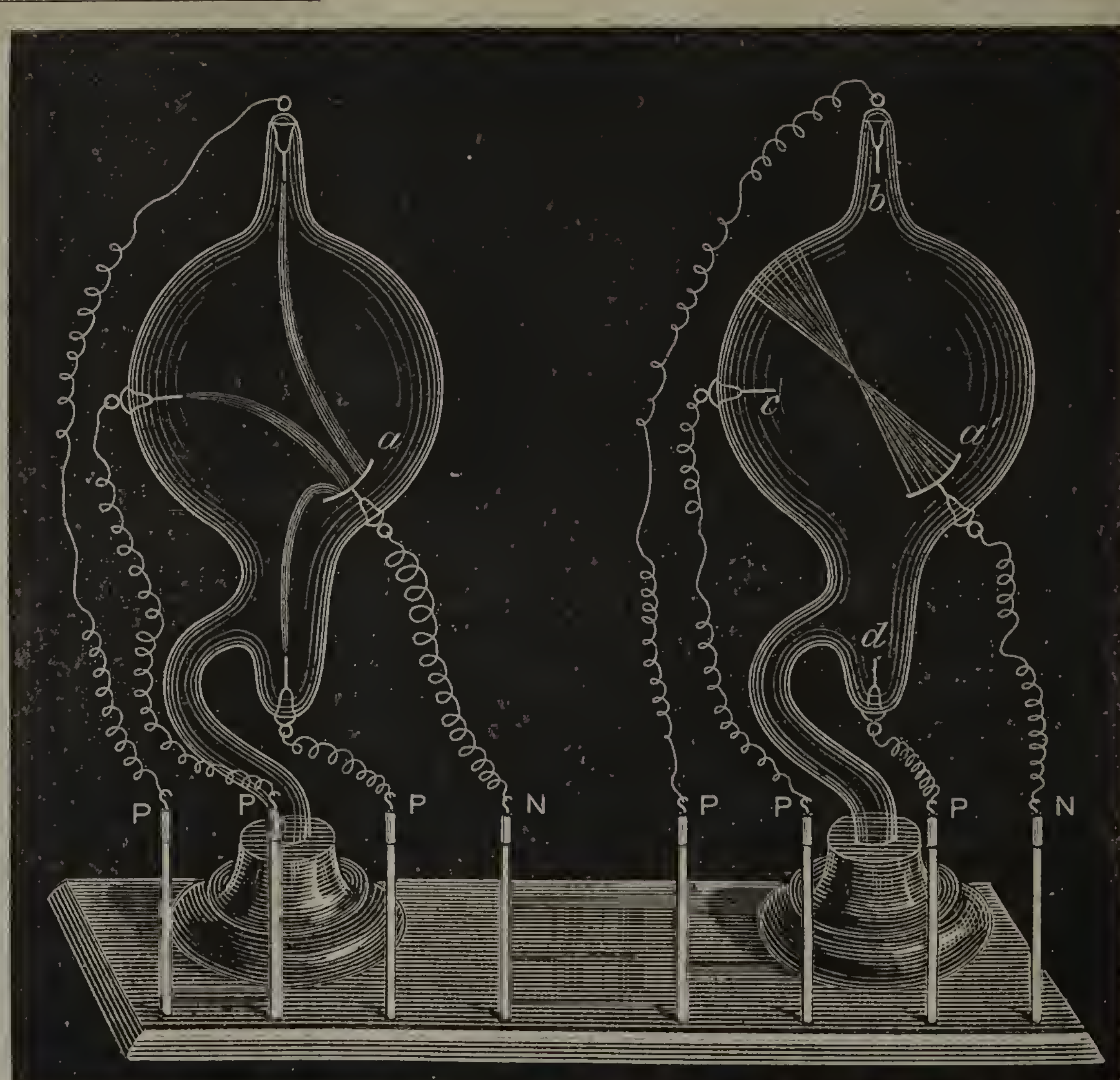


Fig. 7.

* A lecture delivered to the British Association for the Advancement of Science, at Sheffield, Friday, August 22, 1879.

of the positive pole scarcely matters at all; the phenomena seem to depend entirely on the negative pole. If the negative pole points in the direction of the positive, all very well, but if the negative pole is entirely in the opposite direction it is of little consequence: the Radiant Matter darts all the same in a straight line from the negative.

If, instead of a flat disk, a hemi-cylinder is used for the negative pole, the Matter still radiates normal to its surface. The tube before you (Fig. 8) illustrates this property. It contains, as a negative pole, a hemi-cylinder (*a*) of polished aluminium. This is connected

Fig. 8.

with a fine copper wire (*b*), ending at the platinum terminal (*c*). At the upper end of the tube is another terminal (*d*). The induction-coil is connected so that the hemi-cylinder is negative and the upper pole positive, and when exhausted to a sufficient extent the projection of the molecular rays to a focus is very beautifully shown. The rays of Matter being driven from the hemi-cylinder in a direction normal to its surface, come to a focus and then diverge, tracing their path in brilliant green phosphorescence on the surface of the glass.

Instead of receiving the molecular rays on the glass, I will show you another tube in which the focus falls on a phosphorescent screen. See how brilliantly the lines of discharge shine out, and how intensely the focal point is illuminated, lighting up the table.

Radiant Matter when intercepted by Solid Matter casts a Shadow.

Radiant Matter comes from the pole in straight lines, and does not merely permeate all parts of the tube and fill it with light, as would be the case were the exhaustion less good. Where there is nothing in the way the rays strike the screen and produce phosphorescence, and where solid matter intervenes they are obstructed by it, and a shadow is thrown on the screen. In this pear-shaped bulb (Fig. 9) the negative pole (*a*) is at the pointed end. In the middle is a cross (*b*) cut out of sheet aluminium, so that the rays from the negative pole projected along the tube will be partly intercepted by the aluminium cross, and will project an image of it on the hemispherical end of the tube which is phosphorescent. I turn on the coil, and you will all see the black shadow of the cross on the luminous end of the bulb (*c*, *d*). Now, the Radiant Matter from the negative pole has been passing by the side of the aluminium cross to produce the shadow; the glass has been hammered and bombarded till it is appreciably warm, and at the same time another effect has been produced on the glass—its sensibility has been deadened. The glass has got tired, if I may use the expression, by the enforced phosphorescence. A change has been produced by this molecular bombardment which will prevent the glass from responding easily to additional excitement; but the part that the shadow has fallen on is not tired—it has not been phosphorescing at all and is perfectly fresh; therefore if I throw down this cross — I can easily do so by giving the apparatus a slight jerk, for it has been most ingeniously constructed with a hinge by Mr. Gimingham—and so allow the rays from the negative pole to fall uninterruptedly on to the end of the bulb, you will suddenly see the black cross (*c*, *d*, Fig. 10) change to a luminous one (*e*, *f*), because the background is now only capable of faintly phosphorescing, whilst the part which had the black shadow on it retains its full phosphorescent power. The stencilled image of the luminous cross unfortunately soon dies out. After a period of rest the glass partly recovers its power of phosphorescing, but it is never so good as it was at first.

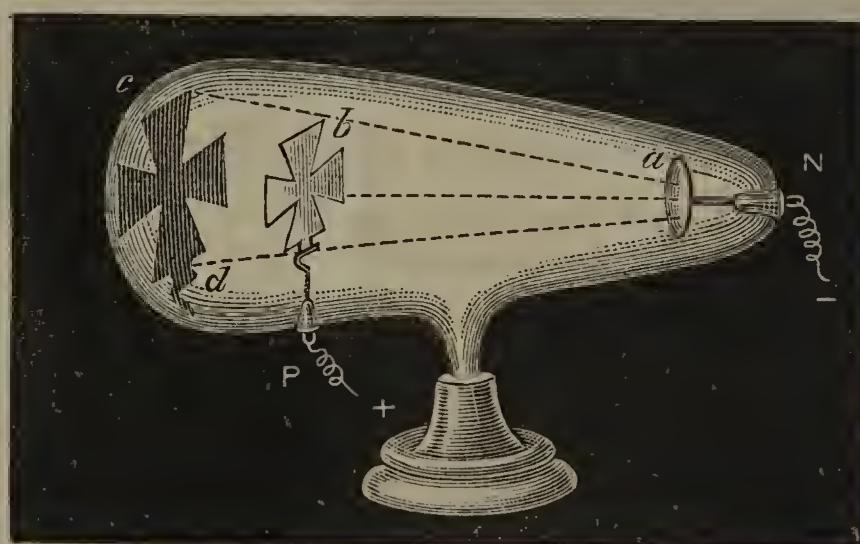


Fig. 9.

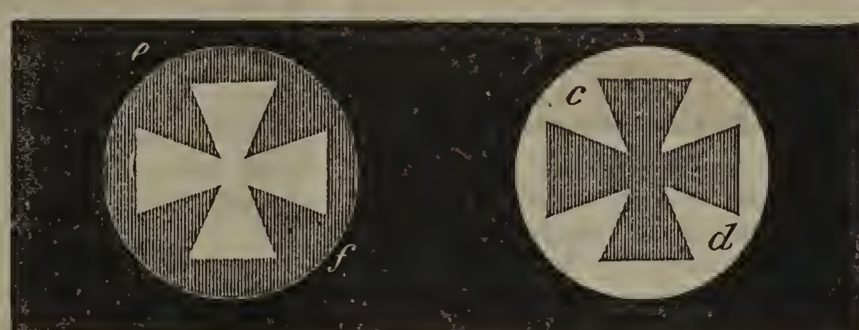


Fig. 10.

Here, therefore, is another important property of Radiant Matter. It is projected with great velocity from the negative pole, and not only strikes the glass in such a way as to cause it to vibrate and become temporarily luminous while the discharge is going on, but the molecules hammer away with sufficient energy to produce a permanent impression upon the glass.

Radiant Matter exerts strong Mechanical Action where it strikes.

We have seen, from the sharpness of the molecular shadows, that Radiant Matter is arrested by solid matter placed in its path. If this solid body is easily moved the impact of the molecules will reveal itself in strong mechanical action. Mr. Gimingham has constructed for me an ingenious piece of apparatus which, when placed in the electric lantern, will render this mechanical action visible to all present. It consists of a highly-exhausted glass tube (Fig. 11), having a little glass railway running along it from one end to the other. The axle of a small wheel revolves on the rails, the spokes of the wheel carrying wide mica paddles. At each end of the tube, and rather above the centre, is an aluminium pole, so that whichever pole is made negative the stream of radiant matter darts from it along the tube, and striking the upper vanes of the little paddle-wheel causes it to turn round and travel along the railway. By reversing the poles I can arrest the wheel and send it the reverse way, and if I gently incline the

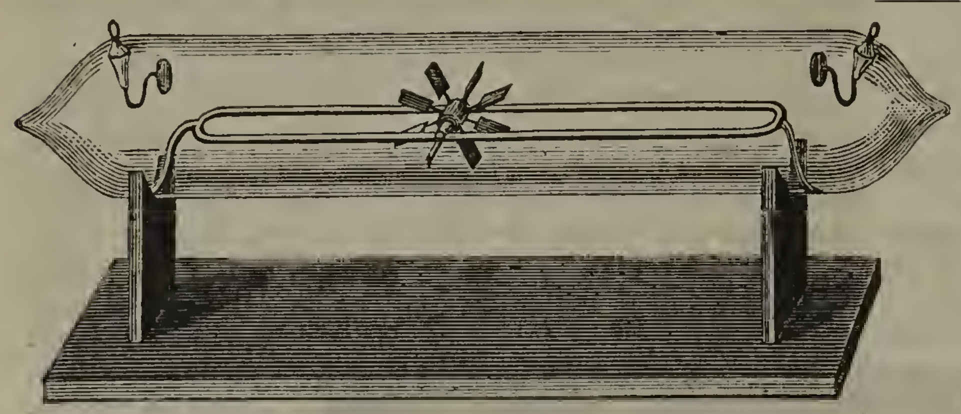


Fig. 11.

tube the force of impact is observed to be sufficient even to drive the wheel up-hill.

This experiment therefore shows that the molecular stream from the negative pole is able to move any light object in front of it.

The molecules being driven violently from the pole there should be a recoil of the pole from the molecules, and by arranging an apparatus so as to have the negative pole movable and the body receiving the impact of the Radiant Matter fixed, this recoil can be rendered sensible. In appearance the apparatus (Fig. 12) is not unlike an ordinary radiometer with aluminium disks for vanes, each disk coated on one side with a film of mica. The fly is supported by a hard steel instead of glass cup, and the needle point on which it works is connected by means of a wire with a platinum terminal sealed into the glass. At the top of the radiometer bulb a second terminal is sealed in. The radiometer therefore can be connected with an induction-coil, the movable fly being made the negative pole.

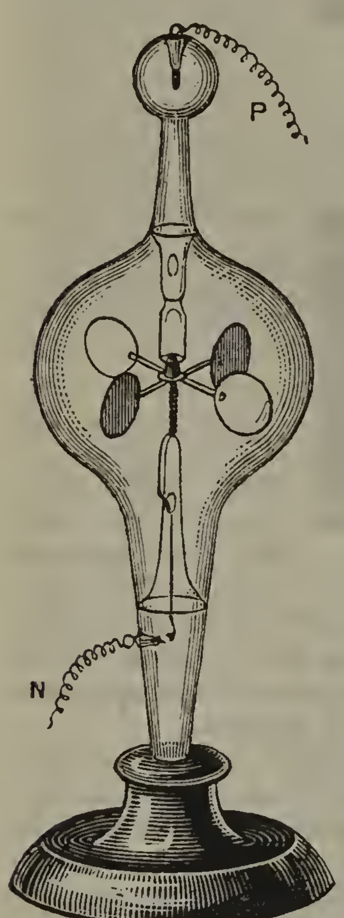


Fig. 12.

For these mechanical effects the exhaustion need not be so high as when phosphorescence is produced. The best pressure for this electrical radiometer is a little beyond that at which the dark space round the negative pole extends to the sides of the glass bulb. When the pressure is only a few millims. of mercury, on passing the induction current a halo of velvety violet light forms on the metallic side of the vanes, the mica side remaining dark. As the pressure diminishes, a dark space is seen to separate the violet halo from the metal. At a pressure of half a millim. this dark space extends to the glass, and rotation commences. On continuing the exhaustion the dark space further widens out and appears to flatten itself against the glass, when the rotation becomes very rapid.

Here is another piece of apparatus (Fig. 13) which illustrates the mechanical force of the Radiant Matter from the negative pole. A stem (*a*) carries a needle-point in which revolves a light mica fly (*b b*). The fly consists of four square vanes of thin clear mica, supported on light aluminium arms, and in the centre is a small glass cap which rests on the needle-point. The vanes are inclined at an angle of 45° to the horizontal plane. Below the fly is a ring of fine platinum wire (*c c*), the ends of which pass through the glass at *d d*. An aluminium terminal (*e*) is sealed in at the top of the tube, and the whole is exhausted to a very high point.

By means of the electric lantern I project an image of the vanes on the screen. Wires from the induction-coil are attached, so that the platinum ring is made the negative pole, the aluminium wire (*e*) being positive. Instantly, owing to the projection of Radiant Matter from the platinum ring, the vanes rotate with extreme velocity. Thus far the apparatus has shown nothing more than the previous experiments have prepared us to expect; but observe what now happens. I disconnect the induction-coil altogether, and connect the two ends of the platinum wire with a small galvanic battery; this makes the ring red-hot, and under this influence you see that the vanes spin as fast as they did when the induction-coil was at work.

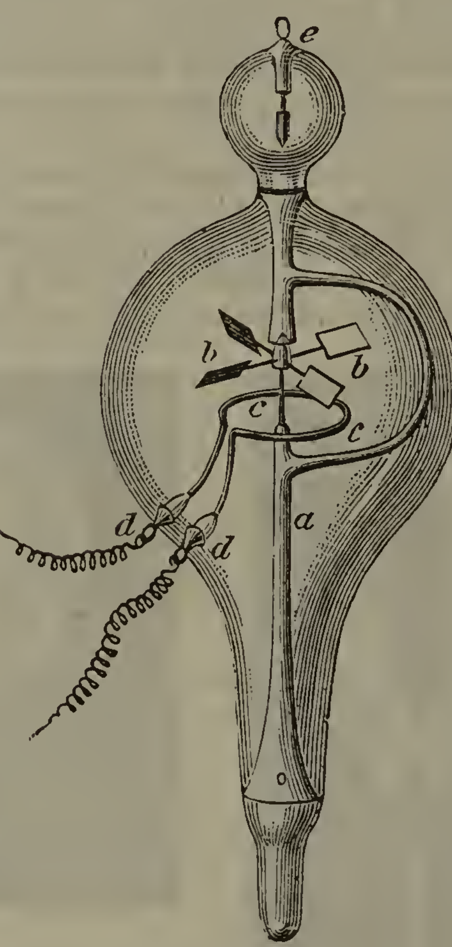


Fig. 13.

Here, then, is another most important fact. Radiant Matter in these high vacua is not only excited by the negative pole of an induction-coil, but a hot wire will set it in motion with force sufficient to drive round the sloping vanes.

(*To be continued.*)

EXTRACT OF YLANG YLANG.

True.

Extract of jasmine	8 ounces.
,, rose	16 ,,
Tincture of orris root	8 ,,
,, civet	4 ,,
Oil of ylang ylang	4 drachms.
Alcohol	2 pints.

Artificial.

Tincture of tonka beans . . .	3 ounces.
,, musk	4 ,,
Extract of tuberose	4 ,,
,, cassia	4 ,,
Tincture of orris root	8 ,,
Oil of orange (fresh)	2 drachms.
Neroli	½ drachm.
Alcohol, sufficient to make . .	4 pints.

Can. Ph. Journ.

A BRILLIANT PURPLE FOR SHOW BOTTLES.

Sulphate of copper	2 drachms.
Water	2 ounces.
French gelatine	1 drachm.
Boiling water	2 ounces.
Solution of potassa	2 pints.

Dissolve the copper salt in the water and the gelatine in the boiling water. Mix the two solutions and add the liquor of potassa. Shake the mixture a few times during ten hours, after which decant and dilute with water.

Can. Ph. Journ.

The Pharmaceutical Journal.

SATURDAY, OCTOBER 25, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

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THE APPLICATION OF THE FOOD AND DRUGS ACT IN NEW DIRECTIONS.

WE have so often had occasion to complain of the vexatious manner in which the Sale of Food and Drugs Act has been had recourse to as a means of instituting frivolous prosecutions that it is with much satisfaction we are enabled to speak of some recent cases with approval, and also to express the opinion that if the line of action taken in those cases is followed up, some real service may be done in the public interest as well as in the furtherance of the objects contemplated by the Pharmacy Act.

Reports of the cases we now refer to will be found in the present number of the Journal at page 336. In one of these cases a person described as a druggist, of 229, Stirling Road, Glasgow, was charged with having sold to the food inspector of the district a quantity of powders—purporting to be dispensed according to the prescription of a medical practitioner in Glasgow—that were not what was ordered by the prescriber.

In the first place, we may state that the person against whom the prosecution was instituted is not upon the Register of Chemists and Druggists of Great Britain, and that he is therefore presumably as unqualified to dispense the prescriptions of medical men as he is disentitled to use the designation of druggist. That such was the case may be inferred from the manner in which the powders were prepared on account of which he has been charged with a breach of the Food and Drugs Act. The prescription ordered salicylate of soda 5 grains and pulv. ipecac. co. 6 grains, with the direction in Latin that eight such powders should be supplied. The person dispensing the prescription does not appear to have been acquainted with the usual mode of writing such directions and consequently to have divided the quantities of the ingredients ordered into eight parts, so that each of the powders was deficient in quantity to the extent of seven eighths.

It is unnecessary to comment upon the nature of this proceeding from a pharmaceutical point of view, but having regard to the provisions of the 7th section of the Sale of Food and Drugs Act, that no person shall sell any compounded drug which is not composed of ingredients in accordance with the demand of the purchaser, there seems to be no question that it involved a breach of the law, and that it rendered the seller of the powders liable to the penalty of £20 imposed by the 7th section of the Food and Drugs Act.

It appears that there was no attempt at defence, and that the defendant at once pleaded guilty, and thereupon a fine of £5 was imposed by the sheriff, who remarked that though he was satisfied there was no fraudulent intention, the powder had evidently been dispensed by a person ignorant of the medical formulæ used in prescriptions.

The further offence of improperly using the designation "druggist" is one to be dealt with under the Pharmacy Act. As this proceeding is under some pretext or other common in Glasgow this case will probably receive further notice.

The other two cases were both prosecutions of grocers in Derbyshire, for the sale of an adulterated drug as it was technically stated, the article referred to being "paregoric," that was not of the quality demanded, inasmuch as it was found on analysis to be devoid of opium, the most important ingredient of that preparation. An attempt was made to defend both cases on the ground that "paregoric" was a preparation that had no place in the British Pharmacopœia, and consequently that there was no standard by which its composition should be judged of. Hence it was contended that the Court had no power to deal with the cases under the Food and Drugs Act for the deficiency, while at the same time the absence of opium from the preparation sold as "paregoric" protected the seller from liability to a penalty under the Pharmacy Act, 1868. The untenable nature of this defence is too apparent to require argument, and we cannot avoid expressing our deep regret at finding from the statements made that such a defence should, as it appears, have been suggested by members of the pharmaceutical body, and that such irregular sales of medicinal preparations should have been in any way encouraged by them.

Whether the term "paregoric" has a place in the British Pharmacopœia or not seems to be, in our opinion, a matter of very little importance, since it is so familiarly known as being a popular synonym for the preparation that is in the Pharmacopœia, and just as we should contend that a person asking for "milk of sulphur" should be supplied with the preparation that name is most frequently understood to represent, so we should contend that any person asking for "paregoric" ought to be supplied with a preparation containing opium. It may be that as there is now no recognition of the term "paregoric" in the British Pharmacopœia the preparation of that article may be carried out according to various private formulæ, but still in its general character it ought to conform closely to the standard of strength as a mild opiate that appertains to the Pharmacopœia preparation which it represents.

We think, therefore, the magistrates exercised a very wise discretion in rejecting the defence offered and holding that persons who sold "paregoric" should sell what was properly to be understood by that name, and nothing else which they or the persons who supply them may imagine to answer the purposes of trade without incurring the penalties resulting from infringement of the Pharmacy Act. But we cannot go the length of agreeing with the magistrates' suggestion that if the Pharmacy Act does not permit unregistered persons to sell "paregoric" with opium in it, they should sell an article under that name without opium in it, even under the condition of putting upon the bottle a label stating that it is "minus the opium." Such a proceeding would be, we think, very objectionable and we should have laudanum without opium, and perhaps other potent preparations sold without the ingredient to which their medicinal as well as poisonous energy is due, and the confusion thus created between the preparations that possessed their proper character and those that did so only in name might readily lead to the most disastrous consequences.

There has been lately much dissatisfaction among members of the drug trade because of the irregular sales of medicines and drugs by grocers and other small dealers in country places, and we have reason to believe that there is too much probability that in some cases such a trade is promoted by individuals without due regard for the general interests of the body to which they belong. Whether that trade be carried on so as to constitute a punishable breach of the Pharmacy Act, or under the belief that it can be done with impunity by making use of the patent medicine stamp, or, worse still, by selling to the public articles which have no virtue beyond assuming the names of the preparations they are pretended to be, it is certainly time that some vigorous and united action should be taken by those who have the common welfare of the business at heart with the object of putting an end to practices so detrimental to the credit of pharmacy.

We regret to have to record the death, on the 16th inst., of Dr. Arthur Leared, Senior Physician of the Great Northern Hospital. It appears that only a few days previously he returned home unwell from a holiday tour, having contracted typhoid fever in Portugal. Dr. Leared on more than one occasion showed his interest in the Pharmaceutical Society by taking part in its Evening Meetings, and he also contributed an interesting collection of Morocco drugs to the Society's Museum.

The death is also announced of Mr. Alfred Henry Garrod, Fullerian Professor of Physiology at the Royal Institution, at the early age of 30 years. The deceased was a son of Dr. Alfred Baring Garrod, and had already attained a considerable prominence in the scientific world.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

At a meeting of the Board of Examiners for England and Wales, held in London, on Wednesday, October 22nd, 1879, the report of the College of Preceptors on the examination held on October 7th, was received.

Three hundred and eighty-seven candidates had presented themselves for examination, of whom *one hundred and eighty-three* had failed. The following *two hundred and four* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

(Arranged alphabetically).

Abbott, Thomas Henry	Bradford.
Akerman, John William	Bath.
Allan, Alexander Fergusson	Greenock.
Allan, Charles Joseph	Tadcaster.
Andrews, Walter	Winchester.
Aplin, John Dare	Colyton.
Arnott, Daniel	Pontypridd.
Baker, Alfred John E.	St. Austell.
Bassano, Francis William	Derby.
Bayley, Alfred Jonathan	Lancaster.
Bearpark, Thomas	Leyburn.
Beck, William Henry	Selby.
Bell, Andrew	Dundee.
Bell, John Henry	Epworth.
Bell, Thomas	London.
Booth, Frank	Mansfield.
Boyd, Alexander	Glasgow.
Bradford, Lionel Meredith	London.
Brown, Fredk. Wm., jun.	London.
Brown, James	Ripon.
Carter, Octavius	Bournemouth.
Carter, William	Penzance.
Chabot, Frank	London.
Chadwick, John Booth	Stockport.
Chamberlain, John W. West	York.
Chamberlin. Charles James	Barnsley.
Chattaway, William	Leicester.
Clayton, George	Manchester.
Coleman, Alfred Thomas	Leicester.
Collen, William Creswell	London.
Compton, Richard William	Leicester.
Cooper, Walter Temple	London.
Dale, John Dickin	Stafford.
Davis, Frederick	Oundle.
Davis, Norman	Sunderland.
Deighton, Frank	Bradford.
Dinsdale, Fred	Liverpool.
Dobie, Robert Douglas	Glasgow.
Doubleday, Frederick Wm.	Norwich.
Down, Frank Walter	Sittingbourne.
Downs, Herbert	Edinburgh.
Dowty, William	Evesham.
Dryden, Thomas	Landore.
Elliott, Horace Herbert	Stowmarket.
Farquhar, Robert Forbes	Aberdeen.
Felce, Albert	Norwich.
Flynn, Robert Francis	Feltham.
Fodd, John William	Peebles.
Fraser, Alexander Mackie	Girvan.
Freeman, Frederick William	St. Albans.
Gant, Robert Richard	Norwich.
Gibson, John William	Richmond, Yorks.
Gilding, Matthew	Wainfleet.
Gilson, Charles Boulter	London.
Gordon, Robert Henderson	Rosemarkie.
Gray, Philip	Bristol.
Greaves, William	Ironville.
Gregory, George Henry	Lincoln.
Hamilton, Francis	Glasgow.
Harding, John W. Ainsworth	Macclesfield.
Harries, Charles Albert	Velindre.
Harrison, Jeremiah	Clitheroe.

Harrison, John....................Lincoln.
Hepworth, Harry....................Skipton.
Hilton, Ivor Ajax Robinson ...Myerscough.
Hogg, Tom ....Derby.
Holmes, Fred ....Lincoln.
Holroyd, Henry ....Hingham.
Holt, Clarence Dalton..........Manchester.
Hooper, William Henry ....Okehampton.
Hunter, George Ackland ......London.
Hutton, James Alfred..........Scarborough.
Irving, John Thomas ....Skipton.
Jack, James ....Arbroath.
Jacka, Vivian Tyacke..........Penzance.
Jaffrey, William ....Logie Buchan.
Jeans, Alfred ....Mansfield.
Jenkinson, Arthur ....London.
Johnson, Arthur George ....Sutton-on-Trent.
Johnson, John Robert..........Cambridge.
Jones, Benjamin Owen ....Llanidloes.
Jones, Edwin Pryce..............Aberdare.
Jones, Ellis ....Portmadoc.
Jones, John ....Llandovery.
Jones, John Wesley..............Llanelly.
Jones, Samuel ....Llandilo.
Kerr, David ....Oakham.
Kerr, Peter Murray..............Dumfries.
King, Ebenezer Thomas ....Reading.
Kingston, Edwin J. B..........Bath.
Knight, William ....Chichester.
Lee, Charles Henry ....Melton Mowbray.
Lees, James ....Manchester.
Legg, James Alfred..............London.
Ling, Frederic George..........Southampton.
Livesey, William Forrest ......Preston.
Longtoft, William ....Bedale.
Lowther, Herbert Reginald ...Birmingham.
Loxton, William Arthur.........Plymouth.
Lyon, Herbert ....Sheffield.
McGeorge, David..................Castle Douglas.
McGuffie, William A. ....Stranraer.
McIntosh, John ....Edinburgh.
Mack, William Wilson ....Nottingham.
Mackenzie, Alexander..........Leith.
Marr, Edward Albert ....Newcastle-on-Tyne.
Marshall, Arthur Harflete ......Redhill.
Martin, James ....Carnoustie.
Martin, John......................Redruth.
Martin, John Bennet ....Falmouth.]
May, Harry Arthur..............Reading.
Mays, Frank Webb ....Grantham.
Menhinick, Charles H. F. ......Stonehouse, Devon.
Miller, Frederick ....Strood.
Miller, John Priest ....Norwich.
Morgan, William Thomas ......Llandovery.
Morrison, Clarence ....Inverness.
Moxon, John Lawrence ....Wellingborough.
Neale, Charles Swanson ....Stoke-on-Trent.
Neve, Annie ....London.
Nichol, Anthony ....Carlisle.
Nichol, Henry Walter...........Bedford.
Noble, James ....Camborne.
Norman, Edwin ....Ripley.
Orchard, Arthur Bishop Carey..London.
Owen, Evan ....Weston-super-Mare.
Paine, Charles ....Belton.
Paine, William ....Ashton-under-Lyne.
Parish, Alfred James ....Kidderminster.
Pearce, William Frederick ......Southampton.
Pollock, Arthur....................Glasgow.
Puckey, William ....Bishops Stortford.
Raffan, Robert ....Buckie.
Raine, Ralph William...........Newcastle-on-Tyne.
Reece, Richard James...........London.
Rees, John........................Rhydlewis.
Roberts, Lewis ....Aberystwith.
Roberts, Rowland..................Holyhead.
Robertson, Daniel..................Perth.
Robinson, John Colburn ....London.
Rose, George Ernest ....Stratford-on-Avon.
Rutter, Clement Thomas ......Birmingham.
Sanders, Ernest.....................Manchester.
Scholes, William Isaac ....Pendleton.
Senior, Joseph ....Castle Northwich.
Shaw, John Bingley...............Lincoln.
Shepperley, Fredk. Montgomery. Nottingham.
Shipman, Joseph James ....Chesterfield.
Skilling, James.....................Stonehouse, Devon.
Skirrow, William ....Bingley.
Smeeton, Charles William ......Leeds.
Smith, George ....Worcester.
Smith, John ....Manchester.
Smith, Lewis.........................Grassendale.
Smith, Sam ....Batley Carr.
Smith, William John ....Newcastle-on-Tyne.
Softley, William Henry ....Godalming.
Spark, Albert Edward............Kirkwall.
Stark, Arthur Campbell ....Norwich.
Stark, John Edgar ....Dumfries.
Stephen, James, jun. ....Gamrie.
Stephenson, Thomas...............Edinburgh.
Stirling, George ....Dunoon.
Sturdy, John Robert ....Lincoln.
Sursham, Frederick Thomas ...London.
Sutherland, David Alexander...Edinburgh.
Sykes, Ernest John ....Bath.
Taggart, Robert ....Glasgow.
Terry, Edwin........................Tadcaster.
Thomas, David ....Pontypridd.
Thomas, John Griffith............Neath.
Titmas, John H. ....Flixton.
Tollitt, William.....................Liverpool.
Tomlin, John Percy...............Tunbridge Wells.
Topham, Thomas ....Mirfield.
Trezise, George T. E. ....Wellingborough.
Tugwell, Ernest Harry ....Greenwich.
Turner, George Edward ....Brigg.
Ward, Robert Edward............Kettering.
Walker, John Frederick ....Hull.
Watchorn, Fredk. William......Leicester.
Watkins, William James ......Bath.
Watson, Frederick Percy ......Lincoln.
Weeks, Charles Frederick ......Devonport.
Weighill, William Lancelot ...West Hartlepool.
Welch, John Latimer ....Bristol.
Wharton, James ....Preston.
Whitfield, Allison..................Sunderland.
Whitton, James ....Dingwall.
Wilde, Frank ....Andover.
Wilkie, John Proudfoot ....Hayfield.
Williams, Arthur Gore ....Llandovery.
Williams, David ....St. Clears.
Williams, John Fox...............Gloucester.
Wilson, Albert ....Garstang.
Winter, George Mitchell.........Leicester.
Wisker, Robert Hardy ....York.
Withers, William..................West Bromwich.
Woltz, Alfred Eugène............London.
Wood, Alfred Lyon ....Stonehaven.
Wood, Arthur W. H. ....Ullesthorpe.
Woodward, Edwin ....Macclesfield.
Woolley, Evan Edward ....Llanidloes.
Young, John........................Newport. Mon.

The questions for examination were as follows:—

Time allowed: Three hours for the three subjects.

I. LATIN.

1. Translate the following passages into English:—

A. Quibus rebus cognitis, cum ad has suspiciones certissimæ res accederent, quod per fines Sequanorum Helvetios *traduxisset*, quod obsides inter eos *dandos* curasset, quod ea omnia non modo injussu suo et civitatis, sed etiam inscientibus ipsis *fecisset*, quod a magistratu Hæduorum accusaretur, satis esse causæ *arbitrabatur*, quare in eum aut ipse animadverteret, aut civitatem animadvertere *juberet*.

B. Hæc cum pluribus verbis *flens* a Cæsare peteret, Cæsar ejus dextram *prendit*; consolatus rogat finem orandi faciat; tanti ejus apud se gratiam esse ostendit, uti et rei publicæ injuriam et suum dolorem ejus voluntati ac precibus condonet. Dumnorigem ad se vocat, fratrem adhibet; quæ in eo reprehendat ostendit, quæ ipse intelligat, quæ civitas *queratur*, proponit; monet, ut in reliquum tempus omnes suspiciones *vitet*; præterita se Divitiaco fratri condonare *dicit*.

2. Give the present, perfect, and infinitive of the verbs in italics.

3. Parse *either* "*non modo injussu suo et civitatis*," *or* "*consolatus rogat finem orandi faciat*."

4. Compare *certus*, and give three adverbs formed from the superlative degree of adjectives. Decline *obsides*.

5. Decline, singular and plural, the pronouns *ego*, *tu*, *ille*, *qui*.

II. ARITHMETIC.

[The working of these examples, as well as the answers, must be written out in full.]

6. Of twenty-one people, thirteen lose £116 7*s*. 8*d*. each, and eight lose £93 0*s*. 9*d*. each. What is the average loss per man.

7. Find the weight of 5 dozen spoons, each weighing 2 oz. 4 dwt.

8. Multiply $3\frac{3}{20}$ by $15\frac{5}{7}$, and divide $\frac{2}{3\frac{3}{4}}$ by $\frac{2\frac{3}{4}}{3}$; and add together the sum and difference of these results.

9. What do the digits 5, 7, 3 represent in the decimal ·573? Reduce $\frac{6}{7}$ of £1 + $\frac{3}{8}$ of a guinea + $\frac{3}{560}$ of 6*s*. 8*d*. + $\frac{1}{14}$ of half-a-crown, to the decimal of £100.

10. How long will it take 17 men to earn £50, if 12 men in $6\frac{1}{2}$ days can earn 13 guineas?

III. ENGLISH.

11. Decline in full the pronouns *I*, *thou*, *he*; and give their corresponding possessive forms.

12. Explain what is meant by *weak* and *strong* verbs; give one example of each. Show, by example, how intransitive verbs may become transitive.

13. Parse fully each word in the following sentence:—

"She never told her love;
But let concealment, like a worm i' the bud,
Feed on her damask cheek."

14. Write a short composition upon *one* of the following subjects:—"Knowledge is Power," "The Zulu War," "Thrift," "The advantages of Travelling," "Some modern invention with which you are acquainted."

The following is a list of the centres at which the examination was held, showing the number of candidates examined at each centre and the result:—

	Candidates. Examined.	Passed.	Failed.		Candidates. Examined.	Passed.	Failed.
Aberdeen	26	5	21	Lancaster	8	5	3
Birmingham	23	9	14	Leeds	23	12	11
Brighton	4	2	2	Lincoln	15	10	5
Bristol	17	7	10	Liverpool	7	4	3
Cambridge	2	2	0	London	54	26	28
Canterbury	3	1	2	Manchester	26	12	14
Cardiff	6	6	0	Newcastle	8	4	4
Carlisle	11	5	6	Northampton	5	3	2
Carmarthen	13	9	4	Norwich	11	7	4
Carnarvon	4	2	2	Nottingham	16	9	7
Cheltenham	3	1	2	Oxford	1	1	0
Darlington	6	3	3	Peterborough	5	4	1
Dundee	6	4	2	Sheffield	5	2	3
Edinburgh	19	8	11	Shrewsbury	5	3	2
Exeter	10	6	4	Southampton	6	4	2
Glasgow	11	9	2	Truro	7	6	1
Hull	6	3	3	Worcester	3	3	0
Inverness	4	3	1	York	7	4	3
Jersey	1	0	1				

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

Wednesday, October 1, 1879.

Present—Charles R. C. Tichborne, LL.D., Ph.D., President; Dr. A. Smith, Vice-President; Sir George Owens, M.D., Dr. T. Collins, Dr. Whitaker (Belfast), Messrs. Allen, Bennett (Kingstown), Brunker, Doran (Bray), Goodwin, Hayes, Hodgson, Holmes, Oldham, Payne (Belfast), Pring (Belfast), Simpson.

The minutes of the meeting held on September 3 were read and signed.

A letter was read from the Secretary of the Société de Pharmacie de Constantinople, informing the Council of the formation of that Society, and requesting the aid of the Council in carrying out the work which it had undertaken. A copy of the first number of the Society's Journal accompanied the letter.

The Registrar was instructed to acknowledge with thanks the receipt of the letter and Journal, to forward in return a copy of the Calendar, and to state that this Society would lend any aid that might be in its power towards furthering the aims of the new Society.

Read a letter from Mr. Robert Barklie, F.C.S., Chemical Teacher in the Belfast Working Men's Institute, renewing the application made by him in March last that the Council should recognize the instruction in practical chemistry given in the Institute by him.

Resolved that Mr. Barklie's letter be considered at next meeting.

Read a letter from Mr. William Dowling, of Killarney, praying the Council to recognize the Preliminary examination of the Apothecaries' Hall, which he had passed in 1876.

The Registrar to write, informing him that there is a notice of motion upon this subject to be considered at the next meeting.

Read a letter from Mr. William Prott, of Belfast, asking, as a pharmaceutical chemist and member of the Pharmaceutical Society of Great Britain since 1852, that he be allowed to go forward to both the Preliminary and Practical examinations now, or be admitted to such special examination as the Council may deem necessary. The writer stated that it was his intention to commence business as a chemist in Belfast.

The Registrar to send him a copy of the same reply as he had been instructed to send Mr. Dowling.

Proposed by Mr. Oldham, seconded by Mr. Goodwin, and resolved—

"That a Hektograph be purchased for the use of the Society."

Proposed by Mr. Hayes, and seconded by Mr. Payne,—

"That this Council is of opinion that after this year it is not desirable to retain the College of Science on the list of Schools from which certificates are received."

The motion was rejected on a division.

The following candidate for membership, who was proposed by the President at the September meeting, and seconded by Mr. Brunker, was now elected a member—

Mr. Thomas Batt, 48, Fontenoy Street, Dublin.

The examination for the licence as pharmaceutical chemists was held on this day, but had not concluded when the Council rose.

There were five candidates for the examination.

ANNUAL MEETING OF THE PHARMACEUTICAL SOCIETY OF IRELAND.

Monday, October 6, 1879.

The fourth annual meeting of this Society was held at the College of Physicians, Dublin, at 4 o'clock p.m., on the above date. The following members attended:—Professor Tichborne, President, in the chair; Dr. A.

Smith, Vice-President. *City members*—Messrs W. N. Allen, jun., Atkinson, Batt, E. J. Boileau, Brunker, Collins, Galwey, Goodwin, Grindley, Hayes, Hodgson, Holmes, Murphy, Oldham, Park, Simpson, James Wells, W. F. Wells, jun., H. Whitby. *Members from the Provinces:*—Dr. Hodges (Belfast), Messrs. Beggs (Dalkey), Bennett (Kingstown), Carter (Naas), Doran (Bray), G. Hardy (Tandragee), R. L. McAdam (Kingstown), Minchin (Athy), Murray (Clones), Sterling (Kilkenny), Vance (Bray).

Mr. W. N. Allen, jun., moved, in accordance with notice sent to the Registrar a few days previously, that the voting papers of all members who had not paid their subscription for the preceding year be rejected, in accordance with rule 8 on page 54 of the Calendar.

The motion was seconded by Mr. Grindley.

The President declined to put the motion—the effect of which, if carried, would be to reject the votes of the original members named in the Pharmacy Act; and he stated his opinion that those members were entitled to record their votes, and that the regulations relating to subscriptions applied to elected members only.

The Vice-President and Dr. Hodges, Belfast, with some others, also held the same opinion.

The President stated that if Mr. Allen, or any other member, thought his ruling was wrong, they could appeal to the Privy Council, and have the question decided for them.

The voting papers which had been returned, 57 in number, were laid on the table, and the President appointed Messrs. Bennett, Goodwin and Minchin, as scrutineers, to count the votes.

The Treasurer laid on the table the annual statement of accounts, audited by Messrs. Allen and Hayes, showing a balance to credit of the Society of £81 0*s.* 4*d.* in Bank, and £307 12*s.* 8*d.* in New 3 per cent. stock.

The annual list of members who had paid their subscriptions for the year ending September 30, 1879, was laid on the table.

On the motion of Mr. Doran, seconded by Mr. Grindley, the statement was received and adopted.

The scrutineers of the voting papers now brought in their report. Fifty-seven voting papers had been returned, of which two had been rejected, one being unsigned, and the other from a member whose subscription was unpaid. The following were the number of votes obtained by each of the candidates for a seat on the Council.

OUTGOING MEMBERS OF COUNCIL.

Aquilla Smith, M.D., 51 votes.
William Goulding, M.P., 34 votes.
John Thomas Holmes, 49 votes.
Sir George B. Owens, Kt., M.D., 43 votes.
Henry Bennett, 45 votes.
John Chilcott Charles Payne, 44 votes.
Henry Whitaker, M.R.C.S.E., 41 votes.

In addition, Mr. William N. Allen, jun., obtained 25 votes, and Mr. William F. Wells, jun., 2 votes. Mr. Wells, however, stated that he was not a candidate for the office.

The President hereupon declared the seven outgoing members of Council to have been re-elected.

The meeting then proceeded to the election of officers for the ensuing year.

Charles R. C. Tichborne, LL.D., Ph.D., was re-elected President, on the motion of Mr. E. M. Hodgson, seconded by Mr. Hayes.

Dr. Aquilla Smith was re-elected Vice-President on the motion of Mr. Holmes, seconded by Mr. Goodwin.

Mr. E. M. Hodgson was re-elected Treasurer, on the motion of Mr. Brunker, seconded by Mr. Murray.

Mr. Hugh James Fennell was re-elected Registrar, on the motion of Mr. Oldham, seconded by Mr. Simpson.

The present Examiners, viz.:—

In Latin, English, and Arithmetic: Edward W. Collins, A.B., M.D., Dublin, M.R.I.A.;

In Materia Medica and Botany: Walter G. Smith M.D., Dubl., F.K, and Q.C.P.I.;

In Pharmaceutical and General Chemistry: Harry Napier Draper, F.C.S.; and

In Practical Pharmacy: Robert Montgomery, L.H.A., Dubl., M.R.C.S., Engl.,

were re-elected for one year, on the motion of Mr. Bennett, seconded by Mr. Doran.

The Finance Committee of last year, viz.:—Messrs. Thomas Collins, John Goodwin, John Thomas Holmes, and Stanley Oldham were re-elected, on the motion of Mr. Simpson, seconded by Mr. Hodgson.

The present Auditors, Mr. William Allen and Mr William Hayes, were re-elected, on the motion of Mr Grindley, seconded by Mr. W. F. Wells, jun.

The meeting then proceeded to the consideration of—'The report of the Committee on the Pharmacy Act, Ireland, 1875, as amended by the Council,' (printed in the *Pharmaceutical Journal* for June 14, 1879, page 1025,) a copy of which had been forwarded to each member of the Society in September, asking their opinions on the various points touched on. A large number of letters from country members in response to this request were laid on the table.

The clauses were now considered *seriatim.*

Clause 1 was agreed to.

Clause 2 was struck out.

Proposed by Mr. Brunker, seconded by Mr. Hodgson, and resolved:—

"That it is desirable that the Pharmaceutical Council should seek powers which will enable them to compel all persons who under section 31 have their right to sell poisons preserved to them, to register their names."

On the motion of Mr. Brunker, seconded by Mr Simpson, Clause 3 was amended to read as follows:—

"To compel all chemists or druggists actually engaged in the sale of poisons, or poisonous drugs, at the passing of the Pharmacy Act, 1875, on making a declaration to that effect, and giving reasonable proof thereof, to be registered on payment of a fee not exceeding three guineas, and that such persons shall be styled 'registered druggists.'"

Clause 4 was struck out, on the motion of Mr. Holmes, seconded by Mr. W. N. Allen, jun.

Proposed by Mr. Murray, seconded by Mr. Beggs, and resolved:—

"That clauses 5 to 9 remain as they are, the words 'and examination' being omitted in Clause 9."

Clause 10 was adopted on the motion of Mr. Brunker, seconded by Mr. Hayes.

Clauses 11 and 12 were adopted, on the motion of Mr. Hayes, seconded by Mr. Sterling.

Additional Clause.

Proposed by Mr. Sterling, seconded by Mr. W. F. Wells, jun., and resolved:—

"That the Council be instructed to insert a Clause to have an examination instituted for assistants to pharmaceutical chemists."

Proceedings of Scientific Societies.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting held at 32A, George Street, on October 15, 1879, a paper was read by Mr. Parkinson, on the "Preliminary Examination."

Mr. Parkinson began by saying that the subject of education had been discussed so much of late years, that he felt he owed an apology for bringing it forward once more. He conceived its importance justified him in so doing. He should not attempt to grasp the wider phases of the subject, but would confine himself to education as gauged by the Preliminary examination, which he described "as the three R's with a little Latin thrown in." He expressed his surprise that so very modest a standard of accomplishment should have satisfied the framers of the regulations, especially when he considered how very varied a range of duties the pharmacist was called upon to perform. In his opinion no education it was possible for a boy to receive was too elaborate. He drew attention to the preliminary examinations of other bodies, and said the time had come when pharmacists ought seriously to consider whether a higher standard ought not now to replace the present one. The defects of the present standard were the very moderate amount of Latin required and the total absence of Greek and mathematics. He pointed out some of the advantages in education of an acquaintance with those subjects, and said it was a cruel kindness to decoy youths into the trade by so easy an examination, and contended that justice to them was a sufficient reason for raising the standard, though many others might be found. The matriculation examination of the London University was the one that ought to be aimed at, and when, as a start, that was obtained, it might be hoped that pharmacy would assume the higher aspects, which had been so well described by one of pharmacy's ablest sons in another place.

An animated discussion followed, and though the majority of the speakers looked upon the matriculation examination as impracticable at present, a decided preponderance of opinion favoured increasing the stringency of the Preliminary examination.

A vote of thanks to Mr. Parkinson having been proposed and carried, the meeting terminated.

Parliamentary and Law Proceedings.

Prosecution under the Sale of Food and Drugs Act for Improper Dispensing of a Prescripton.

On Thursday, October 16, before Sheriff Spens, Alexander Beaton Chalmers, druggist, 229, Stirling Road, Glasgow, pleaded guilty to a charge, at the instance of the Sanitary Department, of having sold to W. T. Armstrong, food inspector, a quantity of powders prescribed for a patient by Dr. Neil Carmichael, South Portland Street, Glasgow, in which the ingredients were defective in quantity to the extent of seven-eighths in each powder. His Lordship imposed a penalty of £5, and remarked that while he was satisfied there was no fraudulent intention on the part of the defender in dispensing these powders, it was quite clear they were made up by a person in his employment, ignorant of the medical formula, for whom he was responsible.—*Glasgow Herald.*

[We have been supplied by a correspondent with what purports to be a copy of the prescription. It is written in pencil and is as follows:—

"℞ Sodæ Salicylat. . . . . gr. v.
Pulv. Ipecac. Co. . . . . gr. vj.
M.
Mitte tales viij.
S. One every 3 or 4 h.".

Ed. Ph. J.]

Prosecutions for Sale of Paregoric devoid of Opium.

At the Chesterfield County Police Court on Saturday, October 11, Lieutenant Colonel Shortt, charged Richard Hollingworth, grocer, of Newbold Moor, with selling adulterated drugs at Newbold Moor, on September 5, to wit, 3 ozs. of paregoric, not of the quality demanded.

Colonel Shortt said that on the day in question he visited the shop of defendant. He demanded 3 ozs. of paregoric for which he paid 7*d*. The defendant supplied the drug himself. The inspector then told the man that he required the sample for analysis, under the Drugs Act, and divided and labelled it as usual, and forwarded one sample to the analyst, labelled "962." On October 1 the analyst sent a certificate of analysis, on which he said, "I certify that I received a sample of a fluid called 'paregoric,' marked 962, which sample was devoid of opium—the most important constituent. There should be 1½ or 2 grains in the fluid ounce." The inspector said that the practice of selling the so-called paregoric without opium was very dangerous. Persons went and purchased the article minus the opium, and, as it would be very ineffective, they would go in all probability to another shop, where the mixture would contain a proportionate amount of the opiate.

The Defendant said that he obtained the article from Mr. Greaves, who had told him that the Bench had no power to deal with the case as the preparation had no place in the work known as the Pharmacopœia, which contained the components of all standard medicines. As the mixture (which was an effectual remedy in cases of slight cough) had no place in that work he contended that the Bench had no power to deal with the case.

The case of James Walmesley, of the same place was heard, which was a very similar offence.

Mr. Walmesley admitted the charge, but said he sold it as supplied by Mr. Oldfield. This sample contained a very small amount of opium, considerably under the quantity laid down by the Pharmacy Act.

Mr. Oldfield, chemist and druggist, of New Square, Chesterfield, said the mixture was a thing kept in all chemists' and a great many small shops. He had supplied this article, and it had a [*sic* in report, ? no] place in the Pharmacopœia. The Pharmacy Act says that "no person other than a chemist and druggist shall deal in, or have in his shop for sale any article containing opium;" in consequence, chemists sold the paregoric minus the opium, and he considered it was as effectual without as with it for what it was chiefly used for. The bottles containing "paregoric," so called, for shopkeepers should, properly, be labelled "minus the opium," and had been so in the past, but remarkable to say, this was an oversight by one of his *employés* in the packing house. He was very sorry for the omission.

Mr. Barnes: Well, we have decided in these two cases to fine you the very nominal fines of 1*s*. each and the costs, and you must clearly understand that, if you sell anything for "paregoric," it must be "paregoric" and nothing else. If the Act does not allow you to sell the article with the opium in it, then you must label it "minus the opium," or, in fact anything you like, but you must not sell it as in the past.—*Derbyshire Times.*

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[345]. This injection ought to be filtered as "Nemo" surmises, as the insoluble sulphate of lead irritates the mucous membrane of the surface to which the preparation is applied. It is true that some prescribers make the combination in ignorance of the incompatibility of the salts, which separately have similar therapeutic effects; but that circumstance should not excuse the absurd practice of dispensing it as "J. C." and St. Rule recommend.

J. B. L. Mackay.

[345]. The injection of liq. plumbi and zinci sulph. shou d not be filtered.

F. STEVENS.

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[346]. Though tincture of iodine is often applied externally in domestic medicine it is not strong enough for reducing glandular enlargements, hence the introduction of the liniment into the B.P., whilst the tincture is intended for internal administration. As neither physicians nor dispensers are supposed to be conversant with the multitudinous formulæ of the Hospital Pharmacopœias, it is best to supply lin. iodi, B.P., when iodine "paint" or "pigment" is ordered.

J. B. L. MACKAY.

[346]. When pigment. iodi is ordered it is customary to send the liniment or a solution stronger than the tincture.

F. STEVENS.

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[348]. Ferri et ammoniæ sulphas ought to be supplied as ordered in the prescription. This salt is erroneously called iron alum (there being no alumina in its composition) while the double sulphate of iron and potash bears the same name.

To dispense ferri et am. cit. would be to exceed the dispenser's bounds. If the latter was really meant the fault rests with the prescriber and no blame would be attributable to the dispenser who used the former salt.

J. B. L. MACKAY.

[348]. Here ferri et ammon. cit. is evidently intended.

F. STEVENS.

[348]. I should use ferri ammon. sulph. as it is ordered. I cannot see why ferri ammon. cit. should be used.

T. J. R.

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[349]. This makes a good mass, rubbed together with a little thick mucilage.

F. STEVENS.

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[351]. This is indeed a difficult case and likely to puzzle many. The prescriber ought to be seen, for possibly it was his intention that bromide of potassium should be exhibited in the form of an effervescing tonic mixture, but then the proportions for neutralization are not correct. There is no *evidence* that hydrobromic acid was intended.

J. B. L. MACKAY.

[351]. In this mixture I think the deposit should be allowed to remain and the bottle shaken.

F. STEVENS.

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[352]. I see no reason why this mixture should present a turbid appearance. My experience is that it does not, even after standing several days. Why Mr. Rogers has failed I cannot say.

F. STEVENS.

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[355]. It is impossible to produce a dry powder with these ingredients as the potassium citrate is so deliquescent. Not long since I had to dispense a prescription containing lithium and potassium citrates with sugar. With the permission of the patient I made a solution of it.

F. STEVENS.

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[357]. This mixture would not become quite clear, the opacity of milk being due to the suspension of minute globules of *fat* on which pepsine has no action whatever. Two hours was ample time for the change to take place, in other words, for the artificial digestion of the caseine contained in the milk.

J. B. L. MACKAY.

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[358]. Rub the quinine to a fine powder, shake up with the tincture and add the fetid spirit of ammonia last. Had the proportions been different, it would be dissolved in the tincture with the aid of heat and the ammonia finally mixed therewith.

J. B. L. MACKAY.

[358]. "Quiniæ Sulph." should rub his quinine to powder with a portion of the water, add tinct. aurant. and spt. ammon. fœt. and remainder of the water. A "shake the bottle" label should be put on.

C. F. W.

[358]. I think "Quinæ Sulph." should prepare the prescription as follows:—Dissolve the quinine in the tr. aurantii by the aid of heat, then add the water, and lastly the spt. am. fœtid.

FERRI CIT.

[358]. Dissolve the "quinine" in the "sp. ammon. fœtid" and "tr. aurant.," afterwards adding it to the water.

T. J. R.

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[359]. Rub the extract with a drop or two of glycerine and water and gradually incorporate with the oil without heat. A slab should be used. It was not permissible at all to employ lin. belladonnæ instead.

J. B. L. MACKAY.

[359]. Carefully dry the ext. belladonnæ at a gentle heat, reduce to powder, sift through muslin, and then rub together with the oil.

The alcoholic extract is tolerably miscible with oil, but as there seems to be some doubt as to its relative strength its employment may be objectionable.

D. D. CAIRNIE.

[359]. Rub the extract in a mortar with a few drops of water to soften it, then add the oil. It may be sent out in a pot or wide-mouthed bottle.

F. STEVENS.

[359]. "Apprentice" might rub in a mortar the ext. belladonnæ with a few drops of boiling water, then gradually add the olive oil and send out in a small W. M. bottle.

J. M.

[359]. I should say the prescriber must mean ℥ij of olive oil. Heat the oil to the boiling point and rub the extract belladonna in it until dissolved.

FERRI CIT.

[359]. Rub the ext. of belladonna down into a smooth paste with a little water, and then add the oil. It will require a "shake the bottle" in sending it out.

T. J. R.

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[360]. Codeia and carbolic acid can be made into pills with bread crumb and mucilage. F. STEVENS.

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[361]. If Mr. Lawton had added the detergent along with the glycerine, then the saponified oil, and lastly the rose water in successive portions he would have succeeded better. J. B. L. MACKAY.

[361]. If this lotion has been sent out with "a sediment only at the bottom," the oil must have been omitted.

F. STEVENS.

[361]. If Mr. Lawton will triturate the oil in a mortar with just sufficient lime water necessary for saponification, then add the powders, then the remainder of the lime water and the rose water, and lastly the glycerine and liquor carbonis detergens, the result will be an elegant flesh-coloured lotion without any supernatant indispersible "scum."

D. D. CAIRNIE.

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[362].

℞ Acidi Hydrochlorici 2·0 = drachmam dimidiam . . . . } By weight.
Tincturæ Aurantii 18·0 = drachmas quatuor et dimidiam . . . . . }

Misce, signa: 10—15 minima = guttas (sumenda sunt).

November 18, 1878.

Dr. Biermann resides during the summer season at Baden-Baden, during the winter season at St. Remo.

W. H. LANGBECK.

A similar reply is sent by T. J. R.

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[363]. The turbidity and coloration are due to the separation of iodine probably caused by impure iodide of potassium. The presence of iodate would account for the change. Tartaric acid would not liberate free iodine from either the iodide or iodate alone, but when both are present iodine is set free.

J. B. L. MACKAY.

[363]. Nemo should test his iodide of potassium. It evidently contains iodate, which is decomposed by the excess of tartaric acid used, iodine being set free.

C. F. W.

[363]. The prescription contains more tartaric acid than required to neutralize the bicarbonate of soda. The remaining acid acts upon the bromide and iodide of potassium, liberating slowly parts of the bromine and iodine, therefore the change of colour.

H. W. LANGBECK.

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[364]. The second article "glycyrrhini" is glycerine.

F. STEVENS.

[364]. The word is simply mis-spelt and one need have no hesitation in dispensing glycerine.

J. B. L. MACKAY.

[364]. I would have no doubt about dispensing glycerine in "Pyrethrum's" case.

J. M.

[364]. The prescriber appears to have made a mistake in spelling. I should read it glycerini.

C. F. W.

[364]. Glycyrrhini should be glycerini, for if glycyrrhizini were intended a much smaller quantity would have been ordered, as the dose of the latter is 1—2 grains.

H. W. LANGBECK.

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[365]. Would any reader of the Journal inform me whether it is possible to prepare the following so as to produce a white ointment?—

℞ Ung. Hyd. Ammon.,
Ung. Pot. Iodidi. . . . . āā ℥j.
Misce. Fiat unguentum.

The above was dispensed with ointments prepared strictly according to B. P., but did not answer the expectation of the prescriber, whereupon he took it to a chemist known to him, and he produced a creamy ointment.

I should be glad to hear the opinions of those who can explain what result they would expect from the above.

UNGUENTUM.

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[366].

℞ Acid. Carbolic. . . . . ʒij.
Ext. Opii . . . . ʒij.
Ol. Olivæ . . . . Oss.
Misce bene. To be used as directed.

How should the above be dispensed?

APPRENTICE.

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[367]. Could any reader mention a convenient mode of forming pills, each to contain 5 grains of black pitch?

SUB UMBRA FLORESCO.

Notes and Queries.

[629]. ROOKE'S GOLDEN OINTMENT.—The ℞ given by Dr. Rooke in his 'Anti Lancet' several years ago, was ung. hyd. nit., and the reason he afterwards assigned why he began to prepare it himself was the number of complaints he received of a total want of uniformity in the article sold by the trade (*vide* fol. 113).

RUSTICUS.

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[632]. CHLORAL HYDRATE.—Will some of your readers give me their experience of the above in solution in distilled water. Some draughts 25 grains to ℥iss appear to have undergone some change from keeping. What is the change that occurs chemically?

DELTA.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE CREAM OF TARTAR OF THE PHARMACOPŒIA.

Sir,—In reply to Professor Redwood's remarks on a portion of my letter contained in your issue of October 11, and to which he appears to take exception, I think it must be evident to most of your readers that "vagueness and ambiguity" lie in the direction I there indicated and not "somewhere else," the Professor's remarks to the contrary notwithstanding; and I think, further, that he has slightly misunderstood what I intended to convey by the first portion of my remarks. When I stated (parenthetically) that "this crude tartar" was evidently something quite distinct from cream of tartar, it was intended to refer not to any ambiguity on the part of the Pharmacopœia description, but to the evidence of Mr. Hodgkinson, reported in the Journal of September 27, p. 257, viz., that "cream of tartar was sent to this country from Spain and France, and came in a state that was known as argol. . . . . . The argol was generally taken from the docks by the grinders. . . . . . Argol, or cream of tartar, was the natural product of the fermentation of the juice of grapes."

If, therefore, Professor Redwood is "at a loss to understand how anyone could suppose that crude tartar on being ground would form cream of tartar or anything like it," probably the evidence quoted above will convince him that such a supposition is entertained by some; but at the same time I wish it to be distinctly understood that I never assumed or affirmed anything of the sort, knowing perfectly well that ground argol, whether red or white, is quite a distinct thing from cream of tartar.

With reference to the tests given in the Pharmacopœia for ascertaining the purity of cream of tartar (and it is here that the "ambiguity" I mention lies), the first one provides one for the presence of a trace of calcium salt, the next points to the absolute purity of the article; if it does not, may I ask Professor Redwood why 188 grains are taken and why the residue obtained on heating this to redness till gas ceases to be evolved requires for exact neutralization (exact neutralization being not always required in the application of the Pharmacopœia tests) 1000 grain measures of volumetric solution of oxalic acid. If this is not intended as a quantitative test for the amount of potash salt, of what use, may I ask, is the test at all? I am quite aware that the calcium carbonate in the residue would consume the oxalic acid equally with the potassium salt, but I scarcely think anyone would apply the test without first washing out the soluble potassium salt on a filter.

My suggestion that some wholesale house should send out an article guaranteed to within 5 per cent. of impurity had no reference whatever to the Pharmacopœia description, neither did I give, so far as I am aware, any reason for the supposition on Professor Redwood's part that the above quantity was what I meant by a "trace" of impurity; this suggestion was made solely with the idea that it would represent a product commercially attainable, and not an impossible one, such as the Pharmacopœia indicates.

137A, *Aldersgate Street*. ALFRED E. TANNER.

P.S.—In my letter of October 11, line 8, "1 grain" is a misprint for "1 gramme."

Sir,—Professor Redwood's letter in your last issue asserts that "in the case of cream of tartar, the lime salt, the presence of which is indicated by the test, being variable in quantity, the specified indication of it is made to refer to a minimum rather than a maximum quantity."

I do not know whether Professor Redwood makes this assertion on his own authority alone, but I certainly cannot think that the Council of the Pharmaceutical Society, composed of gentlemen practically acquainted with the drug trade, would endorse such an erroneous statement.

According to this statement of Professor Redwood's, the presence of any proportion of lime salts, even 90 per cent. would not constitute a violation of the "characters and tests" of the Pharmacopœia, while acid tartrate of potash chemically pure would be in direct violation of such "characters and tests."

Professor Redwood's connection with the Pharmacopœia can certainly give him no right, after it has been published, to pretend to read between the lines and say that the tests for impurities refer to minimum, rather than to maximum quantities, and therefore, until his statement is adopted by others, it would rank simply as the expression of an individual opinion; but if it is so endorsed, the value of the Pharmacopœia, as a standard, is at an end, since every analyst will have a perfect right to put any possible or impossible interpretation that he may think fit upon all the "characters and tests." If it is permissible to make one alteration, it is obviously impossible to draw the line there, and further alterations must be permitted.

By all means let every error which exists in the Pharmacopœia be set right, but this must be done in a proper way, and after full discussion, and not by tampering with the plain and common-sense meaning of the words used.

The particular subject of cream of tartar is of small importance compared with an attempt like this to destroy the only existing standard, and therefore as far as that substance is concerned, I content myself with saying that though tartrate of lime may be, and doubtless is, a necessary ingredient of commercial cream of tartar, and the admixture of small proportions of it would therefore be wisely overlooked by the public analyst, yet until the Pharmacopœia is amended it is not a "legitimate" constituent of the drug, except in "traces only."

79, Great Tower Street, E.C. G. W. Wigner.

Dispensing Memoranda.

Sir,—The astonishingly divergent opinions finding expression under the above heading in your issue of the 18th inst., give four most important indications:—

1st. The very varied manner in which a prescription is handled at different pharmacies.

2nd. The limited character of the libraries of some pharmacists, or else the inability of the latter to make proper use of standard works of reference.

3rd. That questions, which to some minds appear palpably absurd, should not be excluded from the "Dispensing Memoranda."

4th. The absolute necessity that every pharmacist should utilize some means of intercourse with other members of the trade in order to promote unanimity of opinion.

In the issue referred to, Mr. Wilkinson gives the correct answer to No. 346 (pigmentum iodi). In such cases the name of the prescriber should be ascertained, from the signature, and that of the hospital where he studied. The intended preparation will probably be found in the Pharmacopœia of that hospital.

After reading his reply to No. 346, I was surprised to notice his answer to No. 348 (ferri ammon. sulph.); since by using ferri am. cit. he takes a most unwarrantable liberty, unless he is furnished with data not supplied in the prescription (such as a personal knowledge of the idiosyncrasies of the prescriber). The *modus operandi* indicated by "Nemo" is even more objectionable. It is impossible, in this case, to state definitely what the prescriber intended, for there are two double sulphates of iron and ammonia containing iron in the ferrous and ferric states respectively, viz., the ordinary photographic salt, $Fe''SO_4, Am_2SO_4, 6H_2O$, mentioned by "St. Rule," and iron alum, $Fe'''_2 3SO_4, Am_2SO_4, 24H_2O$, referred to by J. C. But the ambiguity does not extend beyond these two salts, and if the prescriber cannot be consulted, either might be used, and a note made on the prescription to indicate which was dispensed for the guidance of subsequent dispensers. Since "iron alum" is more frequently used in medicine and the ferrous double salt finds its chief application in photography, it is, perhaps, more than likely that the former was meant. It would certainly be a doubtful compliment to a pharmacist's education for him to plead ignorance to his customer, as "Nemo" recommends. He ought to know either that he does not keep in stock the ingredient ordered, or that the prescriber has omitted indispensable data.

In reviewing these varied opinions, it is important that we should trace out the cause of the discrepancies, and endeavour to indicate the remedy. The primary cause is the carelessness of the prescriber in using ambiguous nomenclature. The ever-expanding fields of information recorded in every branch of science render it a necessary consequence that a man wishing to become eminent must confine himself to a branch of study, to the exclusion of other sections of science. For this reason scientific men are rarely good scholars, and, on the other hand, good scholars have, as a rule, but a partial familiarity with science; so also eminent medical men are rarely good chemists or pharmacists, therefore chemistry and pharmacy should find their devotees amongst pharmacists. Prescribers, then, would render a great service to pharmacists, saving them from much undeserved mistrust and ignominy, if they were to avoid dabbling in doubtful synonyms, and for substances, etc., contained in the British Pharmacopœia, to use the precise nomenclature there employed. For galenical preparations not included in the B.P., the initials of the Pharmacopœia, or other standard works, where the formula may be found, should be appended. For non-official chemical preparations, they should inquire of a pharmaceutical chemist (one who has studied the science, and not one who has been simply crammed for his examination) whether there is any doubt about the name he uses.

Having pointed out one cause and its remedy from the prescriber's point of view, I proceed to append remedies from the dispenser's standpoint.

Firstly, careful perusal of the "Dispensing Memoranda," inserting notes of incompatible mixtures, etc., and expressing opinions on the questions raised. An adverse opinion was recently expressed on the ground that it would excite want of confidence among medical men and others reading the divergent opinions; but I consider that the removal of the cause of mistrust far outweighs an objection of that sort, and I am sure that a medical men of any perception would see the cause, and appreciate the cure. In fact, the medical profession has found a similar need, and applied a parallel remedy in the column of the *British Medical Journal* headed "Our Confessional."

Secondly, I would urge upon all chemists, assistants and apprentices, the value of forming associations at the meetings of which all such difficulties could be discussed.

Thirdly, that chemistry proper should be more stringent at the "Minor," and that an acquaintance with other pharmacopœias than the British should be required.

In conclusion, I would express my opinion that the "Dispensing Memoranda" is doing a great and good work, but I trust that it will not be trifled with by correspondents sending in absurd questions "as a joke," or without having previously made endeavours to solve them.

R. H. Parker.

Sir,—May I suggest that in the case of answers to the questions on dispensing, the name of the writer should appear, and not a "nom de plume," which in many cases hides a lamentable ignorance. This would give your readers some idea of the value of the opinions, and would, I venture to think, save your space for more trustworthy information.

C. Parkinson.

Registration under the Dental Act.

Sir,—The large amount of (in many cases) intemperate correspondence respecting the right of a chemist extracting teeth and performing the minor operations in dental surgery to use the title of "dentist" is truly absurd.

Turning to the dictionary, we find the definition of a "dentist" as "an operator on the teeth." (N.B.—It does not say "a maker of artificial teeth.")

If extracting a tooth is not an operation in dental surgery, what is it?

If the *bonâ fide* dentist is to be only the man who can do both the mechanical and surgical work, it is quite evident that many old respected practitioners must give up.

How many of the great guns could make a piece decently if they tried?

Most dentists put out their work to mechanical men. It is not considered the province of the medical profession to make crutches or wooden legs, and I believe there are many *bonâ fide* dentists who can extract, scale, stop, take impressions and fit, who never made a set in their lives.

To what end did the Pharmaceutical Society obtain the terms of "dentistry in conjunction with pharmacy" if it was not to cover the existing rights of those chemists who extracted teeth, etc., to use the title of dentist and to continue their operations? And if, as some affirm, it is not necessary to register to perform dental operations if you do not call yourself a dentist, perhaps some one can explain why there are separate clauses, "in conjunction with medicine or surgery," "in conjunction with pharmacy"? Let the chemists hold their own.

DEFENCE, NOT DEFIANCE.

Hours of Trading.

Sir,—The unnecessary late closing of some chemists' shops is a scandal. I say unnecessary, because I feel convinced that a great deal of the trade done after 8 p.m., or whatever times the shttters are put up, might be got through before that time, if chemists in their respective towns would agree amongst themselves to discourage the late shopping of some of their customers. I wish I had the power to persuade my brethren in the trade to cultivate a little friendly co-operation amongst themselves to this desirable end. I agree, therefore, with the remarks by "Camphora" in to-day's Journal.

Referring to the letter of "Verus" in the Journal of Oct. 11, I cannot see that the fact of his not having been a day out of his shop for "nearly twenty years," is worthy of boasting about. There must be a serious risk of the man becoming very narrow minded who confines himself for so long a period to the limits of a chemist's shop. Or I may be wrong. The "contented mind" may be the "continual feast."

16 and 17, *Cliffe, Lewes.* W. T. MARTIN.

The Drug Trade in South Africa.

Sir,—Enclose please find extracts from letters I have received from a friend in the drug trade in South Africa, Orange River Free State. I have no doubt they will be read with interest by others as well as emigrants; they give a fair idea of what this man had to contend with. He had a good notion of insinuating himself into the good graces of those with whom he came in contact. He went out on "spec," taking with him a lot of meerschaum pipes, which he sold well. How a person would do there now is a problem. The results of the late war are to be felt.

October, 1877.

"Teacher, barman, farmer, brickmaker, and now back to the old trade again. Get £6 a month and all found. Just moved into a very fine shop to-day; have soda water machine, and do a roaring trade, sell large quantities of Dutch drops to the Boers. The bases are valerian, ether, turps, camphor, assafœtida, etc. The governor has done well up here, visits, performs surgery, midwifery, etc., and charge slap up. The Boers think him a demigod. Patents, are 13½*d.*, 2*s.* 6*d.*, !2*s.* 9*d.*, 5*s.* 6*d.*, and so on. Mixtures 4*s.*, 7*s.*, and often more.

"I had rough times at first, and have slept on the grass many times, with clothes wet, and no blanket, under waggons and in barns, walked all day, and lain down at night, and have met better men worse off.

"I cannot recommend emigration indiscriminately. You see many a man rubs along at home, with his own family connections, etc., and passes for a good sort, who if placed in a strange country, with no social influence to check him, would go to the very lowest. That is my idea, I give it for what it is worth. I think it is a side of the question which is not often put forward, but it should be."

Extract March 20, 1879.

"The dullness of a small colonial town is intolerable, so I gave up my berth. When the terrible news came of the loss at Isanhlawana I could stand it no longer, so I joined the Transvaal Volunteers. Our pay is 12*s.* a day, out of which we pay our expenses, expected to be 3*s.* or 4*s.*"

Letter dated May 16, 1879.

"Unless a person comes to a situation he must make up his mind to rough it, or at least to turn schoolmaster, which is the only thing open for strangers who are not mechanics, and have not coin enough to start farming on their own account. . . . A situation is easily obtained from advertisements in the *Chemist and Druggist* and *Pharmaceutical Journal.*"

J. S.

Sir,—Of pharmacy in the Transvaal I know nothing, not having been there, but I know that many of the Dutch Boers, during their annual visit to Maritzburg to dispose of their produce, buy their medicines there, and seem to keep a stock. The prices obtained are generally large, but trade is chiefly done by barter, the merchants buy their produce, and supply them with goods, and any they do not keep they either get for them, or if they recommend any customer, the chemist has to allow a commission, which I consider a very rotten state of trading. A knowledge of Dutch is absolutely necessary in Transvaal. There is a nominal examination to pass by a Medical Board before anyone can commence business in Natal. I think they accept the pharmaceutical certificates in lieu of examination.

There were about nine or ten chemists in Durban and Maritzburg when I was there, the hours of business being generally from 7 in the morning till 5 p.m., the days varying only about two hours in the year. Salaries vary from £70 in the house to £100, and about £150 out-door. There are some in business who have done very well; but I should say that Natal now (just after the war) will be very dull for some time, as merchants have bought largely during the war, and they are now forcing their goods on to the market at any price.

The trade there is similar to here, except that all the medical men send their prescriptions to the chemist. There is a large trade done in cooling drinks. I know one chemist in Maritzburg (who does a large business with the military officers) who must have coined money during the war.

A RETURNED EMIGRANT.

"*Kenbaan.*"—The question of "official" *v* "officinal" has been frequently discussed in this country and the United States, and probably it will not be lost sight of when the time comes for the revision of the British Pharmacopœia.

"*Ferri Cit.*"—Recipes for Glycerine Jelly will be found in the Journal for November 30 last (vol. ix., p. 462).

"*Theta.*"—The second word is the Spanish word for "English," but we do not recognize the first. It might be equivalent to "kino."

T. J. R.—The double salt is more stable.

T. W. G.—See a paper on the colour of podophyllum resin, by Messrs. Senier and Lowe, in vol. viii., p. 441.

"*Surrey.*"—We should require to see a specimen before accepting the statement.

"*Inconvenience.*"—We believe the Catalogue is now being compiled.

"*Triplex.*"—The Dental Act was printed in vol. ix., p. 52. The Registrar under the Act is Mr. W. J. C. Miller, Medical Council Office, 315, Oxford Street, W.

"*Carey.*"—The subject of the strength of Orange Flower Water was discussed during the meeting of the Pharmaceutical Conference in Dublin last year. See *Pharm. Journ.* [3], vol. ix., p. 249.

"*Gwendoline.*"—No. 6 is probably *Festuca gigantea.* The other five are correctly named.

Erratum.—On p. 320, col. ii., line 19, *for* "On glancing at the above title," *read* "On glancing at the above table."

"*Juror.*"—The 12th section of the Juries Act, 1870, provides that "No person whose name shall be in the Jury Book as a juror shall be entitled to be excused on the ground of any disqualification or exemption, other than illness, not claimed by him at or before the revision of the list by the justices of the peace."

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Mayhew, Hughes, Simcock, Kent. Long, Warneford, Leigh, Rainer, Postans, Student, Isograph, Nigel, Cumberland, Sub Umbra Floresco, Delta, Olibanum, Tinctura.

TARTRATE OF LIME IN CREAM OF TARTAR.

BY B. H. PAUL, PH.D.

Having regard to the recent discussion as to the amount of lime existing in the state of tartrate in cream of tartar, it may be of interest to make known the following results of some experiments carried out with the object of determining the extent to which cream of tartar prepared in the usual way might contain lime combined with tartaric acid.

Tartrate of lime was in the first instance prepared from tartaric acid and carbonate of lime, using such proportions as would furnish a salt having the composition represented by the formula $C_8H_{10}CaO_{12}$. The boiling solution deposited on cooling, crystals, which by analysis were proved to contain 21 per cent. CaO, instead of 16·6 per cent., which would be the amount in a true acid tartrate having the formula above mentioned. This salt was not therefore a bitartrate, though the conditions were suitable for the formation of that compound. Neither was it a neutral tartrate, $C_4H_4CaO_6$, for in the anhydrous condition this salt contains 29·7 per cent. of lime.

However, on adding the crystallized tartrate of lime to a boiling solution of bitartrate of potash, prepared by neutralizing 5 grams of tartaric acid with carbonate of potash, and then adding another 5 grams of tartaric acid, the tartrate of lime was dissolved, and after some few minutes the liquid was filtered while near the boiling point. On cooling, crystals were deposited having all the external character of bitartrate of potash; but on analysis this salt was found to contain a considerable amount of lime, though forming a perfectly clear solution.

It is therefore evident that the ordinary method of preparing cream of tartar is not capable of effecting the entire separation of the potash salt from the lime salt, which is so frequently a constituent of "argol," both as of normal origin from the grape juice itself, and also in part produced by the reaction of gypsum added to the must in the process of wine making.

As a necessary consequence tartrate of lime must be looked upon as necessarily forming some part of the "cream of tartar" met with in commerce, as an extraneous matter with which the drug is unavoidably mixed in the process of preparation, not as an impurity or adulterant according to the terms of the Food and Drugs Act. The extent to which this substance extraneous to bitartrate of potash may be present in "cream of tartar" will appear to be somewhat different, according to the nature of the compound that a certain determined percentage of lime is assumed to represent. Taking the salt referred to above, for example, if the amount of neutral anhydrous tartrate of lime would be 7·6 per cent. the amount of the same salt in a hydrated condition would be 10·5 per cent. and the amount of bitartrate of lime would be 13·6 per cent.

The amount of water in neutral tartrate of lime is here taken as being four molecules; but there are diverse statements on this point, and therefore it would perhaps be best to state the amount of extraneous material in terms of anhydrous tartrate of lime. If sulphate of lime also be present, as it sometimes is in small amount, allowance must be made for this in calculating the quantity of tartrate of lime from the lime found by analysis.

As regards the presence of sulphate of lime in "cream of tartar," it would appear that this can only be the case when adulteration has been practised, unless the amount of sulphate of lime be very small, for it is improbable that such a quantity as 20 per cent. of sulphate of lime can be introduced into "cream of tartar" during the ordinary preparation of that article and remain as such in it. More likely there would be decomposition of the sulphate together with the production of tartrate of lime and sulphate of potash, and in this way the greater part of such an amount of sulphate of lime would be got rid of. But if the sulphate of lime be added in the state of powder to the "cream of tartar," it is to be understood that its presence would be indicated by analysis.

ACONITUM HETEROPHYLLUM, WALL.*

BY DR. M. DUNIN V. WASOWICZ.

(*Continued from page* 303.)

In the chemical examination of the roots I first prepared an infusion, and then a clear decoction with 50 grams to 250 grams of liquid, and applied to these the following tests:—

(A.) The watery infusion filtered slowly but clear. It was yellow coloured, had a bitter taste, reddened blue litmus paper, frothed considerably, became covered after a time with a thin pearly film, and after two or three days became turbid. Perchloride of iron produced neither in the cold nor after heating any precipitate or turbidity. Tannic acid solution produced at once a dirty white turbidity that disappeared completely by gentle warming and reappeared on cooling. Nitrate of silver produced a slight white turbidity, and after a time a flocculent yellow precipitate. Acetate of lead produced a dirty white precipitate that did not disappear on boiling. With basic acetate of lead the precipitate was more voluminous and dark yellow coloured. Tartrate of antimony and sulphate of copper did not produce either precipitate or alteration of colour. Gelatine solution did not produce either alone or by addition of hydrochloric acid, any precipitate, even after the liquid was allowed to stand or by boiling. Solution of iodine in iodide of potassium produced a deep yellow coloration that soon became blackish blue, and after some time a dirty brownish black precipitate. Potassio-iodide of mercury and potassio-bromide of mercury produced a white turbidity.

(B.) The decoction was darker coloured, filtered very slowly, soon became turbid, and behaved generally like the infusion, except that the reactions were more distinct. A quantity of both liquids was precipitated with basic acetate of lead, and—

(1) The precipitate was decomposed by sulphuretted hydrogen. In the filtrate, which had a distinctly acid reaction and tasted but slightly bitter, gelatine solution produced no precipitate; perchloride of iron coloured it blackish (not green); mercurous nitrate produced a white precipitate.

(2) The liquid separated from the precipitate and from excess of lead was acid, very bitter, and gave at once considerable precipitates with tannic acid solution and potassio-iodide of mercury. Portions of the extracts were boiled with lime water and became at first reddish and after longer boiling dirty green coloured, from which I inferred that decom-

* *Archiv. der Pharmacie*, vol. xi., p. 19

position must have taken place. This observation induced me to avoid the use of alkalies and alkaline earths and to adopt the following mode of treatment.

The coarsely cut roots were extracted with alcohol of 85 per cent. with gentle heat and the filtered extract distilled to remove the alcohol. The residue, having the consistency of thin syrup, deposited after twelve hours standing in the cold an apparently crystalline mass, having a fatty feel. This was separated by filtration from the liquid portion, which was diluted with a large quantity of water and evaporated on a water-bath until all the alcohol was got rid of. After cooling, a further small quantity of the above mentioned brown fatty mass separated upon the surface and was removed from the liquid, which when filtered had a dark brown colour, an acid reaction, and a very bitter taste. It was mixed with basic acetate of lead until nothing more was precipitated. The dirty yellow precipitate was washed with water until sulphuric acid gave no further reaction with the washings. In this process there were obtained for further examination:—

(A.) A brown apparently crystalline fatty mass.

(B.) The precipitate produced by basic acetate of lead, probably containing the acids separated.

(C.) The liquid filtered from the lead precipitate, in which bitter substances and alkaloids were to be sought.

(A.) *The brown, apparently crystallizable, substance* did not dissolve in water or alcohol, and was only partially soluble in boiling water or ether, but dissolved completely in amylic alcohol to a clear dark brown liquid. The ethereal solution was of a brownish colour, and was without any action upon red or blue litmus paper. The solution in amylic alcohol had a slight acid reaction.

After evaporating the ether there remained a slight brownish apparently crystalline residue, which was completely volatilized when heated on platinum foil, giving off an odour like burnt fat. Being convinced that I had to do with a vegetable fat, the entire quantity of the brown substance was several times treated with ether, and the solution thus obtained was shaken with water acidulated with sulphuric acid until it no longer became coloured. After distilling off the excess of ether I again obtained a brown coloured substance that was again dissolved in ether, and shaken with acidulated water. As this no longer became coloured the residue left after evaporating off the ether was mixed with animal charcoal, and after some time again extracted with ether. The solution thus obtained was considerably paler. A portion of it was rapidly concentrated and saponified with soda solution—sp. gr. 1·11—the yellow-coloured soap, separated with salt, dissolved in boiling water, digested with animal charcoal, the boiling solution filtered, and then decomposed with dilute sulphuric acid. The fat acids thus separated were converted into soda and then into lead salts; the latter treated with ether appeared to consist chiefly of oleate. I did not succeed in detecting glycerine in the mother liquor.

Another portion of the ethereal solution was allowed to evaporate slowly in the cold. After two days there remained a soft yellowish-white mass that asted at first mild and afterwards somewhat acrid. This was partly soluble in absolute alcohol. It melted at 32° C., and did not again solidify to a uniform mass, but remained partially liquid. The liquid portion had a distinctly acid reaction, and did not solidify until cooled below zero. The purified fat burnt with a slightly smoky flame, giving off a distinct odour of burning wax. Its specific gravity at 15° C. was ·895.

When exposed for some time in an open vessel to the action of the air the fatty mass separated into two layers. The upper oily rancid-smelling dark coloured layer had a distinctly acid reaction, and dissolved readily and completely in 95 per cent. alcohol. The lower layer, after washing with alcohol, appeared as a white apparently crystalline mass that dissolved readily in boiling alcohol and in ether. It crystallized out from the ether in small needles that melted at 62° C., and accordingly was palmitic acid.

It then remained to ascertain whether the fat contained stearic acid. For that purpose I prepared from the liquid portion of the fat soluble in cold spirit a lead salt, under the impression that the oleic acid might be mixed with stearic acid, since stearic acid is soluble in cold alcohol. The lead salt thus obtained did not dissolve completely in ether, so that I conjectured that stearic acid was also present, although in very small amount.

More minute chemical examination was scarcely possible, since the whole quantity of material did not exceed three grams.

The circumstance that I was not able to detect glycerine in the mother liquor was not to be regarded as a proof that the fat was only a mixture of the three acids, and not a glyceride, as it is well known that glycerine is difficult to detect in such small quantities, and if the fat were not a glyceride the original ethereal solution should have had an acid reaction.

(B.) *The lead precipitate* was thoroughly washed, suspended in water while still moist and decomposed with sulphuretted hydrogen. The filtrate from the sulphide of lead was evaporated, after separating the sulphur to the consistence of an extract. The residue was readily soluble in water and the solution was more or less dark coloured according to strength. It had a very slight bitter taste, reddened blue litmus paper, did not give a precipitate with gelatine, acquired a blackish colour with perchloride of iron, did not become turbid with tannic acid solution, but gave with the double iodide of potassium and mercury a slight curdy precipitate, and deposited after long standing warty crystals in very small quantity. This solution was again precipitated with basic acetate of lead and the precipitate treated as above described. In the solution of the extract thus obtained double iodide of mercury and potassium no longer gave a precipitate.

The extract thus purified was thoroughly extracted with ether. The yellowish solution had a sourish taste and left after evaporating off the ether, a yellowish indistinctly crystalline mass, completely soluble in ether, alcohol and water. The aqueous solution of it, digested with animal charcoal, deposited after some days an almost colourless warty crystalline mass. This had a sour taste, was free from odour, melted at 165° C., and charred when more strongly heated, but did not volatilize.

The conjecture that this substance was aconitic acid was readily confirmed. The aqueous solution gave with mercurous nitrate a white flocculent precipitate; nitrate of silver gave no precipitate. The neutral soda salt gave with nitrate of silver a white precipitate that soon became black, and perchloride of iron gave a reddish-brown precipitate. The rest of the acid was crystallized again from ether and burnt. I thus obtained from 0·1823 gram of dried substance:—

$0·2756\ CO_2 = ·07515\ C = 41·223$ per cent. C.

$0·061\ H_2O = ·0066\ H = 3·620$,, H.

For $C_6H_6O_6$	Calculated.	Found.
C. . .	41·379	41·223
H. . .	3·447	3·620
O. . .	55·173	

The portion of extract insoluble in ether, and constituting the greater part of it had still an acid reaction. Its taste was at first mild and afterwards disagreeably astringent. It was dissolved in a little water, mixed with animal charcoal, evaporated to dryness, and extracted with dilute alcohol. The solution had a brownish-yellow colour, slight acid reaction and was coloured black by perchloride of iron. When boiled with ferrous sulphate no change took place, but after adding acetate of soda in solution the liquid immediately become black. The solution did not reduce Fehling's liquor, but when a large quantity of the alcoholic solution was evaporated to a syrupy consistence, and then boiled with a solution of oxalic acid, cuprous oxide was at once separated.

Basic acetate of lead therefore precipitates from the watery extract of the root aconitic acid, a peculiar form of tannic acid, grape sugar and mucilage.

(*To be continued*).

FUCUS VESICULOSUS.*

The subject of obesity and its treatment has of late years received much attention both from doctors and their patients. The interest excited by the appearance of Mr. Banting's 'Letter on Corpulence' will not be readily forgotten. The medicinal agents most commonly employed in the treatment of this condition are acids,—chiefly in the form of lemon-juice and vinegar,—strong alkalies, and iodide of potassium. Of late, however, a preparation known as "anti-fat" has been extensively advertised, both in this country and in America, possessing, if we may accept the statements of the proprietors, very remarkable powers in removing that superabundance of fat which is so frequently a source of anxiety and discomfort to those who indulge too freely in the pleasures of the table. Anti-fat is said to be a fluid extract of *Fucus vesiculosus*, a common sea-weed, known in this country as sea-wrack or bladder-wrack, and in France as Chêne marin or Laitue marine. It is largely employed on the coasts of Scotland and France in the preparation of kelp; whilst in Ireland, curiously enough, it is found to be invaluable for fattening pigs. It contains, as might be expected, large quantities of iodine, chiefly, according to Gaultier de Claubry, in the form of iodide of potassium.†

Fucus vesiculosus was at one time officinal in the Dublin Pharmacopœia, and is by no means a new remedy. Pliny describes it under the name of *Quercus marina*, and says it is useful for pains in the joints and limbs. In the eighteenth century it was largely employed by Gaubius, Aunel, Baster, and others, in the treatment of scrofula, bronchocele, and enlarged glands, and even for scirrhous tumours. Its charcoal, known as *Æthiops vegetabilis*, was used in the same class of cases. The fucus has also been found useful in skin diseases and asthma. On the discovery of iodine, in 1811, by Courtois, the saltpetre manufacturer of Paris, it for a time fell into disrepute. In the year 1862 its use was revived by Professor Duchesne-Duparc, of Paris, who whilst using it experimentally in the treatment of psoriasis, found that it possessed the singular property of causing the absorption of fat.

The fucus can be taken either as an infusion, made by steeping half an ounce or a small handful in a pint of boiling water, or in the form of pill or liquid extract. The dose of the infusion is about a cupful, but it is so abominably nasty that few people can be induced to take it. The pills contain each three grains of the alcoholic extract; and, to begin with, one is taken in the morning, an hour at least before breakfast, and another in the evening, about three hours after dinner. The dose is increased by a pill a day, until the patient is taking ten every morning and evening. It is directed that the ten pills should be taken *dans la même séance*, and that a greater interval should not be allowed to elapse between each pill than is necessary for the process of deglutition. The fluid extract may be given in drachm doses, and it is said that the best results are obtained when both the solid and liquid extracts are taken. In favourable cases the sufferer may expect a reduction in weight of from two to five pounds in the week. Unfortunately, however, the fucus appears to be somewhat tardy in its action, and the patient should lay in a good stock of the drug before commencing treatment. In successful cases one of the earliest effects is an excessive diuresis, and the urine is said to become covered with a film of a beautiful nacreous aspect. In one carefully recorded case the patient did not observe this, but noticed that his water was very high-coloured, and that its odour was extremely offensive. The next action of the drug is usually on the bowels, and the patient has many calls to relieve himself, without, however, being able to pass anything more than a little mucus. Sometimes the feet and body exhale a peculiar fusty smell, so that the patient is a nuisance both to himself and friends. After this, as a rule, the reduction in weight takes place. Occasionally, however, the opposite effect is produced, and the patient gets stouter than ever; in fact, fucus has been recommended as an "anti-lean."

By some authorities it is stated that the fucus should be gathered at the period of fructification, about the end of June, and that it ought to be rapidly dried in the sun; whilst other and equally eminent authorities insist that it should be gathered only in September, and that it should be allowed to dry slowly in the shade, a high temperature, according to them, destroying its active properties. It is generally agreed, however, that the roots and stalks should be rejected, and that the fucus gathered on the west coast is superior to that of the east. We understand that as a matter of fact most of our fucus comes from Billingsgate market, it being extensively employed for packing fish.

It must be confessed that we know little or nothing of the mode of action of this remarkable drug. We are told that it "stimulates the absorbents," but that is throwing very little light on the subject. What we want is a real sound systematic study of its uses and properties, both in the physiological laboratory and at the bedside. When it has been thoroughly and carefully worked out, as so many drugs have been of late years—pilocarpine and gelsemin, for example,—we shall be able to form an opinion as to its value, but at present we are quite in the dark.

* From the *Lancet*, October, 25, 1879.

† *Fucus vesiculosus* is one of those seaweeds which yield an ash containing the smallest amount of iodides. See *Pharm. Journ.*, ix., p. 303.—Ed. Ph. Journ.

CARICA PAPAYA AND PAPAYOTIN *

BY DR. THEODOR PECKOLT.

The papaw tree belongs to the family of the Papayaceæ, which in this country (Brazil) is represented by only two species. It is called by the Pupi Indians "ambapaya" and by the Brazilians "mamao." The trees are diœcious and hermaphrodite, the hermaphrodite tree being distinguished by the people as the "mamao macho" (male mamao), and the fruit-bearing tree as the "mamao femea"

* From the *Zeitschrift d. allg. österreichischen Apotheker-Vereines*, vol. xvii., pp. 361 and 373 (Aug. 20 and Sept. 1, 1879).

(female mamao); further a cultivated variety of the latter is known as the "mamao melao" (papaw bearing mamao).

In the hermaphrodite tree the young plants have the leaves alternate, but these fall off after a short time, leaving only the leaves of the crown; the petioles are divergent, 27 to 32 inches long; the leaf which is disposed like a shield is rounded, about 14 inches broad, divided into seven lobes, and these lobes again into seven sub-divisions. Inflorescence male and female, disposed in racemes; flowers pale yellow, or white, with a pleasant odour, faintly resembling jasmine, differing in appearance from those of "mamao femea" and "mamao melao" in the flower stalk being 8 inches long. The first flowers of a nine months old hermaphrodite tree are always male only. Six months subsequently the development of numerous carpels may be seen, and these gradually continue to be formed. The fruit-bearing flowers which always commence from below, bloom and then bear fruit uninterruptedly throughout the whole year until the death of the tree, which usually takes place after four or five years.

The stems are elegant, and notwithstanding it is stated in some works that the *Carica Papaya* is without branches, this is not the case in Brazil with the hermaphrodite tree; for in the second and third years it throws out abundant branches which bear at first only male flowers.

The fruit of the hermaphrodite tree is considerably smaller than that of the "mamao femea." It is as large as a fist, pear shaped, light yellow when ripe, irregularly furrowed into seven perceptible divisions, and has an average weight of ten ounces. The seeds, when planted, yield both kinds of trees.

The fruit-bearing papaw ("mamao femea") has larger leaves and large perfect separate flowers which are situated immediately above in the crown between the leaf stalks and the stem itself. The flowers are yellowish, 2 inches long, ⅜ inch wide, recurved and revolute, delicate as a wax flower and have a more powerful odour than the preceding. The fruit attains almost the size of a walnut before the flower falls off; in the ripe condition it is as large as a small gourd, but rounder, not so pear-shaped, and provided with a wart; it is of a yellow colour and often weighs a kilogram or more.

The kind improved by cultivation, the "mamao melao," has the same habit, but yields fruit larger than a human head, orange yellow in the ripe condition and weighing from 4 to 6½ pounds. The fruit of the *Carica Papaya* contains over a hundred small polished wrinkled brown seeds, about twice the size of linseed.

The stem of a full grown tree is about 13 to 17 feet high and frequently 12 to 20 inches in diameter; the hermaphrodite tree is often branched above, the diœcious tree always branchless. Stem cylindrical; bark smooth, grey at the lower part of the stem, and greenish above, woody, fibrous, and easy to cut; beneath is a layer the thickness of a finger, of a herbaceous substance like a cabbage stalk; all the remainder is hollow, but has internal partitions at the rings, like the bamboo, which are very porous and easily penetrated.

This herbaceous tree is in Brazil a constant companion of the banana, and is never wanting near the huts of the natives. And rightly do the Indians honour this useful and most grateful tree, specially selected by Providence for a people averse to any cultivation, for without the slightest care or labour after a few months' growth it yields harvests the whole year through.

Notwithstanding that in respect to nutritive value the fruit cannot compete with the banana, its use makes a refreshing change, and as will be seen subsequently by the analyses it is not so very poor as a food stuff.

The *Carica Papaya* is in the present day hardly absent from any tropical country in Asia and Africa, and it appears to have been shown that like the maize the papaw tree has spread from west to east, or rather from America to Africa and then to Asia. Marcgraf states that he found it growing wild in the primitive forests of Brazil; other authors think it had its origin within the tropical portion of the American continent; certain it is that it was found domesticated near the dwellings of the Indians when Brazil was discovered.

Dr. Heinrich Barth states that in Central Africa the fruit bears the name of "gónda-n-masr," equal to the Egyptian "gonda," which appears to indicate that it has been introduced within historic times through Egypt. But I believe that this tree of a four or five years' life, which like maize, can only be continuously cultivated by means of seed, requires no "historic time" in order, even more rapidly than maize, to become naturalized in all the tropical countries of the world, and the more so because the seeds, unlike those of maize, are not destroyed by insects or beasts, but are in fact more rapidly spread by them. In the northern districts of the Soudan Dr. Barth found the papaw but seldom; on the other hand in the districts between Kátsena and Nyffi, as well as in the southern parts of Kano, Pangónda and Gudjeba, southward to Benuë, scarcely anything else than the papaw tree was usually found. By the Fulde it is called "dukudje" and by the Kanori "bambus masarbe." Both Dr. Barth and Dr. Rohlf speak of the refreshing taste of the fruit, which would also be noticeable in Brazil, if it were not for the possession of a large number of other delicious tropical fruits.

In Brazil the tree is scarcely cultivated, or with but little care, its continued planting, like that of the banana, being self-effected, but with this difference that instead of shoots from the roots it is done by the seeds of the fruit rotting on the ground. The tree is simply left to stand where the seed has been planted either by the use of the fruit as manure or by the agency of birds; the tender young plants brave all weathers and are very tenacious of life, are not eaten by animals, and after becoming ten inches high are not prevented by injury to leaf or bark from growing luxuriantly and almost perceptibly to the eye, even more rapidly than the banana.

On the 20th of February, 1867, I set a young plant, 3 inches high, from a seed of the "mamao femea," in the pathway from the house to the garden, a place where it was exposed to injury from continual passers-by and poultry, and very unfavourable to the development of a fruit tree. On the 20th of November—nine months subsequently—the first inflorescence appeared; the tree was then nearly 5 feet high; at the lower end the stem was 1½ inches in diameter, and branchless; the crown had twelve leaves, and in the angles of nine leaves were the long stalked racemes of flowers of the hermaphrodite tree. The lowest raceme, with nine flowers, opened first, always from below upward; the topmost raceme had only seven flowers. The whole of the flowers were male; the first perfectly developed diœcious flowers were developed at the end of fourteen months, and always below first.

A "mamao femea" which bore fertile flowers from the commencement, flowered first when fourteen months old, also beginning from below. The stem at this time had a height of 17 feet 4 inches.

The improved "mamao melao," which yields fruit as large as a pumpkin, is treated with somewhat more care, and its management may even be called cultivation. The seeds are planted, together with the flesh of the fruit, in a light soil, not too moist and containing abundance of organic matter; if they be planted without the flesh of the fruit only trees that yield the original fruit of the uncultivated kind are obtained. I had doubts respecting this, but have satisfied myself of its correctness by numerous experiments.

When the plants are about 3 to 4 inches high they are transplanted, and for this a lighter soil is selected, which is not too shady, and too much watering must be avoided; this is usually left to the weather. After fourteen to eighteen months the tree-like plants bear fruit through the entire year without cessation. After four or five years of this fruit-bearing existence the top commences to decay and it dies from above downwards, the stem being eventually completely destroyed by the wind if not previously removed by man.

The fruit, like the banana, is collected in the full grown, but still green condition, so as to ripen in the house. If perfectly ripe when taken from the tree the flesh, especially in the neighbourhood of the skin, is bitter; moreover, the ripe fruit is difficult to secure against destruction by birds.

During my seventeen years' residence in the interior of the province, from 1851 to 1868, I examined almost the whole of the Brazilian fruit and food plants; this work is published in here by Messrs. C. and H. Laemmert, under the title 'As Plantas nutritivas e do gozo do Brazil,' but has not yet reached the letter M. In my manuscript of 1868 occurs the examination of the fruit, seeds and milk of the *Carica Papaya* and the discovery in the milk of a white amorphous substance, which in my notice I described as "papayotin." This same substance I found also in the leaves, and although I knew that the leaves had been used from time immemorial by the Indians for rendering meat tender, it did not occur to me that my "papayotin" might be a pepsin-like substance, until I saw in the Austrian Society's Journal, a short time since, notices of the work of Herr Wittmack and Dr. C. G. Roy, which induced to me to look up my notes and make some experiments with papayotin, when I found the solubility of meat in a solution of papayotin confirmed, and therefore publish my investigation. I do not thereby make the smallest claim to priority and do not even desire that the name should be adopted, but only to invite a further and more perfect investigation of this interesting substance, and by the making known of my own imperfect experiments to become useful as a guide and to save several useless experiments.

Analysis of the Fruit.

In 100 grams of fresh fruit, freed from rind, taken from the three kinds of "mamao," I found the following substances:—

	1. Mamao femea.	2. Mamao melao.	3. Mamao macho.
Caoutchouc-like Substances	—	—	0·046
Soft Yellow Resin . . .	0·165	—	—
Reddish-yellow Fat . . .	—	0·020	—
Albumenoid Substances .	1·070	0·500	0·753
Sugar	3·238	3·580	4·333
Pectinous Matter	1·315		
Tartaric Acid } combined with Bases.	0·075		
Citric Acid . } combined with Bases.	0·020	0·480	2·332
Malic Acid . } combined with Bases.	0·083		
Dextrin, Extractive Matter, etc.	5·503		
Water	85·351	92·500	89·445
Cellulose	3·180	2·920	3·091

100 grams of fresh fruit flesh of the "mamao femea" gave 1·239 grams of ash, and 100 grams of it dried gave 8·457 grams.

In a kilogram of pure ash from the flesh of the fruit I found—

Carbonic Acid	140·945
Chlorine	56·013
Sulphuric Acid	52·401
Phosphoric Acid	71·573
Soluble Silicic Acid	165·340
Insoluble Silicic Acid	5·423
Ferric Oxide	19·504
Maganous Oxide	0·277
Alumina	38·576
Lime	23·438
Magnesia	47·878
Potash	63·248
Soda	315·332
Loss	0·007

The milky juice, which is contained in the unripe fruit in considerable quantity, disappears upon the ripening of the "mamao macho" fruit almost entirely, and then there is found in the flesh of such fruit traces of a caoutchouc-like substance, which doubtless originates from the small quantity of milk. On the other hand, the milk disappears from the fruit of "mamao femea" and "mamao malao" entirely on ripening, but the caoutchouc-like substance is in the "mamao femea" replaced by a yellow soft resin, and in the cultivated "mamao melao" by a dark reddish-yellow fatty oil. Both the latter sorts have a more delicate taste, and the "mamao melao" has actually a melon flavour. However, it is not to be denied that the taste is insipid and not particularly refreshing, as the prized free acids are entirely wanting in the fruit and only a trace of an aroma is present. The milk in the ripe juice is rich in free acid, but this disappears in the ripening.

I am at present engaged during my little spare time in the examination of the unripe fruit in different stages, and will return to the subject subsequently.

The seeds are frequently used as a vermifuge, and information as to the manner of administering them will be given at the close of this paper.

The examination of the seeds was unfortunately not completed; they deserve a perfect analysis, for which I can supply sufficient materials.

In my notes I have the following entries:

I. 500 grams of dried powdered seeds were repeatedly extracted with 90 per cent. alcohol, distilled, and the residue treated with hot distilled water as long as the water was coloured. Residue insoluble in water (A).

The watery solution, evaporated to the consistence of a thin syrup, and allowed to stand some time, yielded 0·803 gram of crystals, which proved to be a compound of lime with an organic acid. The mother liquor, upon evaporation gave 3·250 of extractive, having an unpleasant taste, and coloured dark brown by perchloride of iron.

The residue insoluble in water (A) consisted of an oil containing resin. It was carefully separated from the resin and weighed 73·333 grams; it was of a dark brown colour, and of the consistence of castor oil, odourless, and having a disagreeable flavour with long persistent acrid after-taste. In ether it was only partially soluble, and was preserved for further investigation as *papaya oil.* The resin weighed 3·833 grams and formed a tasteless and odourless dark brown powder.

II. 500 grams of finely pounded seeds were digested in a still at reduced pressure with caustic potash and 80 per cent. alcohol, strained and pressed; and the residue again treated in a similar way with alcohol. The united liquor was filtered and distilled, then evaporated to about 800 grams, when the separation of crystals was noticed and in consequence it was set aside for a time. It was then separated from the crystals, further evaporated, and allowed to stand for a longer time in a cool place. No crystallization or other separation was noticed, and it was now warmed and saturated with acetic acid in small excess. After a long time a brown oil separated; removed from this and carefully further evaporated a dark brown resin separated, which will be described further on. The liquid was separated from the resin and repeatedly shaken with ether. The ethereal solution evaporated gave 2·315 grams of an oil-like substance, having a peculiarly disagreeable taste and smell, which was easily soluble in ether and alcohol. Heated upon platinum it burnt with a smoke irritating to the eyes, and clear flame, and left no residue. This was preserved for examination as *caricin.* The liquid separated from the ether was evaporated and gave 14·722 grams of a nauseous tasting extract.

The crystals, etc., weighing 3·704 grams of a dazzling white fat acid, similar to palmitic acid, were preserved as *carica fat acid.*

The oil β, weighing 38·426 grams, behaved similarly to the papaya oil obtained in the first experiment.

III. 500 grams of finely pounded seeds were treated with caustic lime and distilled water as in the preparation of santonin. The impure precipitate thrown down by acid, was dissolved in alcohol and evaporated, then treated with boiling water, and separated by filtration from resinous substances. The watery solution, evaporated to a syrupy consistence and stood in a cool place, yielded after a long time granular crystals, which when dried weighed 8·722 grams. Heated upon platinum the substance melted to a clear liquid, and volatilized leaving only a trace of a black residue. In cold water it appeared insoluble, in boiling water and in cold alcohol soluble. The solution scarcely reddened litmus paper, and it had a cool bitter taste. It was preserved as *papayic acid* (?).

The resin acid was purified by repeated solution in alcohol and formed after evaporation a brownish substance that could be rubbed to a light brown powder. This had a bitter taste, with a pepper-like biting after-taste. On platinum it burnt with a smoke irritating to the mucous membrane to a small carbonaceous residue. It was insoluble in water and ether, and readily soluble in alcohol and alkalies. From a solution of carbonate of soda it was precipitated by acids in yellow flocks. The alcoholic solution of the resin slightly gelatinized with ammonia; it gave with acetate of copper a dark green precipitate and with acetate of lead and tincture of galls no reaction. Preserved for further experiments as *papaya acid resin*.

IV. 100 grams of dried seed powder were extracted with ether, alcohol, water, acids, and alkalies, and besides the above mentioned products there was obtained 0·220 gram of soft resin, very similar to the soft resin found in the flesh of the fruit of "mamao femea." The fatty oil was yellow coloured, and by ether only 5 per cent. of oil was obtained from the seeds.

The oil, the so called "caricin," and the resin acid were used against intestinal worms; all three products were active, but the most favourable results were obtained with the resin acid in doses of from 0·02 to 0·04 gram.

(*To be continued.*)

THE VALUE OF ALTHÆA AS A PILL EXCIPIENT.*

BY W. WALLACE BEITENMAN, PH.G.

The use of althæa as an excipient was suggested from the fact that it contains a large amount of mucilage, and in endeavouring to determine its value as such, I found it to answer admirably in every respect but one, which I shall shortly state.

The proportion of mucilage contained in good althæa is from 25 to 35 per cent. This it readily yields to boiling water, together with about the same amount of starch, some pectin, sugar, etc., which are also present. Treated with cold water, the mucilage, without the starch, is extracted, the infusion becoming ropy.

In experimenting with the althæa, it was used, however, only in the form of a fine powder. With some few substances, by using simply the powder with a little water or simple syrup, a pilular mass was readily obtained; but with most substances the amount of powder required was such as to render the pills too large. To remedy this, combination with other substances was resorted to. Tragacanth, acacia, syrup, solution and syrup of acacia, glycerin, etc., were tried, using them in different proportions and with various results. The best combination was produced by mixing six parts of althæa with one part of powdered tragacanth, and simple syrup sufficient to give the required consistence. By using a smaller proportion of tragacanth the adhesiveness was decreased; while on the addition of a larger proportion it was not materially changed. The use of either solution or syrup of acacia instead of simple syrup did not improve the mixture; while with glycerin the adhesiveness was much lessened. But by mixing about three parts of tragacanth with six of althæa, and then with glycerin, a mixture was obtained nearly as good as the first. In this the adhesiveness, without doubt, was due more to the tragacanth than to the althæa. Acacia used instead of tragacanth, either in the same or in larger proportions, was found far inferior to the latter. In short, in no way could I improve on the combination first mentioned. Giving that in definite quantities, we have the following formula:—

℞ Powd. Althæa	ʒi.
„ Tragacanth	grs. x.
Simple syrup	f ʒii.

Mix well.

This is easily and quickly prepared, is ropy, plastic, and of such adhesiveness that with heavy, inert substances, such as reduced and dried sulphate of iron, a small quantity will give a mass capable of being easily and thinly rolled out.

With quinia and other cinchona alkaloids it answers well, forming with them, either with or without the use of acid, masses of good consistence and plasticity; and, as but a small amount of excipient is required, the white colour of the alkaloids, which for elegance the pills ought also to have, is not perceptibly changed. In speaking of the colour, I may here state that in mixing the ingredients of the excipients it becomes of a pale somewhat dirty yellow colour. In comparing it with several excipients that have met with considerable favour, it was found that for adhesiveness and plasticity it was fully equal if not superior to the best.

Thus, then, for reasons already mentioned, and for its general adaptability, it would undoubtedly prove a valuable addition to the prescription counter were it not for one great objection, viz., that pills prepared with it soon become hard and insoluble.* This seems due mostly to the althæa itself; for with pills prepared with an excipient in which other substances were substituted for the tragacanth and syrup, and especially where althæa and water were used to make a mass, the effect was just about the same. Failing to remedy this tendency to harden, its value practically is naught.

In France althæa is said to be much employed in the preparation of pills and electuaries. On inquiring as to the manner in which it is there used, I was informed that in the preparation of pills it is never used as an excipient or ingredient, but simply to dust or place among them for the same purposes that we use lycopodium, powdered liquorice and rice flour, and when used in the preparation of electuaries, etc., only to give them bulk and consistence.

Here some prefer althæa to powdered liquorice in the preparation of blue pill. In this I fail to see the advantage, as it produces no change other than making the mass somewhat harder in consistence. In conclusion, to show the adhesiveness of the mixture of althæa, tragacanth and syrup, I subjoin a list of some substances made into pills, stating opposite each the amount of excipient required to form a mass:—

	grs.	Excip., grs.	No. of pills.
Pyrophosphate of iron . . .	45	5	15
Dried sulphate „ . . .	30	3	15
Quevenne's iron	30	4	15
Sulphate of quinia	20	2	20
„ cinchonidia . .	20	2	10
Calomel	50	3	10
Subnitrate of bismuth . . .	50	3	10
Capsicum	45	5	15
Powd. digitalis	15	3	15
„ asafœtida	30	2	10

* From the *American Journal of Pharmacy*, October, 1879.

* Pills made with powdered marshmallow root soon become dry and hard in consequence of the absorbent power of this powder for liquids; but we do not believe that they become insoluble, because marshmallow is capable of absorbing a large amount of liquid, and pills made with it are readily disintegrated.—*Editor Amer. Jour. Pharm.*

RADIANT MATTER.*

BY WILLIAM CROOKES, F.R.S.

(*Concluded from page* 330).

Radiant Matter is deflected by a Magnet.

I now pass to another property of Radiant Matter. This long glass tube (Fig. 14) is very highly exhausted; it has a negative pole at one end (*a*) and a long phosphorescent screen (*b*, *c*) down the centre of the tube. In front of the negative pole is a plate of mica (*b*, *d*) with a hole (*e*) in it, and the result is, when I turn on the current, a line of phosphorescent light (*e*, *f*) is projected along the whole length of the tube. I now place beneath the tube a powerful horseshoe magnet: observe how the line of light (*e*, *g*) becomes curved under the magnetic influence waving about like a flexible wand as I move the magnet to and fro.

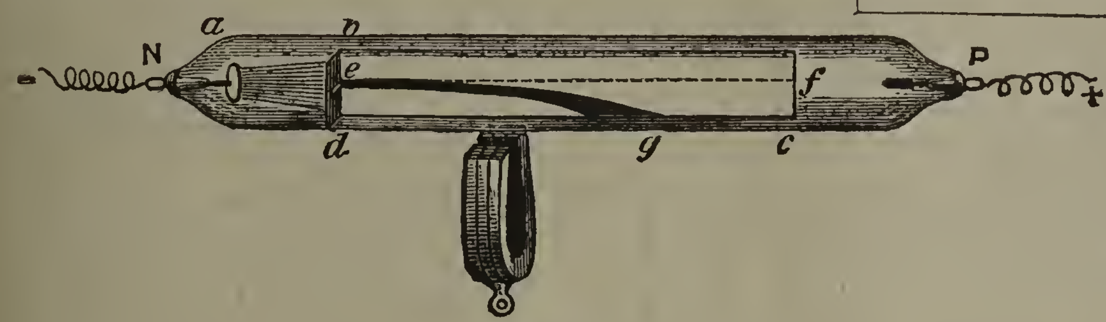

Fig. 14.

This action of the magnet is very curious, and if carefully followed up will elucidate other properties of Radiant Matter. Here (Fig. 15) is an exactly similar tube, but having at one end a small potash tube, which if heated will slightly injure the vacuum. I turn on the induction current, and you see the ray of Radiant Matter tracing its trajectory in a curved line along the screen, under the influence of the horse-shoe magnet beneath. Observe the shape of the curve. The molecules shot from the negative pole may be likened to a discharge of iron bullets from a mitrailleuse, and the magnet beneath will represent the earth curving the trajectory of the shot by gravitation. Here on this luminous screen you see the curved trajectory of the shot accurately traced. Now suppose the deflecting force to remain constant, the curve traced by the projectile varies with the velocity. If I put more powder in the gun the velocity will be greater and the trajectory flatter, and if I interpose a denser resisting medium between the gun and the target, I diminish the velocity of the shot, and thereby cause it to move in a greater curve and come to the ground sooner. I cannot well increase before you the velocity of my stream of radiant molecules by putting more powder in my battery, but I will try and make them suffer greater resistance in their flight from one end of the tube to the other. I heat the caustic potash with a spirit-lamp and so throw in a trace more gas. Instantly the stream of Radiant Matter responds. Its velocity is impeded, the magnetism has longer time on which to act on the individual molecules, the trajectory gets more and more curved, until, instead of shooting nearly to the end of the tube, my molecular bullets fall to the bottom before they have got more than half-way.

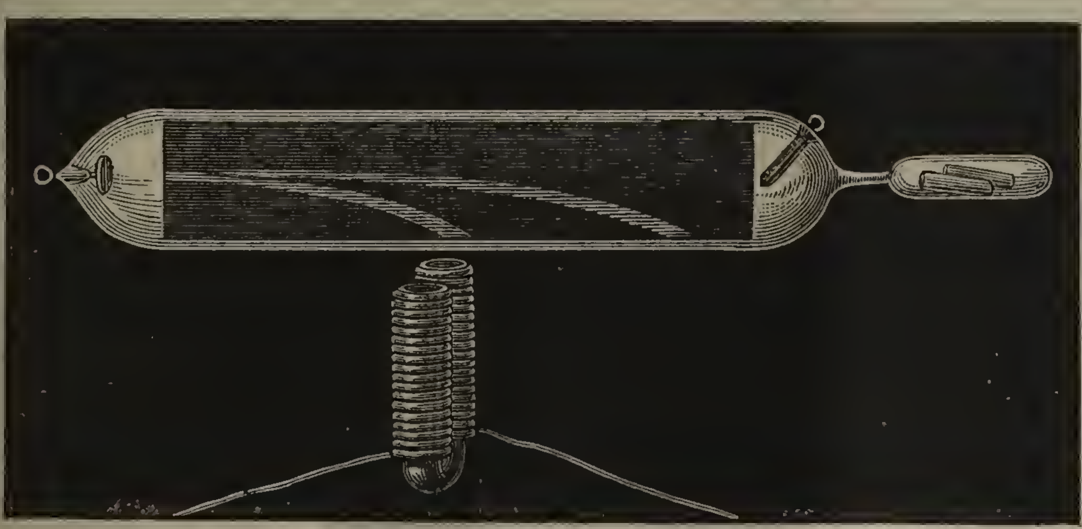
Fig. 15.

It is of great interest to ascertain whether the law governing the magnetic deflection of the trajectory of Radiant Matter is the same as has been found to hold good at a lower vacuum. The experiments I have just shown you were with a very high vacuum. Here is a tube with a low vacuum (Fig. 16). When I turn on the induction spark, it passes as a narrow line of violet light joining the two poles. Underneath I have a powerful electro-magnet. I make contact with the magnet, and the line of light dips in the centre towards the magnet. I reverse the poles, and the line is driven up to the top of the tube. Notice the difference between the two phenomena. Here the action is temporary. The dip takes place under the magnetic influence; the line of discharge then rises and pursues its path to the positive pole. In the high exhaustion, however, after the stream of Radiant Matter had dipped to the magnet it did not recover itself, but continued its path in the altered direction.

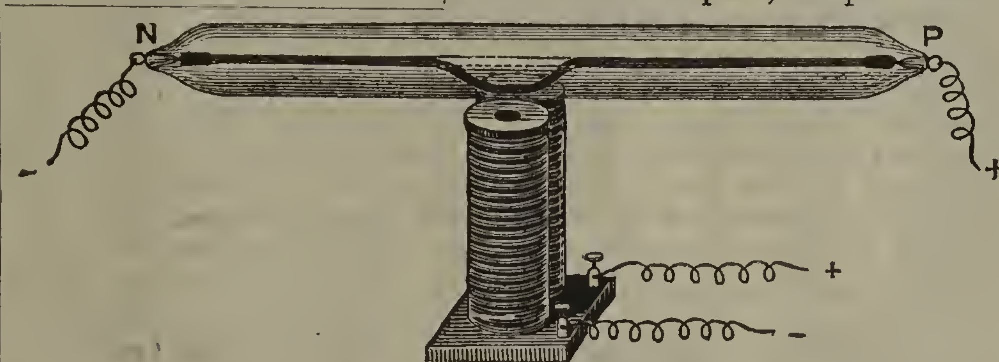

Fig. 16.

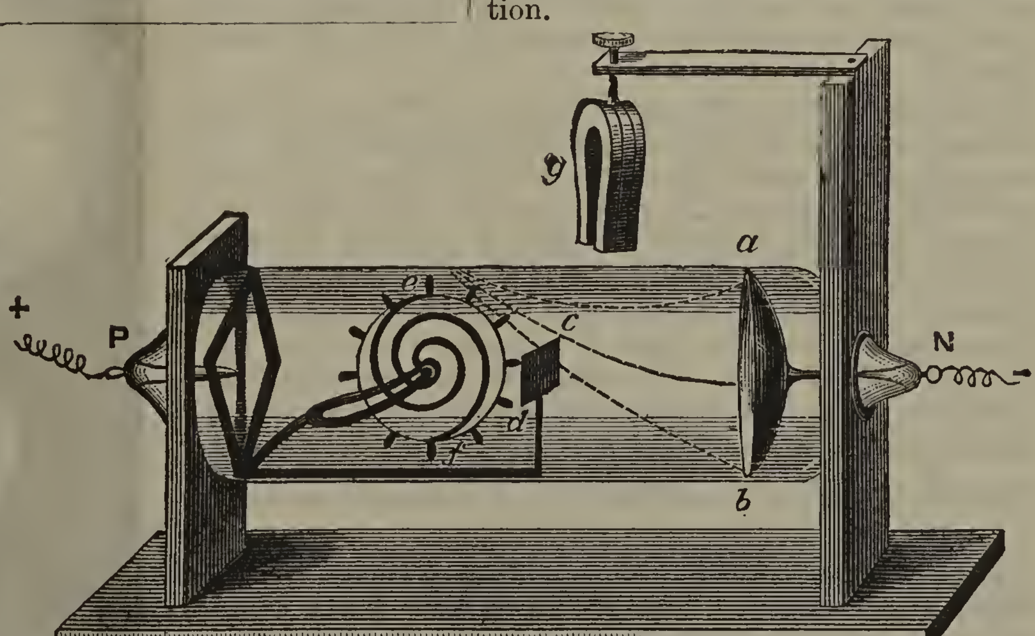

Fig. 17.

By means of this little wheel, skilfully constructed by Mr. Gimingham, I am able to show the magnetic deflection in the electric lantern. The apparatus is shown in this diagram (Fig. 17). The negative pole (*a*, *b*) is in the

* A lecture delivered to the British Association for the Advancement of Science, at Sheffield, Friday, Aug. 22, 1879.

form of a very shallow cup. In front of the cup is a mica screen (*c*, *d*), wide enough to intercept the Radiant Matter coming from the negative pole. Behind this screen is a mica wheel (*e*, *f*) with a series of vanes, making a sort of paddle-wheel. So arranged, the molecular rays from the pole (*a*, *b*) will be cut off from the wheel, and will not produce any movement. I now put a magnet (*g*), over the tube, so as to deflect the stream over or under the obstacle (*c*, *d*), and the result will be rapid motion in one or the other direction, according to the way the magnet is turned. I throw the image of the apparatus on the screen. The spiral lines painted on the wheel show which way it turns. I arrange the magnet to draw the molecular stream so as to beat against the upper vanes, and the wheel revolves rapidly as if it were an over-shot water-wheel. I turn the magnet so as to drive the Radiant Matter underneath; the wheel slackens speed, stops, and then begins to rotate the other way, like an under-shot water-wheel. This can be repeated as often as I reverse the position of the magnet.

I have mentioned that the molecules of the Radiant Matter discharged from the negative pole are negatively electrified. It is probable that their velocity is owing to the mutual repulsion between the similarly electrified pole and the molecules. In less high vacua, such as you saw a few minutes ago (Fig. 16), the discharge passes from one pole to another, carrying an electric current, as if it were a flexible wire. Now it is of great interest to ascertain if the stream of Radiant Matter from the negative pole also carries a current. Here (Fig. 18) is an apparatus which will decide the question at once. The

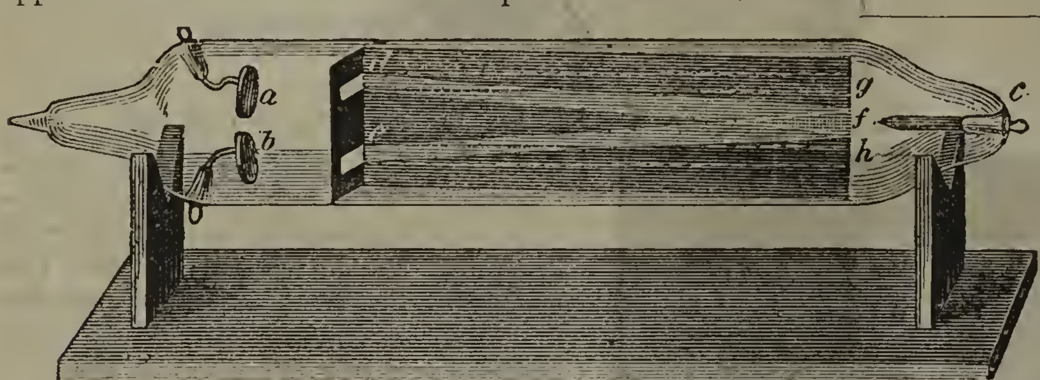

Fig. 18.

tube contains two negative terminals (*a*, *b*) close together at one end, and one positive terminal (*c*), at the other. This enables me to send two streams of Radiant Matter side by side along the phosphorescent screen—or by disconnecting one negative pole, only one stream.

If the streams of Radiant Matter carry an electric current they will act like two parallel conducting wires and attract one another; but if they are simply built up of negatively electrified molecules they will repel each other.

I will first connect the upper negative pole (*a*) with the coil, and you see the ray shooting along the line (*d f*). I now bring the lower negative pole (*b*) into play, and another line (*e*, *h*) darts along the screen. But notice the way the first line behaves; it jumps up from its first position *d*, *f*, to *d*, *g*, showing that it is repelled, and if time permitted I could show you that the lower ray is also deflected from its normal direction: therefore the two parallel streams of Radiant Matter exert mutual repulsion, acting not like current carriers, but merely as similarly electrified bodies.

Radiant Matter produces Heat when its Motion is arrested.

During these experiments another property of Radiant Matter has made itself evident, although I have not yet drawn attention to it. The glass gets very warm where the green phosphorescence is strongest. The molecular focus on the tube, which we saw earlier in the evening (Fig. 8) is intensely hot, and I have prepared an apparatus by which this heat at the focus can be rendered apparent to all present.

I have here a small tube (Fig. 19, *a*) with a cup-shaped negative pole. This cup projects the rays to a focus in the middle of the tube. At the side of the tube is a small electro-magnet, which I can set in action by touching a key, and the focus is then drawn to the side of the glass tube (Fig. 19, *b*). To show the first action

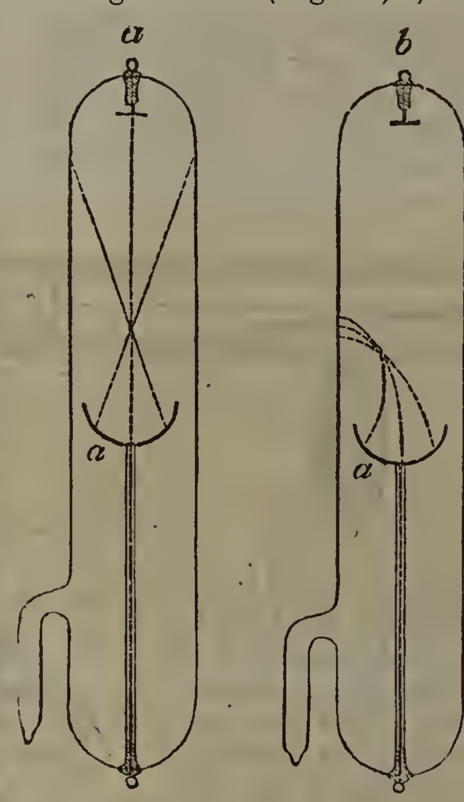

Fig. 19.

of the heat I have coated the tube with wax. I will put the apparatus in front of the electric lantern (Fig. 20, *d*: *vide* next page), and throw a magnified image of the tube on the screen. The coil is now at work, and the focus of molecular rays is projected along the tube. I turn the magnetism on, and draw the focus to the side of the glass. The first thing you see is a small circular patch melted in the coating of wax. The glass soon begins to disintegrate, and cracks are shooting starwise from the centre of heat. The glass is softening. Now the atmospheric pressure forces it in, and now it melts. A hole (*e*) is perforated in the middle, the air rushes in, and the experiment is at an end.

I can render this focal heat more evident if I allow it to play on a piece of metal. This bulb (Fig. 21) is furnished with a negative pole in the form of a cup (*a*). The rays will therefore be projected to a focus on a piece of iridio-platinum (*b*) supported in the centre of the bulb.

I first turn on the induction-coil slightly, so as not to bring out its full power. The focus is now playing on the metal, raising it to a white-heat. I bring a small magnet near, and you see I can deflect the focus of heat

Fig. 21.

just as I did the luminous focus in the other tube. By shifting the magnet I can drive the focus up and down, or draw it completely away from the metal, and leave it non-luminous. I withdraw the magnet, and let the molecules have full play again; the metal is now white-hot. I increase the intensity of the spark. The iridio-platinum glows with almost insupportable brilliancy, and at last melts.

The Chemistry of Radiant Matter.

As might be expected, the chemical distinctions between one kind of radiant matter and another at these high exhaustions are difficult to recognize. The physical properties I have been elucidating seem to be common to all matter at this low density. Whether the gas originally under experiment be hydrogen, carbonic acid, or atmospheric air, the phenomena of phosphorescence, shadows, magnetic deflection, etc., are identical, only they commence at different pressures. Other facts, however, show that at this low density the molecules retain their chemical characteristics. Thus, by introducing into the tubes appropriate absorbents of residual gas, I can see that chemical attraction goes on long after the attenuation has reached the best stage for showing the phenomena now under illustration, and I am able by this means to carry the exhaustion to much higher degrees than I can get by mere pumping. Working with aqueous vapour I can use phosphoric anhydride as an absorbent; with carbonic acid, potash; with hydrogen, palladium; and with oxygen, carbon, and then potash. The highest vacuum I have yet succeeded in obtaining has been the 1-20,000,000th of an atmosphere, a degree which may be better understood if I say that it corresponds to about the hundredth of an inch in a barometric column three miles high.

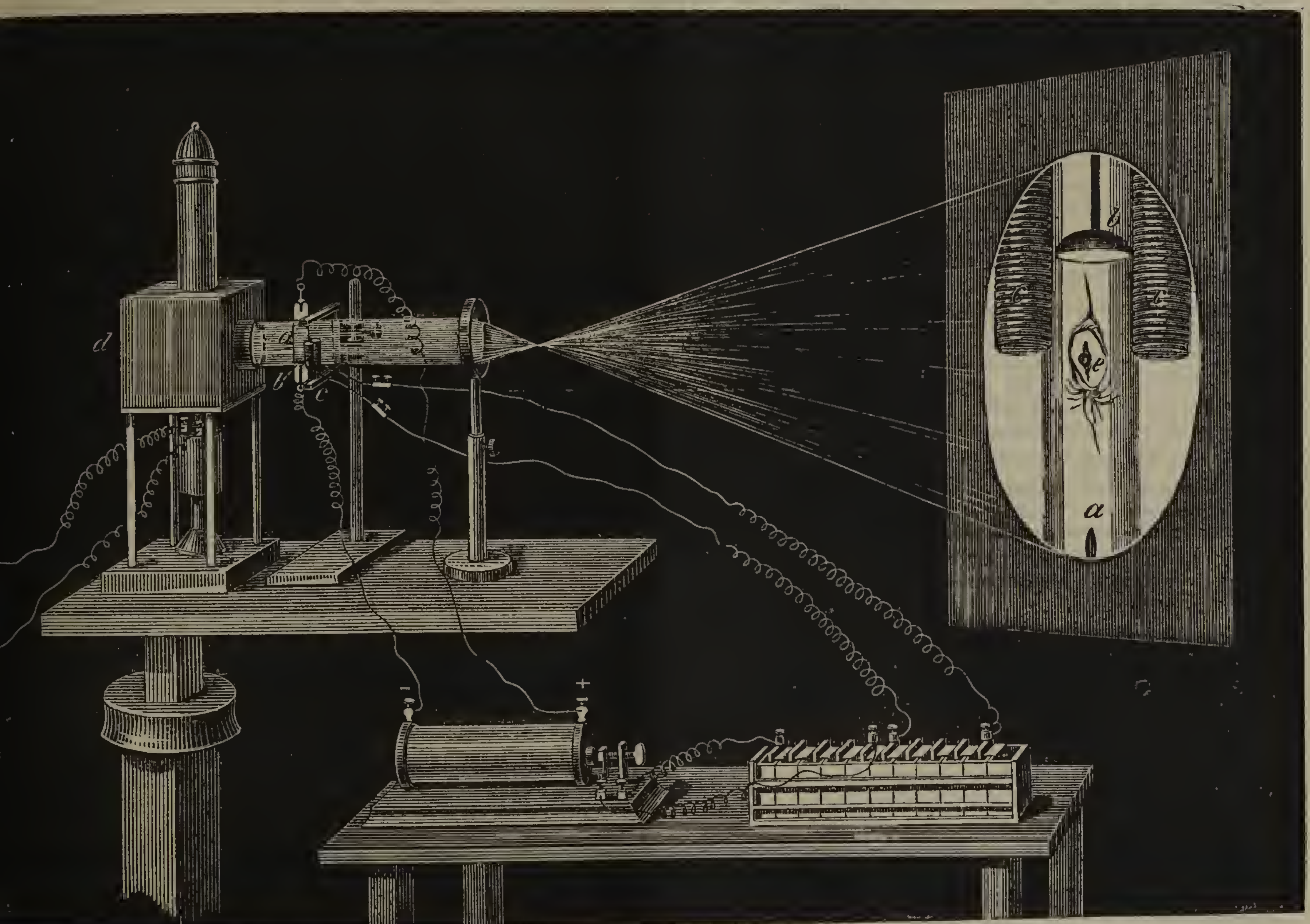

Fig. 20.

It may be objected that it is hardly consistent to attach primary importance to the presence of *Matter*, when I have taken extraordinary pains to remove as much Matter as possible from these bulbs and these tubes, and have succeeded so far as to leave only about the one-millionth of an atmosphere in them. At its ordinary pressure the atmosphere is not very dense, and its recognition as a constituent of the world of Matter is quite a modern notion. It would seem that when divided by a million, so little Matter will necessarily be left that we may justifiably neglect the trifling residue and apply the term *vacuum* to space from which the air has been so nearly removed. To do so, however, would be a great error, attributable to our limited faculties being unable to grasp high numbers. It is generally taken for granted that when a number is divided by a million the quotient must necessarily be small, whereas it may happen that the original number is so large that its division by a million seems to make little impression on it. According to the best authorities, a bulb of the size of the one before you (13·5 centimetres in diameter) contains more than 1,000000,000000,000000,000000 (a quadrillion) molecules. Now, when exhausted to a millionth of an atmosphere we shall still have a trillion molecules left in the bulb—a number quite sufficient to justify me in speaking of the residue as *Matter*.

To suggest some idea of this vast number I take the exhausted bulb, and perforate it by a spark from the induction coil. The spark produces a hole of microscopical fineness, yet sufficient to allow molecules to penetrate and to destroy the vacuum. The inrush of air impinges against the vanes and sets them rotating after the manner of a windmill. Let us suppose the molecules to be of such a size that at every second of time a hundred millions could enter, How long, think you, would it take for this small vessel to get full of air? An hour? A day? A year? A century? Nay, almost an eternity! A time so enormous that imagination itself cannot grasp the reality. Supposing this exhausted glass bulb, indued with indestructibility, had been pierced at the birth of the solar system; supposing it to have been present when the earth was without form and void; supposing it to have borne witness to all the stupendous changes evolved during the full cycles of geologic time, to have seen the first living creature appear, and the last man disappear; supposing it to survive until the fulfilment of the mathematical prediction that the Sun, the source of energy, four million centuries from its formation will ultimately become a burnt-out cinder ;* supposing all this—at the rate of filling I have just described, 100 million molecules a second—this little bulb even then would scarcely have admitted its full quadrillion of molecules.†

But what will you say if I tell you that all these molecules, this quadrillion of molecules, will enter through the microscopic hole before you leave this room? The hole being unaltered in size, the number of molecules undiminished, this apparent paradox can only be explained by again supposing the size of the molecules to be diminished almost infinitely—so that instead of entering at the rate of 100 millions every second, they troop in at a rate of something like 300 trillions a second. I have done the sum, but figures when they mount so high cease to have any meaning, and such calculations are as futile as trying to count the drops in the ocean.

In studying this Fourth state of Matter we seem at length to have within our grasp and obedient to our control the little indivisible particles which with good warrant are supposed to constitute the physical basis of the universe. We have seen that in some of its properties Radiant Matter is as material as this table, whilst in other properties it almost assumes the character of Radiant Energy. We have actually touched the border land where Matter and Force seem to merge into one another, the shadowy realm between Known and Unknown which for me has always had peculiar temptations. I venture to think that the greatest scientific problems of the future will find their solution in this Border Land, and even beyond; here, it seems to me, lie Ultimate Realities, subtle, far-reaching, wonderful.

"Yet all these were, when no Man did them know,
Yet have from wisest Ages hidden beene;
And later Times thinges more unknowne shall show.
Why then should witlesse Man so much misweene,
That nothing is, but that which he hath seene?"

NEW CEMENTS FOR DENTAL AND OTHER PURPOSES.‡

Charles Sylvester Rostaing di Rostagni, of Philadelphia, has procured patents for preparing cements for dental and other purposes, which are compounds of pyrophosphates.

A mixture of acid or neutral calcium phosphate is fused in a crucible together with zinc phosphate, or 1 part of calcium phosphate is fused with 10 to 30 parts of oxide of zinc, and enough ammonium phosphate to saturate the zinc oxide. The solidified, glassy mass is dissolved in dilute phosphoric acid; to the solution may be added a little magnesia or oxide of cadmium. The solution is evaporated, and when wanted for use the mass is dissolved in a little distilled water.

The inventor also prepares mixtures of phosphate of zinc, or magnesium, or cadmium with the above mass.

Another cement is prepared from 3000 parts oxide of zinc, to which are added 5 to 50 parts of boracic acid dissolved in alcohol or water. The oxide of zinc may partly be replaced by lime, magnesia or baryta. The mixture is heated for several hours to a white heat, and if desired coloured, a sufficient quantity of an aqueous solution of the characteristic metallic salts used for producing coloured beads may be previously added.

Zinc silicate, prepared by double decomposition of sodium or potassium silicate with a soluble zinc salt, may also be employed.

* The possible duration of the Sun from formation to extinction has been variously estimated by different authorities, at from 18 million years to 400 million years. For the purpose of this illustration I have taken the highest estimate.

† According to Mr. Johnstone Stoney (*Phil. Mag.*, vol. 36. p. 141), 1 c.c. of air contains about 1000,000000,000000,000000 molecules. Therefore a bulb 13·5 centims. diameter contains $13{\cdot}5^3 + 0{\cdot}5236 + 1000{,}000000{,}000000.000000$ or 1,288252,350000,000000,000000 molecules of air at the ordinary pressure. Therefore the bulb when exhausted to the millionth of an atmosphere contains 1,288252,350000,000000 molecules, leaving 1,288251,061747,650000,000000 molecules to enter through the perforation. At the rate of 100,000000 molecules a second, the time required for them all to enter will be

12882,510617,476500 seconds or
214,708510,291275 minutes, or
3,578475,171521 hours, or
149103,132147 days, or
408,501731 years.

‡ From *New Remedies*, October, 1879.

THE HANBURY MEMORIAL FUND.

A meeting of the Committee of Organization of the Hanbury Memorial Fund was held at 17, Bloomsbury Square, on Thursday, October 23.

The Secretaries reported that in accordance with the instructions of the General Committee at its final meeting on February 19, 1879, as reported in the *Pharmaceutical Journal* of March 8, 1879, the Pharmaceutical Society had been requested to act, by its Council, as trustees of the fund, biennially requesting adjudicators to award the medal, and afterwards presenting the medal so awarded. The Council had accepted the duties. £400 stock in consols had been purchased in the name of the Society. The adjudicators were to be "the respective Presidents for the time being of the Linnæan, Chemical and Pharmaceutical Societies, and of the British Pharmaceutical Conference, together with one pharmaceutical chemist, who shall, prior to each award, be nominated by the last named two Presidents."

Specimens in wax of the dies of the medal were laid before the Committee together with the following letter:—

"Plough Court, Lombard Street,
"August 12, 1879.

"Dear Professor Attfield,—Accept my thanks for a sight of the impression from the die for the memorial medal of my late cousin, Daniel. As now finished, it appears to be admirable, and the likeness excellent. It is remarkable that it should have been rendered so well.

"Yours very truly,
"Cornelius Hanbury."

Mr. H. B. Brady proposed, and Mr. T. H. Hills seconded a resolution to the effect that the dies be accepted, and be handed over to the custody of the Council of the Pharmaceutical Society, and that the costs be paid. Carried unanimously.

The draft deed of declaration of trust, as kindly drawn up by Mr. Flux, and as revised by the members of the Sub-Committee, was read and considered, and a resolution was proposed by Mr. M. Carteighe, seconded by Mr. G. F. Schacht, and carried,—"That the deed as drafted be accepted, that it be engrossed, and that the costs of engrossing and stamping be paid."

Instructions were given to the Secretaries to prepare a cash account and balance sheet for publication so soon as all costs were paid.

On the motion of Mr. W. Southall, the thanks of the Committee were voted to Professor Attfield for his labours in connection with the collection and organization of the Fund.

CHEMICAL SOCIETY.

The first meeting of the Chemical Society for the new session will be held on Thursday, November 6, when the following papers will be read:—On Alizarin Blue, by G. Auerbach. The Transformation Products of Starch, by C. O'Sullivan. Note on the Formulæ of the Carbohydrates, by H. E. Armstrong. A New Method of Determining Sulphur in Coal, by T. Nakamura. The Bromine Derivatives of β Naphthol, by A. G. Smith. Notes on the Dissociation of Ammonia Iron Alum, by J. S. Thomson.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 1, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

KEW GARDENS REPORT.

SOME of the most interesting material in the annual report of the Director of the Royal Gardens at Kew is the collection of reports from various parts of the world where attempts are being made to introduce the cultivation of plants that are useful as yielding drugs or other substances capable of being employed for technical purposes.

This year, a number of medicinal plants are mentioned, among which cinchona may be allowed to hold the first place. In British India, we learn that the introduction of Columbian species of cinchona into India is contemplated, and that Mr. CROSS has collected in New Grenada a number of plants of those species that yield the varieties of bark known as "Soft Columbian" and "Hard Carthagena," which are so largely used for the manufacture of quinine. Samples of bark corresponding to the different kinds were brought home by Mr. CROSS and examined by Mr. J. E. HOWARD, who reported that the soft Columbian variety known as Calisaya of Santa Fé was of the very best description, such as indicates the probability of a much larger production of alkaloid in the bark of more mature trees, and he is of opinion that if the young plants can be safely conveyed to India and established there, the bark obtained from them in the future may prove second to none. Among the plants of the "Hard Carthagena" kind one considered by Mr. HOWARD to be especially worthy of attention is from Coralis Inza, in the Magdalena Valley, yielding 4·75 per cent. of alkaloids, of which 1·88 was quinine and 1·18 cinchonidine. If it proves to be, as he thinks likely, a free grower, this plant might be well worth naturalizing in India.

These plants have been placed at Kew, under the care of Mr. CROSS, and he has reported to the Under-Secretary of State for India that though the number of Calisaya Santa Fé plants is somewhat reduced, fifteen of them are growing and rooting, and he is convinced they will soon become good established plants. Of the Magdalena Valley plants ten are now growing, but some of them are good, and he considers the fate of both sorts as being quite safe.

In Ceylon, cinchona cultivation has had to contend with very unfavourable weather; many old trees have died, and great numbers of cuttings have been destroyed, so that it will be necessary to establish fresh nurseries for rearing young plants. The bark of the trees cut down when they showed signs of bad health has sold well in the London market, and most of the stumps are again sending up fresh shoots.

According to recent accounts the cultivation of cinchonas in Ceylon has quite recovered from the discouragement produced during last year, and as it is stated that returns can be obtained from a cinchon plantation almost as soon as from one of coffee or tea it is probable that the enterprise will be carried out so as to add largely to the wealth and prosperity of the island. It may here be mentioned that one deficiency is the want of a supply of moss for covering up the trees during the growth of renewed bark, and there is an opportunity for introducing some other material as a substitute.

From Jamaica also there is news of success in the cultivation of cinchona. Mr. THOMPSON, late superintendent of the Botanic Gardens, and in charge of the cinchona plantations, reports that the trees, though growing at the low elevation of 2000 feet, are very healthy and well developed.

In some instances the trees of *Cinchona succirubra* in Jamaica have been found to be affected with a disease, apparently caused by the mycelium of a fungus permeating the cambium layer and the bark; but the number of trees thus attacked is small, and it is believed that the disease will be best met by at once felling the trees which appear unhealthy, securing the bark and carefully burning all the *débris.* The base of the stem will generally "coppice," or throw out fresh shoots.

Some of the bark sent to England from Jamaica last year realized a good price as compared with similar bark from India and Ceylon, and there are some thousands of acres of land in the parish of Manchester, having an elevation of about 3000 feet, that is said be especially well adapted for the cultivation of cinchona. At Gordon Town the results obtained show that cinchona cultivation would be very profitable in Jamaica, and the Government has therefore authorized the extension of the plantation by a hundred acres.

The use of the mixed alkaloids prepared from East Indian red bark appears now to be more successful. Dr. KING reports that increased experience has served to establish confidence in it, and there are now but few complaints of the nauseating effect which was at first objected to. Possibly the product sent into the market, or supplied for use in the hospitals, has been improved and made less objectionable. Considering also the high price that quinine has for some time past commanded, there will probably always be a field for the advantageous use of this mixed alkaloid if it continues to be manufactured in a sufficient state of purity.

Among the numerous interesting contributions to the Kew Gardens by persons living abroad, a fine plant of the Dracæna that yields the dragon's blood of

Socotra has been sent by Mr. W. Wykeham Perry, of H.M.S. "Undaunted," which was stationed at Aden during the past year. By the aid of Captain Hunter, Assistant Resident at Aden, it has been ascertained that the tree grows only at an elevation of about 1500 feet, that it is diœcious and that the plants of both sexes yield gum. To obtain the dragon's blood the bark is scraped and after some days the exudation is collected.

Among other plants sent to Kew by Mr. Wykeham Perry are several living specimens of the trees yielding the gum resin olibanum, and from the information furnished respecting the sources of olibanum it seems evident that much remains to be done before our knowledge of this subject is placed upon a thoroughly satisfactory footing. Unfortunately, the zealous collectors of Her Majesty's Customs made the collection of authentic specimens of frankincense brought home by Captain Hunter quite useless for study by hopelessly mixing the contents of the several boxes. Surely it might be possible in a case of this kind to allow such packages to pass through unopened, or at least, to have them examined in the presence of an officer of the institution such specimens are intended for.

Myrrh is another drug to the defective natural history of which Mr. Perry and Captain Hunter have made important contributions by sending to Kew Gardens a set of plants yielding the several kinds of myrrh known in Eastern commerce.

THE UNIVERSAL PHARMACOPŒIA.

Amongst the reports presented to the International Medical Congress, recently held in Amsterdam, was one by Professor Gille, of Brussels, from the International Commission nominated two years before at Geneva to deal with the subjects of uniformity in medicine and the construction of an universal pharmacopœia. This report is interesting in several respects, and especially because it discloses something like an abandonment of the idea of an international pharmacopœia in some pharmaceutical quarters.

It will be remembered* that the principles agreed to at the previous International Medical Congress, held in Geneva in 1877, as suitable for the basis upon which to construct such a work, were closely in accord with those adopted at the last International Pharmaceutical Congress, held in St. Petersburg in 1874. This fact was accordingly communicated to the St. Petersburg Pharmaceutical Society, to which body the carrying out of the decisions of the Pharmaceutical Congress appear to have been entrusted, through its President. This, however, led to no response. On the other hand, the St. Petersburg Society is said to have decided in March last to take no part in the next international pharmaceutical congress, which was to have been held this year in London, and, in July, to have sent back to M. Mehu, without a word of explanation, the scheme for an universal pharmacopœia elaborated by the Paris Society of Pharmacy, which had been referred to a committee of pharmacists to report upon.

Under these circumstances the present reporters think that it devolves upon the medical profession to take up the question of the universal pharmacopœia, and to apply the stimulus necessary to arouse the flagging interest of pharmacists. The report proposes that the commission should be authorized to select a Government to which application should be made to open negociations with other Governments, with a view to the nomination of an international commission to deal with the subject, utilizing as far as possible the work already done. This commission it is proposed should commence its labours immediately after its nomination, and the members of it to report progress to their respective Governments every two years, the subjects upon which they are not in accord being reserved for further investigation.

The report and its recommendations were agreed to by the Medical Congress, and it was decided that the scheme of the Paris Society should be printed in the official proceedings of the meeting at Amsterdam. It was also decided to add to the members of the Geneva Commission, Messrs. Sayre, of New York; Dechambre, of Paris; Ernest Hart, of London; Warlomont, of Brussels; Goye, of Amsterdam; and Palasciano, of Naples.

* See *Pharmaceutical Journal* [3], vol. viii., p. 261.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION

The opening meeting of the above Association for the present session will be held at 17, Bloomsbury Square, W.C., on Thursday, November 13, at 8.30 p.m., when the President, Professor Attfield, will occupy the chair, and the election of officers will take place.

We learn from a colonial newspaper that Mr. C. R. Blackett, the President of the Pharmaceutical Society of Victoria, has been elected a member of the Legislative Assembly for Fitzroy. Mr. Blackett has for some years occupied a prominent place among the pharmacists of Victoria, and in his former office of Honorary Secretary of the Pharmaceutical Society took an active part in the obtaining of the existing Act to regulate the practice of pharmacy in that colony. It appears that Mr. Blackett's popularity was sufficient to secure his election, notwithstanding that the influence of the Government was brought to bear on behalf of another candidate.

We have been requested by Mr. R. Hampson, of St. John Street Road, and Mr. W. M. Covell, of Hackney, to warn our readers against the representations of a man who is going about London soliciting charity with a petition purporting to bear their signatures which have been added without their authority.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

October 22, 1879.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Plowman, Southall and Taylor.

Dr. Greenhow was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

Seven candidates were examined. *Four* failed. The following *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Arnfield, John Cash..............Ashton-under-Lyne.
Bevan, William....................Ipswich.
Cook, William Richard ....Bath.

MINOR EXAMINATION.

Fifteen candidates were examined. *Five* failed. The following *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Austin, Alfred ....Birmingham.
Ballard, William ....Hammersmith.
Blower, Joseph ....Shrewsbury.
Bond, Peter Gillard ....Kingsbridge.
Brown, John ....Pontefract.
Cann, James ....Dorking.
Cheal, Harry Alexander ....London.
Chipp, James..........................Newport, I. W.
Clarke, Henry ....Whitehaven.
Constance, Sidney William......London.

MODIFIED EXAMINATION.

Four candidates were examined. *Two* failed. The following *two* passed, and were declared qualified to be registered as Chemists and Druggists:—

Carter, James ....London.
Jones, Thomas ....London.

October 23, 1879.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Plowman, Southall and Taylor.

MAJOR EXAMINATION.

Eight candidates were examined. *Five* failed. The following *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Gascoigne, Charles ....Hurworth.
Gibbons, Walter ....Manchester.
Howse, Charles Turk ....Cheltenham.

MINOR EXAMINATION.

Eighteen candidates were examined. *Nine* failed. The following *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Cole, Edwin Henry ....Dorking.
Field, William ....Shoreham.
Fowler, William ....Sunderland.
Fryer, Charles Harry ....Leeds.
Godfrey, Henry......................Godalming.
Gordon, John ....Bradford.
Gould, Henry Thomas............Newport, I. W.
Greenwood, George ....Grantham.
Haden, Walter Edward ....Lichfield.

October 24, 1879.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Plowman, Southall and Taylor.

MINOR EXAMINATION.

Twenty-four candidates were examined. *Twelve* failed. The following *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Hearnshaw, John William ......Spalding.
Hessell, James ....Rye.
Hewlett, James......................Northwich.
Hoad, Frank ....Rye.
Hopkins, William..................Warwick.
Hornby, Charles Haycock ......Stockport.
Hutchin, William Francis W...Maidstone.
Jones, Henry.........................New Milford.
Jones, Llewellyn ....London.
Jones, Nathaniel Stevens ......Fulham.
Kilner, Frederick James.........Bristol.
Mason, Frederic Silvester ......Leicester.

October 29, 1879.

Present—Mr. Sandford, President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Plowman, Southall and Taylor.

Dr. Greenhow was present on behalf of the Privy Council.

MAJOR EXAMINATION.

Eight candidates were examined. *Five* failed. The following *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Laxon, Matthew ....Wisbeach.
Leach, Isaac ....London.
Mason, William Brandwood ...Bolton.

MINOR EXAMINATION.

Sixteen candidates were examined. *Eleven* failed. The following *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Moody, Lewis ....Lincoln.
Morgan, Alfred William.........Rochester.
Morris, Humphrey ....Dolgelly.
Parker, Charles......................Lancaster.
Powrie, Percival Chamberlain...Mossel Bay.

October 30, 1879.

Present—Mr. Sandford, President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Plowman, Southall and Taylor.

MINOR EXAMINATION.

Twenty-three candidates were examined. *Twelve* failed. The following *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Reid, William ....Aberdeen.
Richardson, Arthur ....Epworth.
Sedgwick, John ....Blackpool.
Tanner, Herbert ....Wendlebury.
Thompson, John Tatham ......Scarborough.
Thompson, Thomas Clay.........Bedworth.
Watkinson, James ....Farnworth.
Watson, Robert John ....Market Rasen.
Wilding, George James ....Preston.
Williamson, Bamford ....South Shields.
Willson, Robert ....Boston.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's examination:—

Certificates of the Royal College of Surgeons of England.

Beesley, William ....Banbury.
Buxton, Alfred ....Stafford.

Certificate of the Faculty of Physicians and Surgeons of Glasgow.

Burrows, Richard..................London.

Certificate of the Society of Apothecaries.

Sharman, J. Schultz Wm. E....Norwood.

Certificates of the University of Cambridge.

Eastes, Ernest John ....Deal.
Hall, Robert Edward ....Camborne.
Readman, Edward James ......Newport Pagnell.
Youngman, William Edward...Bury St. Edmunds.

Certificates of the College of Preceptors.

Atkinson, Robert B..............Pontefract.
Barritt, Ernest Henry...........Colchester.
Brown, Ernest Ansell ....Margate.
Lugton, Peter ....Manchester.
Thew, Thomas William ....Sunderland.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The second general meeting of the thirty-first session was held at the Royal Institution, on Thursday evening, October 23, the President, Charles Symes, Ph.D., in the chair.

The minutes of the previous meeting were read and confirmed.

The following donations were announced:—The current number of the *Pharmaceutical Journal*, the 'Proceedings of the Liverpool Geological Society' for two sessions 1877–8 and 1878–9, and the *Canadian Pharmaceutical Journal.*

Messrs. J. Barker Galloway and Albert Kehlstadt were elected members.

The President called attention to some remarks of Professor E. Pollaci, published in the *Italian Chemical Gazette*, relative to the process technically known as "Plastering Wines." It was there stated that if gypsum were added to wine during fermentation the proportion of alkaline sulphates dissolved might reach 5 or 6 grams per litre; in fact, the sulphates and tartrates were present to such an extent as to render the wine a saturated solution of them. The public are now demanding a greater state of purity in articles of food, drugs, etc., and he thought it well that *connoisseurs* should be made aware of the fact that under the name of wine they might possibly be drinking a "saturated solution of plaster of paris." This had also a special interest for pharmacists seeing that it might account for some of the impurities in cream of tartar.

Mr. Symes then gave a short discourse on "Radiant Matter." He thought it would be of special interest to the members, now that Mr. Crookes's Sheffield lecture was being published in the *Pharmaceutical Journal*, to have the subject illustrated by experiments. He briefly summarized the characters of the three conditions of matter commonly known, viz., the solid, liquid and gaseous, and then passed on to compare the latter with the ultra-gaseous condition. The mean free path of the molecule, lines of molecular pressure, were experimentally illustrated by means of a series of beautifully illuminated tubes.

Mr. Thomas Johnson, F.I.C., F.C.S., made a communication, which he illustrated with diagrams and experiments, on—

Some Recent Improvements in Burettes, Siphons, Reagent Bottles, and Apparatus for taking Specific Gravity.

The first was *A New Apparatus for taking Specific Gravities of Solids* by means of the volume of water displaced. The apparatus consists of a cylindrical vessel containing water. The top of the cylinder is covered with a brass lid, through the centre of which a needle can be screwed till the point touches the surface of the water contained in the jar. When the substance is dropped into the water the needle is screwed up till the point again rests on the surface of the water, and the displacement is shown on a scale, or the water is drawn off to its original level in an accurately graduated tube.

An Apparatus for Estimating Nitrates by Pelouze's Method.—A flask is fitted with a hollow stopper; a conical glass rod fits into the bottom of the stopper; the funnel-shaped stopper is filled with alkaline solution. On boiling the contents of flask, the steam lifts up the little rod and escapes without allowing the alkaline solution to enter the flask; when the boiling is finished the conical rod is sucked tightly against the opening of the stopper, so no air can enter the flask and vitiate the results.

The glass bead key, a piece of glass in the form of an egg, is introduced into an indiarubber tube, connected with some vessel containing liquid. On gently pressing over the bead with thumb and fore finger, the liquid will flow as required through the tube.

Apparatus for Decanting Liquids.—A bottle without a bottom is inverted and the liquid poured in, a cork fits the neck of the bottle through which passes a glass tube connected by an indiarubber tube to an inner tube which slides up and down. To decant the liquid the inner tube is drawn downwards till the orifice is just above the surface of the sediment.

A New Reagent Bottle.—This bottle is fitted with a hollow glass stopper, filled with cotton wool to exclude dust; a bent glass tube fits in a hole drilled in the shoulder of the bottle, as in an ordinary wash bottle. On placing the forefinger on the opening of the hollow stopper and inclining the bottle no liquid will flow, but on removing the finger the liquid flows instantly, continuously or in drops as required.

Bottles containing standard solutions can be fitted as above, and if it is desirable to exclude atmospheric air from them they can be kept in an atmosphere of carbonic acid. The apparatus for this consists of two bottles which swing on a pivot. When the bottle generating the gas is raised, the acid liquid flows into the other bottle below and the gas ceases to be produced; on raising the other bottle again the acid flows into the generator containing the carbonate of lime and more gas is produced.

A New Burette Float.—This is made square instead of round, so as to diminish the friction against the sides of the burette.

The next communication was on—

A Factitious Sample of Powdered Scammony.

BY M. CONROY, F.C.S.

Writing on scammony, Pereira said "It is adulterated to such a large extent by the peasants who extract, and the Jew dealers who export it, that it is hopeless to seek for a pure specimen except in pharmaceutical museums." This remark is as true to-day as when it was first penned twenty-five years ago, for the difficulty of obtaining gum that will yield even the minimum percentage of resin is exceedingly great, and it is consequently with the greatest difficulty that wholesale houses are able to guarantee their virgin scammony to contain 80 per cent. of resin. Although adulterated samples are, unfortunately, so plentiful, they rarely get into use without their real value having been ascertained, for as a rule, all wholesale houses analyse samples before buying, and buy and sell according to the amount of resin which the sample contains. The most common adulterant is wheaten flour, but occasionally wood ashes, lampblack, gum, etc., are met with.

It is not, however, an adulterated sample that I intend bringing before you this evening, but an entirely factitious one, made up of wheaten flour and resin of scammony. It was purchased from a wholesale house as fine Aleppo powdered gum, but the purchaser doubting its genuineness, sent it to be analysed, and for that purpose it came into my hands. Fine Aleppo scammony is, as you are well aware, commercially known as a kind inferior to the "virgin," and, so far as my experience goes, contains usually from 50 to 70 per cent. of resin. Its odour is, like that of the virgin quality, pleasant and cheesey, but it is considerably tougher, breaks with a rougher fracture, and its powder is generally much darker in colour.

This sample, you will notice, is of a pale buff colour, is entirely devoid of even a trace of the cheesey odour of the gum, but possesses in a marked degree the strong peculiar odour of the resin prepared from the root.

Having satisfied myself by a careful ocular and nasal examination that it was an entirely factitious sample, I exhausted it with ether and obtained 15 per cent. of resin, the remaining matter insoluble in ether consisted almost exclusively of wheaten flour.

The gummy matter found in genuine scammony was entirely absent, as were likewise the usual impurities, such as particles of the root, sand, etc.

From these facts the only conclusion that can be drawn is that the sample is an entirely artificial one, and the sublime simplicity of a wholesale firm attempting to pass off such an article as this for fine Aleppo scammony is certainly very amusing. I am informed that the addition of resin of scammony is frequently resorted to, as a means of bringing up inferior powder to the official standard, but I must say that I have never myself met with any such samples. Such an addition, however, can be readily discovered by the nose, for the odour of resin of scammony is so characteristic and powerful that anyone possessed of a keen sense of smell could discover the presence of even 2 or 3 per cent.

While on this subject, it would, perhaps, be interesting to some of our younger members and associates were I to give a *modus operandi* for the assay of this gum. The Pharmacopœia simply states that ether should remove from 80 to 90 per cent. of resin; but as there are so many ways by which this could be done, some giving more accurate results than others, I will just explain the one by which I work myself, and which I can safely say gives thoroughly accurate results.

50 grains of moderately fine powdered gum, mixed with about double its bulk of powdered glass, is placed in a small percolator: the one which I have here answers admirably; it is the tube of a 2 oz. glass male syringe having a plug of glass wool so placed as to prevent any particles from getting into, or passing through the neck. On the glass wool is placed powdered glass, to the depth of about a quarter of an inch, and on to this the mixture of powdered glass and scammony is placed. Ether is then passed through, until the whole of the resin is extracted, which is seen by the ether passing through colourless. The ethereal tincture is collected in an accurately tared beaker, of about 2 fluid ounces capacity, and placed in the drying oven, which has been previously heated, and the gas extinguished to avoid the ether vapour firing. The heat of the oven will be sufficient to drive off the ether in about ten or fifteen minutes, when the gas may be relit, and the drying completed at 212° Fahr. Towards the end of the process, if the resin be not stirred, it will rise in the beaker in the form of a light, spongy mass, in which condition it rapidly dries. The net weight is then taken, and this multiplied by 2 gives the percentage of resin.

Interesting discussions followed each communication, in which the President, Messrs. Conroy, Davies, Johnson, Hallawell and Watt took part.

LEEDS CHEMISTS' ASSOCIATION.

The annual social meeting of the members, associates and friends was held on Wednesday, October 22, 1879, at the Green Dragon Hotel, Guilford Street, where dinner was provided at eight o'clock p.m.

The President, Mr. Councillor Stead, occupied the chair, and the Vice-President, Mr. S. Taylor, acted as croupier.

After dinner, the usual loyal toasts of "The Queen," "The Prince and Princess of Wales and the Royal Family," were proposed by the Chairman, and drunk with honours.

Mr. S. Taylor proposed "The Town and Trade of Leeds," referring to the steadiness which characterized the trade of the town, due no doubt to the great variety of manufactures carried on in it.

Mr. P. Jefferson briefly replied.

Mr. T. Fairley, F.R.S.E., proposed "The Leeds Chemists' Association," an institution which had done much good, and was calculated to be of service hereafter, especially if the unpleasantness caused by the reduction in some cases of the usual retail prices was overcome.

In responding, Mr. E. Yendall pointed out the advantages which the Society offered, and expressed an opinion that the impression which many of the apprentices of the present day had that it was impossible to study and attend to the duties of the shop was a fallacy, and that instead of leaving over the preparation for their examination until they could place themselves under some London crammer, by systematic study any youth might easily prepare himself without any fear of the consequences.

The Chairman said that as the population of towns increased the necessity would arise for greater facilities by which the youths of successive generations should be educated, and he was glad to refer to the manner in which these demands had been met, the last addition being the Yorkshire College. He had therefore great pleasure in proposing "The Scientific and Educational Institutes of the Town," coupling with the toast the names of Mr. R. Reynolds, F.C.S., and Mr. George Ward, F.C.S.

Mr. Reynolds acknowledged the toast on behalf of the Philosophical Society and the Yorkshire College, accrediting the Chairman with the happy thought which had resulted in this dinner. He rejoiced to be able to say that several members of the Society were attending the day classes of the College, and that there was every promise of success attending the scheme. Last year the expenditure of the College consequent upon the number of professors and assistants, was over £4000, and towards this sum £1500 had been received in fees, a result which he thought was very encouraging in such a young institution.

Mr. George Ward, Lecturer upon Chemistry at the Mechanics' Institute, urged a better attendance at the meetings of the Society. There was nothing chilled the ardour of a lecturer more than a meagre attendance, and upon some occasions there had been a very small number.

A vote of thanks to the Chairman and Vice-Chairman brought an agreeable evening to an end.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION AND SCHOOL OF PHARMACY.

The eleventh annual meeting of this Association was held on Tuesday, October 28. Mr. W. Wilkinson, Vice-President, in the chair.

The following annual report of the council was presented:—

"The past year has been uneventful in the history of our Association. The ordinary winter meetings were held at the Memorial Hall, tea being provided. At some of these meetings scientific subjects were brought before the members, whilst others afforded opportunity for the discussion of important trade questions now occupying the serious attention of chemists and druggists.

"Your committee regret that the usefulness of these meetings is not more generally recognized by members, and that so few realize the importance of their individual interest in the aims of the Association.

"The attendance at the classes held in connection with the Association was smaller than usual; this being attributed by the lecturer mainly to the fact that the fees demanded were somewhat high, whilst the ability to pay on the part of students has been adversely influenced by the depression of trade prevalent in the district.

"In order to meet this condition of things, your committee have this year made a considerable reduction in the fees, and have applied to the Council of the Pharmaceutical Society for a grant of money to supplement the fees as remuneration to the lecturer.

"Your committee have much pleasure in informing you that the sum of £35 has been granted by the Pharmaceutical Society in answer to this application.

"In order that the classes may be made as widely useful as possible, a resolution will be proposed for acceptance by the present meeting abolishing the associates' subscription to the Association, and throwing the classes open to all connected with the trade as assistants or apprentices.

"Your committee trust that this endeavour to restore the Manchester School of Pharmacy to its former scale of usefulness may be cordially seconded by parents and employers, without whose co-operation very limited success can be hoped for.

"In conclusion, your committee again ask the support of all engaged in the practice of pharmacy in this district, and venture to urge those members who have hitherto only contributed to the funds of the Association, to add the encouragement of their presence to the forthcoming winter meetings."

The Treasurer, Mr. G. S. Woolley, having presented his statement of accounts, the report and balance sheet were adopted by the meeting.

A resolution moved by Mr. J. B. Payne, and seconded by Mr. Jas. Botham:—"That the associates' fee be no longer charged," was carried unanimously.

The concluding business of the meeting was the election of officers for the session 1879-80. The following gentlemen were appointed:—

President, Mr. W. S. Brown; Vice-Presidents, Mr. J. T. Slugg, F.R.A.S., and Mr. W. Wilkinson; Treasurer, Mr. G. S. Woolley; Hon. Secretaries, Mr. F. Baden Benger, F.C.S., and Mr. H. Woolley; Council, Messrs. Blain (Bolton), Boor, Botham, Bowden (Patricroft), Hargraves (Oldham), S. Kay (Stockport), B. Robinson, Ralph Robinson (Rochdale), Slack, Westmacott.

HULL CHEMISTS' ASSOCIATION.

The annual meeting of the above Association was held at the Cross Keys Hotel on Thursday evening, the 23rd inst., the President, Mr. James Oldham, in the chair.

The report and balance-sheet, having been read and discussed, were unanimously adopted. Votes of thanks were accorded to the officers for the valuable services they had rendered to the trade during the past year. A ballot was then taken for officers, with the following result:—President, Councillor Myers; Vice-President, Mr. J. Grindell; Hon. Secretary and Treasurer, Mr. C. B. Bell; Committee—Messrs. Hammond, Oldham, Stoakes and Hayles. Regret was expressed that Mr. Stoakes had decided not to accept the office of hon. secretary, as during the three years he had held that position he had been most efficient, and had given universal satisfaction.

Proceedings of Scientific Societies.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The annual conversazione of this Association was held at St. James's Hall, on October 22. A numerous company assembled, amongst whom were noticed several well-known pharmacists.

The programme, consisting of vocal and instrumental performances interspersed with recitations, seemed highly appreciated by the audience and was carried out in a very creditable manner.

Scientific apparatus and objects of interest were kindly lent by various firms. Amongst others we may mention those by Messrs. Maw, Son and Thompson, Messrs. Jackson and Co., and Mr. Rimmel. A splendid assortment of microscopes was exhibited by Messrs. Ladd, Pillischer and Swift, and some rare and new chemicals by Messrs. Hopkin and Williams.

A large amount of attention was given to the collection of Dr. Muter, which consisted of very fine vacuum tubes, microspectroscope, saccharimeter, telephones and microphones, spectroscopes, etc.; and the value of this exhibit was greatly enhanced by the able manner in which the various pieces of apparatus were demonstrated by Dr. Muter and his assistants.

Parliamentary and Law Proceedings.

PROSECUTION FOR SALE OF PAREGORIC DEVOID OF OPIUM.

John Boar, of Ashover, was charged with selling as paregoric a preparation which was entirely destitute of opium.

Colonel Shortt, inspector of weights and measures, said on September 2 he went to defendant's shop for three ounces of paregoric. Defendant served him and he paid 8*d.* for the three ounces. He then told defendant he had purchased it for the purpose of having it analysed. He divided it into three parts in the presence of defendant and sealed each part. He gave defendant one, kept one himself, and sent one to Mr. Allen, the public analyst of Sheffield. Mr. Allen had reported that the preparation was entirely wanting in opium, of which there should be two grains to the ounce.

Defendant said he purchased it of Greaves and Sons, of Chesterfield, and that they informed him he was right in selling it as a mixture free from opium.

Colonel Shortt said he had consulted Mr. Allen on this point, and had received the following reply:—"'Paregoric Elixir' always was, and always is, understood to contain opium. No one objects to shopkeepers selling a common domestic medicine (free from poison), if they will do it under such a name as not to cause mistakes. Dangerous and even fatal results are continually happening owing to the preparation, destitute of opium, being sold under the name of 'Paregoric.' Its failure to produce the intended effects leads to an increase in the dose, and then when the genuine article is obtained, as it will be if a druggist is asked for it, poisonous effects are produced. . . . I am strongly of opinion that the sale of paregoric destitute of opium ought to be put a stop to. It is an abuse similar to the selling of children's gunpowder, warranted not to go off. P.S.—You are at liberty to make any use you like of this letter. I may say that my attention was first called to the importance of the question by medical men and druggists. (Signed), Alfred H. Allen, Sheffield."

Mr. J. S. Robinson, pharmaceutical chemist, of Alfreton, was then sent for by the magistrates, and having consented to give what information he could about any drug, was put on oath and said that paregoric according to the standard should contain two grains of opium to the ounce. A nominal fine of 1*s.* was inflicted, with costs 11*s.* 6*d.*—*Derbyshire Courier.*

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[345]. This injection appears to have given rise to a difference of opinion, as to whether the mixture should be filtered or sent out (with a "Shake the bottle" labe

on) containing the insoluble sulphate of lead. I write from practical experience, not from theory. I have dispensed and seen others dispense, both here and in London, dozens of injections similar to the one mentioned, but have never known one yet to be filtered. Mr. J. B. L. Mackay says that "Some prescribers make the combination in ignorance of its incompatibility." I have only to add that the formula of Dr. Ricord (without doubt the most celebrated physician in the world for sexual maladies) contains the same precipitate, as also does the well-known "Injection brou." The fact is that sulphate or acetate of zinc prescribed alone is more apt to produce stricture, which is avoided by the soothing properties of the insoluble sulphate of lead.

Injection Astringente (Ricord)—
Sulfate de Zinc,
Acétate de Plomb. . . . . . āā 1·0
Eau de Roses . . . . 200·0

Il y a production d'un précipité de sulfate de plomb, *qu'on laisse dans la préparation.—L'Officine* (*Dorvault*).

WILLIAM FOX.

14, *Rue de la Paix, Paris.*

[365]. The two ointments should be freshly prepared, the ung. potas. iodid. to contain double at least the quantity of potas. bicarb. ordered in the B.P. By this method a white creamy ointment will be produced; but on keeping a short time, mercuric iodide will form and change the colour of the ointment, showing what affinity the one element has for the other.

LAVANDULA.

[366]. Dissolve the carbolic acid in the olive oil, then rub the ext. opii with a little distilled water, to a smooth paste, then gradually add the oil and affix "Shake the bottle" label.

LAVANDULA.

[367]. Pitch can be made into very good pills by simply soaking in warm water until sufficiently soft, and rolling out quickly on a slightly warmed machine.

J. F. THURSFIELD.

[368]. Would some of your readers kindly give me their opinion on the following:—

℞ Sp. Ammon. Arom. . . . . . . ʒij.
Tinct. Zingib. . . . . ʒiss.
Sp. Æther Nit. . . . . ʒij.
Pot. Bicarb. . . . . ʒiss.
Aq. . . . . ad ℥viij.
M. ft. mist.

I dispensed it with tr. zingib., B. P., it was returned with the remark that it was not so strong and very much more milky than it was when dispensed in Scarboro'. I afterwards used the soluble essence with satisfactory results. Which was right?

LEO.

[369]. May I call the attention of skilled dispensers to the following prescription recently handed to me with the caution that I would dispense it carefully, as the doctor had warned the patient that it could not otherwise be made takeable?—

℞ Camphor . . . . grs. 50.
Ammon. Carb. . . . . grs. 50.
Spt. Æther. Nit. . . . . . . ♏ 50.
Liq. Ammon. Acet. . . . . . ♏ 100.
Glycerini,
Aquæ Rosæ, part. æqual. . . ad ℥x.
Take ℥j every half hour.

After proceeding to the best of our ability, conscientiously abstaining from making any alteration or addition whatever, we obtained but an unsightly mixture, the camphor separating to the top.

This was returned with a request that we would try and mix it better, as others had done (the prescription bore the stamps of two other chemists), the doctor having stated that he could mix it perfectly.

We thereupon loosened the reins of our conscience with a much more satisfactory result; but I would ask those gentlemen who insist upon strictly "faithful dispensing," how they would proceed in the present case? I would also call attention to the large dose of camphor, 5 grains "every half hour."

F. R. BESSANT.

[370]. Would any dispenser inform me how to dispense the following, and if it ought to be filtered or not?—

℞ Liq. Strychniæ . . . . ʒj.
Sp. Myristicæ . . . . ʒss.
Tinct. Ferri Perch. . . . . ʒij.
Aq. Destill. . . . . ad ℥viij.
M. Ft. mist.

CUMBERLAND.

Notes and Queries.

[629]. ROOKE'S GOLDEN OINTMENT.—In a private letter to a friend a few years ago, Dr. Rooke gave the following formula for his ointment:—

℞ Hydrarg. Perchlor. . . . . gr. ij.
Acid Hydrochlor. pur. . . . . . ♏x.
Hydrarg. Nitr. Ox. (levigated) . . . ʒj.
Adipis . . . . ℥viij.
M.S.A.

C. PARKINSON.

[633]. LIN. SAPONIS.—*Delta* in making the lin. saponis, P.B., has, he supposes, exceeded the temperature, viz., 70°, and the soap has gelatinized. Can any of your readers recommend him what to do with it, as in its present state it is quite useless?

[634]. COLOURING FOR WAX.—Can any reade of the Journal inform me of a deep red colouring to use for bees'-wax melted in oil of turpentine?

"EPSILON.'

Obituary.

Notice has been received of the death of the following:—

On the 18th of September, 1879, Mr. Thomas Henry Morris, Chemist and Druggist, St. Asaph. Aged 32 years.

On the 20th of September, 1879, Mr. Morley Thompson, Pharmaceutical Chemist, Princes Street, Rotherhithe. Aged 66 years. Mr. Thompson had been a Member of the Pharmaceutical Society since 1864.

On the 25th of September, 1879, Mr. George John Haddock, Chemist and Druggist, North Street, Brighton. Aged 36 years.

On the 5th of October, 1879, Mr. William Bentley, Chemist and Druggist, New Basford. Aged 47 years.

On the 14th of October, 1879, Mr. John Sneed, Chemist and Druggist, High Street, Keighley. Aged 51 years.

On the 15th of October, 1879, Mr. James Keith, Pharmaceutical Chemist, Union Place, Aberdeen. Aged 69 years. Mr. Keith had been a Member of the Pharmaceutical Society since 1853.

On the 20th of October, 1879, Mr. William Swarbrick Blackhurst, Chemist and Druggist, Poulton Street, Kirkham. Aged 42 years. Mr. Blackhurst had been a Member of the Pharmaceutical Society since 1874.

On the 23rd of October, 1879, Mr. John Morris, Chemist and Druggist, Brecon Aged 64 years.

On the 27th of October, 1'879, Mr. William Field, Pharmaceutical Chemist, Regent Street, W. Aged 51 years.

On the 27th of October, 1879, Mr. William Frederick Wright, Chemist and Druggist, Regent Street, Leamington. Aged 36 years. Mr. Wright had been a Member of the Society since 1872.

BOOKS, PAMPHLETS, ETC., RECEIVED.

ANNALS OF CHEMICAL MEDICINE, including the Application of Chemistry to Physiology, Pathology, Therapeutics, Pharmacy, Toxicology, and Hygiene. Vol. I. By J. L. W. THUDICHUM, M.D. London: Longmans, Green and Co. 1879.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE CREAM OF TARTAR OF THE PHARMACOPŒIA.

Sir,—As Mr. Tanner wishes me to state the purpose for which the neutralizing test for cream of tartar is given in the Pharmacopœia, if it be not to prove the absolute purity of the article as a potash salt, I may inform him, although I am sure he does not need the information, that while it admits and credits in the estimation the tartrate of lime which the previous test has recognized, it excludes other impurities, such as sulphate of barium or sulphate of calcium. If he still sees ambiguity in this, I can only say I am sorry for it. To me it seems sufficiently clear and consistent.

I find from his explanation that I misunderstood what he meant by first saying he was not prepared to admit that there should be more than a trace of tartrate of lime in cream of tartar, and then suggesting that guaranteed samples may contain 5 per cent. I presume it might be otherwise put, that ten or twelve years ago the Pharmacopœia description was applicable to the best commercial samples, but that it has ceased to be so, owing to the increased quantity of lime salt now generally present. If this be his meaning I think he may be right. But as far as we know, the proportion of tartrate of lime has always been variable, and as the Pharmacopœia test was obviously made to apply to what was the minimum proportion formerly, reasonable men may be supposed to apply it in the same sense now, without necessarily condemning as adulterated samples that contain a larger proportion, such as the maximum in good commercial samples, seeing that this variation results from the mode of producing the article, over which the manufacturer of cream of tartar has no control. Mr. Wigner has thought proper to put a construction upon what I have previously said on this point, which, as it involves an absurdity, could hardly be supposed to be, and certainly is not, what was intended to be conveyed; but at this demonstration I am not surprised.

October 28, 1879. T. REDWOOD.

"PAREGORIC MINUS THE OPIUM."

Sir,—Permit me to thank you for your outspoken remarks upon the above case, which appeared in your last week's issue.

The specious defence made by the two chemists concerned is, as you say, too plain to need any argument. But there is another view of the matter to which I think you did not allude, namely, that when such a defence is set up by a member of the pharmaceutical body—a defence, technically right perhaps, but certainly morally wrong—it cuts the ground from the feet of the unfortunate chemists who happen to be subjected to a really vexatious prosecution under the Adulteration Acts, in which they are morally right but technically wrong. If once magistrates and the general public were to get the impression that we chemists had loose notions in these matters, we should find the principle of *nullum iniquum in jure præsumendum est* more honoured in the breach than in the observance. It is deplorable that any chemist should for paltry pecuniary motives show such an absence of *esprit de corps* as was here exhibited, and I can only suggest to the local secretary for the district to have his wits about him; a wholesale chemist who will supply a petty shopkeeper with "paregoric minus the opium" (we shall have simple syrup minus the sugar next!) would not require much temptation to supply it with the opium, to the detriment of his brother chemists and the safety of the public.

CRITICUS.

MEN'S WORST FOES ARE THOSE OF THEIR OWN HOUSEHOLDS.

Sir,—In your article on "The Application of the Food and Drugs Act in New Directions," reference is made to some of the druggists promoting the sale of drugs and medicines amongst grocers and country shopkeepers "without due regard for the general interests of the body to which they belong."

We beg to enclose a label taken off a bottle brought into our shop casually for some laudanum. Size of the bottle, 3 oz. The government stamp had been upon it, its contents had been tinct. opii, and we have no doubt the firm puts it up in that form specially for country shopkeepers. That we should have such black sheep amongst us is, we think, simply disgraceful. Imagine a respectable firm sending out laudanum with a government stamp upon it, and on the label, in adddition to the name of the firm, the dose. with the additional words, "N.B. This preparation has the same properties as laudanum, and may be used for outward application." Save us from our friends!

36, *Watergate, Grantham.* JNO. COX AND SON.

REGISTRATION UNDER THE DENTAL ACT.

Sir,—The question as to whether a man may legally call himself a dentist unless he is able to undertake all the branches of the profession has been raised, and is now being freely discussed in this Journal, and I have thought that perhaps the following extracts from "The History of Dental and Oral Science in America," quoted by T. Stack, Esq., M.D., Dublin, in an article entitled, "The New Dental Act in its Relations to the Licensing Bodies and the Profession," which appeared in the *Medical Press and Circular*, may throw some light upon the disputed point. In alluding to the present position of dentistry in America, it says, among much other interesting matter, "Besides I have never known, with a single exception, any one individual to excel greatly in both these departments of our arts (*i.e.*, surgical and mechanical).

"It is here, as in Europe, the practice of most of our best educated dental surgeons to employ mechanics to do their artificial work, who never see the patient. . . . Therefore while, on the one hand, I would persuade our well educated men to confine their practice chiefly to operations on the living teeth. I would as earnestly dissuade the mechanical dentist from all attempts at operations in the surgical department. . . . In all large cities, or places, having the requisite facilities, the question is virtually settled by the employment of specialists for most of what is known as 'artificial work.'"

Dr. Stack, furthe on in the article, fully confirms this view, and says that a man should be a surgeon first, and dentist after, and that a man may be entrusted to know whether he is fitted by his mechanical taste to undertake the speciality of dentistry.

By these it will be seen that both here and in America many of our bes men differ from some of your correspondents.

GEORGE JAS. GOSTLING.

Sir,—In the Journal of the 18th inst., Mr. G. Ward states that "In America, there is a matchless dental profession independent of medical men and chemists." I enclose a cutting which illustrates that statement, from *Lloyd's* of the 26th inst. Perhaps it also may operate as a caution to those who use arsenic as a nerve cautery.

"The *New York Times* states that Mr. G. A. Gardiner, nephew by marriage of Prescott, the historian, died in Brooklyn, on the 27th of September, in great agony, after two weeks of indescribable suffering. It is said by his attending physician that his death was caused by arsenical poison placed by a dentist in one of his teeth for the purpose of killing an aching nerve."

202, *Caledonian Road.* E. W.

Bell Scholarships for the Ladies.

Sir,—My friend, Mr. G. S. Taylor, in his usual happy manner, has done good service by drawing attention again to the smallness of the number of candidates who annually compete for the Jacob Bell Memorial Scholarships, and I think he would have placed the Society under still greater obligation to him had he thought well to invite the lady aspirants to pharmacy to compete for these eligible positions, inasmuch as the Council have decided that the term "person" shall henceforth mean men and women, and I doubt not in the future examinations gentlemen candidates will find the ladies pressing hard on their heels for these most serviceable, as well as valuable and much to be coveted, relics of one of the greatest men pharmacy has known.

35, *Baker Street, W.* A. W. Postans.

Trading by Government Clerks.

Sir,—In the Journal for October 4, a letter appeared from "A Looker-on," upon trading by government clerks. I have felt somewhat surprised that that letter has elicited no response, as I must say, without exception, I have seen no statement which has so fairly and temperately laid the case before retail traders, and I hope its being passed over in silence is not due to the fact that retailers have settled down into a state of helpless apathy, vainly trusting that the fates will do for them what they ought to do for themselves.

I took occasion to submit the letter to a legal friend, who pronounced it very well written, but contended that it did not meet the case; he based his objection upon the hackneyed argument that if a servant fulfils his contract he can employ his spare time as he thinks proper. "But," said I, "suppose your head clerk during his spare time takes a little practice on his own account, which in all probability would come to you?" "Why," he replied, "I'd kick him out of the place of course." He at once admitted the justice of the argument. "But," said he, "how would such restrictions apply to the Army and Navy Stores?" I replied that they would not be interfered with provided that they confined their transactions to the members of the service; but they would certainly have to be prohibited from supplying Her Majesty's ships or any institution of a public character. He replied, then retailers have justice and equity on their side and it is their own fault if they don't secure an Act to make trading by crown servants illegal.

For my own part, laying aside all personal or trading interests and looking at it as a question of principle, I consider this system of public trading by the government clerks one of the most flagrant and dishonourable evasions of social obligation which has taken place in modern times, and that by a class who are supposed to be gentlemen, and whom the public have always looked upon as such; beside their conduct is setting up a spirit of discord and retaliation between different classes of the community which have always been on the best of terms with each other; if it goes on it is calculated to produce very bad results socially, and if not checked at once the system will be established as a precedent.

Now, sir, by way of putting a stop to such a system, I have to propose that a central committee be formed in London, consisting of the chairmen or presidents of the different trading associations (chemists and druggists to be represented by the President of the Pharmaceutical Society), that they have the letter by "A Looker-on," with the following letter or any modification of them which may be thought desirable, printed in every trade journal and issued to every retailer in the kingdom. This will educate retailers upon the question and will give them to understand what to request and their reason for so doing when brought face to face with the candidates for future parliamentary honours. Education upon the subject is essential, as I hear retailers complaining in all directions and I have never met with one who understood the case beyond the effect which it produced upon his business. Further, I would suggest that the same letters be printed in the form of a circular and sent at once to each member of Parliament or candidate for future membership. Members are now amongst their constituents and they would have opportunity for calmly discussing the subject. If chemists do not feel themselves sufficiently aggrieved to take the matter up, I hope that it will be brought before other branches of trade, and as soon as I see action commence, I will send 10*s.* towards a fund for defraying expenses.

Justice.

"To ——————, M.P.

"Sir,—We, the representatives of the retail traders of the United Kingdom, beg respectfully to call your attention to the conduct of the clerks in the government offices and others in the service of the state, in forming themselves into trading companies under the disguise of Mutual Benefit Societies, with the avowed object of dealing with the public outside their own immediate class. Now, sir, this is felt by retail traders to be an illegitimate and dishonourable innovation upon their vested interests, inasmuch, as they are taxed to pay the salaries of such officials and public servants, and further, that length of service is acknowledged in declining years by pensions paid out of the earnings of the public. Under such circumstances the salaried and pensioned servants of the state, although not under the immediate control of the public, are in every respect the servants of the public; in fact they occupy precisely the same position towards each other as individuals do in the case of employer and employed, and in such capacity they are morally, if not legally, bound to do nothing which shall in any way injure the interests of any class of the community. In the case of individuals, such conduct would be considered dishonourable and breach of faith and would not be tolerated, and retail traders feel that they are asking nothing unreasonable nor assailing any legitimately vested interests in asking that such conduct shall be prohibited on the part of those employed in the public service.

"Retail traders have no wish to interfere with legitimate competition in business, nor do they in any way wish to interfere with the liberties of those in the service of the state by placing upon them any restriction to prevent them supplying themselves with the necessaries of life at the least possible cost; all they ask is that those whose salaries and pensions are paid out of the earnings of the public shall be prohibited either individually or collectively from entering into business or taking service in any form of such a nature as to be detrimental to the interests of any class of the community.

"Having explained exactly the nature of our grievance and also exposed the injustice of such action on the part of the servants of the state, we beg respectfully to inform you that at the coming election the retail traders in your constituency will ask your promise of support to a measure to be introduced into the new Parliament, which shall prohibit and make illegal after a certain date, any action on the part of the pensioned or salaried servants of the state, either individually or collectively, which has for its object trading with the public outside their own immediate class.

"Trusting that you will admit the reasonableness of the request and that you will give the subject your favourable consideration and promise of support, we beg to remain on behalf of the retail traders of the United Kingdom,

"Yours very respectfully,

"The Central Committee, ——————
"London."

The Health of the Drug Trade.

Sir,—I am very glad to see that this matter is being ventilated in our Journal, that increasing interest is taken in it, and that the salvation army is gradually growing.

I intended to have written directly I saw Mr. Nicol's sensible letter, and beg you to kindly insert this, as my name has become identified with the subject.

The health of the mass is, of course, that of the individual atoms, and with us, as with every other occupation, the weakly will be weeded out, although that occupation may or may not have a direct influence on its followers; and also naturally strong persons will be able to combat influences that must kill the delicate.

It must be candidly admitted that hours used to be longer than happily they are generally now, but probably the conditions were more favourable. Fifty years ago, although light was dawning on the horizon, still there was not such a strain then, as at present, on our brains. It was becoming evident that we must have a better qualification for our duties if we wished to maintain our place in the ranks continually marching on, unless we were content to fall back to the rear; still the stock of the druggist was a perfect elysium of simplicity compared with what it is now, the duties were less onerous and enervating, the prescription was composed of articles contained in the Pharmacopœia, and neither contained so many deadly ingredients (which must always be a source of danger and anxiety to the dispenser), nor did they require so much acumen to prepare; also, I believe that we were held in higher estimation by the public, and that there was more business done of a more profitable nature and giving less anxiety. Now that is all altered. People as a rule take less physic than they formerly did, and are less willing to support the druggist, and what with increased expenses of salaries, wages, rent, rates (taxes I think are lighter), living and education for our children, to most of us comes the greater difficulty to make a living.

In my opinion it is even now the excessive hours we voluntarily (not necessarily) keep, that is the source of mischief. In many towns our brethren are united, close early (7 p.m.), and even have a half-holiday as well in London. Early closing is not a reality, because, although many shops, large especially, and small also, are closed earlier now, still business goes on much as usual and the public defer their orders till the whim takes them, knowing "they can always get anything at any time." Even in those shops where, to use the vulgar expression very prevalent, "more than one is kept," this is very inconvenient, because often times owing to selfish neglect there is a large amount of business thrown on the diminished staff, of whatever strength it may be, that was only intended to be left to attend to sudden illness and cases of unavoidable necessity, and this vile servitude deadens the moral faculties of those who have to submit to it. I am sorry that the original purpose of the Pharmaceutical Society was ever departed from,—the three examinations, the Preliminary for the apprentices, the Minor for the assistant, and the Major for the chemist. I am sure that which costs little is little appreciated, and that the Modified examination has produced a modified effect very injurious to the welfare of the trade. Mr. Burrell speaks of darkening prospects, but I think it should be addressed to the young men themselves. The late Mr. Deane was in favour of a good fee on apprenticeship, as unless a man was able to command a sufficient capital to pay it, he would not have sufficient afterwards to advantageously enter the business, and this is most true, for many young men without position or capital go into business and think their only chance of success is keeping open later than and underselling the old established chemists (as was pointed out by Mr. Corder last year), and Dr. Tilden this year has given us good advice. "Lighten the ship, cast overboard much of the superfluous and derogatory cargo." We must sell to get our living, but ours is something more than a mere trade; let us continue our educational efforts, elevate ourselves, protect our own interests against all comers, shorten the hours of labour and cease to be public slaves, then we shall live long and happily.

I close and have done for sixteen years at 8 p.m., and all day Sunday.

HENRY LONG.

48, *High Street, Notting Hill, London, W.*

Sir,—The discussion on the "Health of the Drug Trade," is very interesting, but I should like to ask your correspondents whether they have not jumped rather rashly to the conclusion that the majority of us pine away in the flower of our youth.

The average duration of life in the psalmist's time might be three score years and ten, but is it now?

C. PARKINSON.

LIQUID EXTRACT OF COTO BARK.

Sir,—In the "Month," page 322, it is stated that Dr. J. B. Yeo has found this preparation useful in the diarrhœa met with in phthisis, and suggests that it should be given in combination with tincture of cardamoms and mucilage.

Will you allow me to ask whether the simple or compound tincture is referred to?

It would be interesting, also, to know whether tincture of catechu given in a similar combination would not answer equally well.

OBSERVER.

[*** The compound tincture of the B.P. is intended.—ED. PH. J.]

FERRI AMMON. SULPH.

Sir,—Having read Mr. Parker's letter in last week's Journal with great interest, I think he has pointed out four very important indications. Speaking from my own experience I think the "Dispensing Memoranda" is a most valuable portion of the Journal, where opinions may be expressed, difficulties cleared, and the trade benefited.

Respecting ferri ammon. sulph., it was a fit subject to make inquiries into, as I was handed a similar prescription a few days ago. Being able to communicate with the prescriber, he said he meant ferri ammon. sulph., and thought it was a preparation generally kept, and that he had prescribed it before. Where I don't know, probably in some of the hospitals, where I am disposed to believe that it is used sometimes. I should be glad to know whether there is anything objectionable in ferri ammon. sulph. being used for medicinal purposes, and what is the dose of it?

COCHLEA TERRESTRIS.

CREDULITY IN MODERN TIMES.

Sir,—There has lately arrived amongst us at Birkenhead a strange phenomenon for this country—a lady doctor, who professes to be an Italian—Madame Enault. She has a magnificent turn out, a chariot all mirrors and gold, with three splendid horses, said to be worth a hundred guineas each; seated on the top of this imposing vehicle are six musicians, dressed in fancy costume, cavalier hats, boots and feathers. The lady herself is attired in a picturesque Italian costume, ornamented with dragons, stars, and other hieroglyphics. She also wears a gilded tiara and head-dress of beads, with flowing black hair. Just imagine the sensation she causes as she drives through the town with her band playing in the loudest strains, to the place where she is located, a piece of ground in Conway Street. This lady appears to cure every imaginable disease that human flesh is heir to—paralysis, extracting teeth, takes out encysted tumours, and all before the public almost instantaneously; but whether she does so in reality or not public opinion is divided. She is surrounded daily by a dense mass of two or three thousand people, including all classes of society, magistrates, merchants, shopkeepers and working men, all anxious and struggling to procure a bottle of a preparation that she calls "malachité," which she sells at 2*s*. per bottle. This she recommends almost for every complaint, for headache, toothache, neuralgia, etc., and to show what effect faith has in many cases of imaginary disease, I may mention that I have examined it, and believe it to be a mixture containing tincture of cannabis indica, together with glycerine and essential oils.

I send this short sketch thinking it may interest some of your readers and many pharmacists in Lancashire, who must have heard of Madame Enault, and to show the height credulity will reach in the nineteenth century.

54, *Stanhope Street, Liverpool.* J. THOMPSON.

"*Omikron.*"—The question is unsuited for insertion in this Journal.

M. D. Morris.—We have no qualification for giving a "legal view."

C. F.—The colouring of the syrup has been referred to the formation of caramel, and at present we know of no way of remedying it. See a paper on the subject in vol. vi. of the present series, p. 811.

"*Tinctura.*"—Such a result should hardly follow if the tincture is prepared strictly according to the B.P.

"*Stuck.*"—(1) See a paper by the late Dr. Crace-Calvert on "Dyes and Dye Stuffs," *Pharm. Journ.* [3], vol. ii., p. 435. (2) See the discussion on the composition of chlorodyne in vol. xi. of the second series of this Journal.

"*Ranunculus.*"—The preparation is one frequently advertised in another part of the Journal.

J. S. Simcock.—Your letter has been forwarded to our correspondent.

"*Olibanum.*"—A recipe for incense will be found in vol. viii. of the present series, p. 519.

"*Delta*" (Ipswich).—See the article on "Fats," in Ure's 'Dictionary,' vol. ii.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Horsley, Ward, Barnaby, Ferguson, Leigh, Howe, Fowke, Boutell, Morris, E. W., T. W., J. W. A., Ranunculus, One of them, Criticus.

TARAXACUM.*

BY CHARLES SYMES, PH.D.

When a short time since a trivial circumstance caused me to reflect on my experience with regard to the pharmacy of taraxacum, I was fully aware that the subject had received considerable attention from very able men in the earlier days of the Pharmaceutical Society, and that for some years past little had been written or said concerning it. This implied that the conclusions then arrived at were uniform, that the results were altogether satisfactory, and that it would be a fruitless task again to open up the subject. Reference, however, to the early volumes of the Journal seemed rather to indicate that the subject had been abandoned because high authorities differed, and not because perfect results had been arrived at.

I have therefore ventured to bring the matter forward anew so that it might receive further consideration, and trust that on the present occasion it will receive full discussion, so that with the experience of the days already mentioned, and the cumulative results of observation since that time, we may, when a new edition of the British Pharmacopœia goes to press, feel that as regards taraxacum we are walking in the light of to-day.

In the present edition of the Pharmacopœia, "taraxaci radix" is described as the "fresh and dried root of *Taraxacum Dens Leonis* gathered between September and February."

Now it is this *time of gathering* which presents the first difficulty, and is really the point at issue. Mr. Joseph Houlton, writing in the *Medical and Surgical Journal* of August, 1828,† after quoting several authorities says: "My own observations perfectly coincide with those of Bergius. In the month of March, the juice obtained from the bruised root by pressure is a thin, watery and brownish fluid, weak in flavour; whilst that procured by the same process towards the end of the summer is thick, opaque and cream-coloured, and in a few minutes after being expressed it sets to a much more solid consistence, becoming as thick as common paste; it is very bitter and saponaceous. This is the season in which I have chosen it for medical purposes, and from many years of observation upon this plant of disputed virtues, I have been led to a conviction that it has medicinal powers varying essentially according to the time of year in which it is gathered, and the mode in which it is prepared." Extending the period somewhat later in the year, viz., to the latter part of the autumn, these views were subsequently confirmed by Squire, Bell, Hills, Cracknell and others. Bentley, on the other hand, furnished some very convincing arguments in favour of the use of roots collected in the spring, and in support of his views related his personal experience not only as to the superiority of the preparations then obtainable from a pharmaceutical point of view, but also as to their greater medicinal efficiency.

Christison and, I believe, others entertained the same views. Giles considered the time which elapsed between collecting and using the roots was of the first importance, and the season at which they were collected quite secondary. The United States Pharmacopœia directs the roots to be collected in the autumn.

I am not aware that anything more definite than these varied opinions has been arrived at, and yet as a medicine taraxacum and its preparations are extensively used. If, however, this short, and I fear, imperfect paper, should elicit facts which will enable us to arrive at satisfactory conclusions on this and other points, or should start anew the investigation of the subject, it will have served some useful purpose.

My own experience, which has been derived from operating some years ago on several tons of the root and recently on smaller quantities, at various seasons of the year, points to November as the month in which taraxacum roots should be gathered for medicinal use, the period being extended to the beginning of December if the winter has not commenced early; or in other words, the later they are gathered, so long as they have not been subjected to the influence of frost, the better they will be. At this period it is true they contain a large quantity of inulin, but the active principle, or taraxacine is more fully developed (if bitterness is any criterion) than at any other season, and the inulin can be separated from the expressed juice far more readily than the saccharine matter which abounds in the spring. I have examined samples of the fresh juice late in the autumn which had comparatively little action on Fehling's solution, whilst at other seasons it is very marked and energetic. No sooner does the frosty weather set in than the roots become sweet, the starchy matter becoming converted into saccharine; a necessary condition of things before it can serve the useful purpose in the economy of the plant for which it appears designed, viz., for the nourishment of the root during the cold weather. This is probably brought about under the influence of a ferment which operates specially at low temperatures; but that starch, even in the absence of a ferment, and in the cold, may be gradually converted into dextrine has recently been shown by Riban (*Bull. Soc. Chim.*, xxxi., 10), and as regards the change in dandelion roots, no one who will take the trouble to examine them before and after a few sharp frosts will have the least doubt as to the increased sweetness. My first impression was that the bitter principle remained intact and was merely masked by the presence of the saccharine matter, but experiment led me to the conclusion that it became more or less altered in character and that its destruction probably went on *pari passu* with that of the inulin; and this conclusion became strengthened on the perusal of a paper by Morson, in the 1st vol. of the *Pharmaceutical Journal*, page 52, on "Vegetable Extracts," in which he writes as follows:—"The bulk of most extracts consists of sugar, starch, enuline, gum, and other inert substances, which although inoperative in themselves exert in combination with water a very destructive influence on the really active proximate principle of the plant." These remarks were doubtless founded on experiment and careful observation, and although here the conditions differ somewhat, inasmuch as the vital influence is absent, still the results appear to be the same.

As to the preparations of taraxacum, the solid extract is not regarded by medical men as an agent of much activity, except in large doses; the succus on the other hand is much prescribed, not unfre-

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, November 5, 1879.

† Reproduced in *Pharm. Journ.*, vol. i., p. 421, 1st series.

quently in too small doses, but when well prepared and moderately fresh is a good representative of the medicinal properties of the drug. When, however, it is kept for any length of time, and more especially in warm weather, it often becomes turbid, deposits, and sometimes ferments, losing most of its bitterness, and this will, as a matter of course, occur much more readily in the presence of a large quantity of saccharine matter than in its comparative absence. Reasons which it will be unnecessary to detail render it undesirable to increase the quantity of alcohol in any medicinal preparation of the kind, beyond the amount necessary for its complete and perfect preservation, but especially in that under consideration where the quantity administered is or should be comparatively large. But in the formula given a minimum of spirit is used at a risk of the stability of the preparation, and I would suggest an increase of say 5 per cent. of spirit as desirable, and the dose as regards bulk might be diminished by concentrating the filtered juice as soon as possible after expression from the roots.

There is a preparation of taraxacum officinal in the United States Pharmacopœia, but not in the British, viz., the fluid extract prepared from the dry root, with which many pharmacists are, I presume, acquainted. It is a concentrated, efficient, elegant and stable preparation. The sample No. 1, which possesses much of the bitterness and the peculiar odour of taraxacum, is in a perfect state of preservation, and is at least three years old. Sample No. 2 has been recently prepared from roots a year old, and No. 3 from roots collected and dried about ten days since; both these are very decidedly bitter.

Like most of the American fluid extracts the one under consideration is of such a strength that one fluid drachm represents 60 grains of the dry powdered drug; and as the best autumnal roots lose 75 per cent. of moisture in drying (spring roots about 80 per cent.), each fluid drachm represents at least four times the quantity of fresh root. The formula will be well known; the finished product contains one half its bulk of rectified spirit, one-fourth glycerine, the remaining fourth consisting of dissolved extractive and water. Liquid extract of taraxacum is not unfrequently prescribed in this country (the dispenser often being uncertain as to what is really intended), and I think this preparation would fill a want; and that it, or some modification of it, should find a place in the next British Pharmacopœia.

[*The discussion on this paper is printed at p.* 374.]

THE PREPARATION OF CASTOR OIL.*

BY ERNEST P. RAAB, PH.G.

From an Inaugural Essay.

Castor oil is obtained in the United States by the following method, as witnessed at the "Belleville Oil Works," owned by Messrs. Brosius and Son. The seeds having been thoroughly cleansed from the dust and particles of the pod, with which they are more or less contaminated, are placed in an iron reservoir and slightly heated. Great care is taken to prevent them from being scorched, the object being only to make the oil more fluid for expression. The pressing is now proceeded with by means of hydraulic presses, which are preferred on account of the great force exerted by them. Each piece has a series of movable plates and cylinders, of which each cylinder is filled, the plate pushed in, and then the power applied. The first quality oil is thus expressed, and runs into a large tank below. The pressed seeds are now heaped into a pile and allowed to remain for a day. Next day they are again heated in another iron reservoir, put into a series of cylinders, power is applied, and the second quality, or lubricating oil, is obtained. Messrs. Brosius and Son use a portion of their oil-cake for fuel, and send the remainder to the East, where it is utilized in combination with other matter to produce artificial guano. A Philadelphia firm, Messrs. Baeder, Adamson and Co., have resorted to bisulphide of carbon as a solvent for the press-cake, thereby obtaining a dark thick liquid. The process is similar to that carried on in France with alcohol, the product, however, being a very common lubricating oil, but without smell of bisulphide of carbon. The firm does not now manufacture any more.

The oil made by the process in use at the "Belleville Oil Works" is called cold-pressed, to distinguish it from any of the other methods in which more heat is employed. The cold-pressed oil without doubt deserves the preference, and is now extensively used. The yield per bushel after two expressions is sixteen pounds, or two gallons; the first expression yielding twelve pounds, the second four pounds. Sometimes a third expression is resorted to, but this oil is much coloured and the yield so very small that it hardly pays for the labour and expense incurred; the yield is from one to three pounds.

The process of purifying and clarifying the oil is accomplished in various ways, and is the specialty of every factory. The great point in purification as well as clarification to be noticed is the fact not to expose the oil too long to the air, as it is then liable to become rancid. The first expressed oil is clear white, or rather colourless, like water; the colour of the second expression is yellowish, like syrup of squills. Castor oil is remarkable for its power of mixing, in all proportions, with glacial acetic acid and with absolute alcohol without the aid of any other agent. It is soluble in four parts of alcohol, ·835 or ·850, at 15° C., and mixes without turbidity with an equal weight of the same solvent at 25° C. Its specific gravity is ·97 to ·98; it congeals at —12° to —13° C., and becomes solid at —40° C.

The oil of the first expression is used for medicinal purposes; that of the second for oiling leather, lubricating machinery, burning and various other purposes.

The oil-cake is either, by the addition of animal matter and other ingredients, made into manure, artificial guano, or is used for fuel. The latter is the customary practice in large oil mills, where a saving of from 40 to 50 dollars a week is effected thereby.

* From the *American Journal of Pharmacy*, October, 1879.

SOPHISTICATIONS OF OLIVE OIL.

The adulteration of this oil has become so prevalent that the French Minister of Agriculture and Commerce had requested the Academy of Sciences to ascertain the most trustworthy method for the detection of such frauds Among the procedures at present under examination by a special committee is the use of a diagometer, an instrument devised by Professor Luigi Palmieri, founded on the difference of the electric conductivity of oils. Seed oils are as a class better conductors than olive oil. At the same time every oil conducts the better the greater are its impurities. Linseed and cotton seed oil are among the best conductors, whilst the oils of pine seeds and of hazel nuts are almost as feebly conductive as the purest olive oil, known in commerce as virgin oil. Fortunately these two oils are too rare and costly to be used in the adulteration of olive oil. The use of the diagometer requires considerable manipulative skill.—*Chemical News.*

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 8, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, *17, Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary, 17, Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

SOLICITATION OF VOTES BY CANDIDATES FOR THE BENEVOLENT FUND.

THE idea that, in the administration of relief from the Benevolent Fund, the most worthy candidates should have the advantage simply because they are most deserving is one that we cordially sympathize with, and to that extent we share with the mover and the seconder of the motion respecting canvassing cards and solicitation of votes in their desire to prevent, as far as possible, any advantage being gained by or for individual candidates through other means than that of having a preferential claim to relief from the Fund by reason of their actual circumstances and antecedents.

But having admitted thus much we cannot avoid adding that it is our conviction the object sought for cannot be attained by means of such regulations as it is proposed to establish, and we need not go far beyond the remarks made by those who supported Mr. SHAW's motion for evidence in support of this view. The Benevolent Fund of the Pharmaceutical Society is a feature of that Society which every member has reason to be proud of, not only by reason of the good it has done, but also on account of the good it is yet able to do. However, the good character of this Fund, like that of all other charitable funds, is not wholly unqualified. Even in its accumulation, and still more in its application, it affords opportunities for the exhibition of various tendencies of human nature not altogether admirable perhaps, or even pleasant, but still natural tendencies which it would be quixotic to quarrel with, or to attempt to put down arbitrarily.

It is upon the basis of these tendencies that the system of soliciting votes, of sending out circulars and cards, is carried on by candidates with the view of promoting their election, and it is from a sort of instinctive perception that voters are likely to be influenced more or less by such tendencies that this system is had recourse to. Looking at the practice impartially it may not be possible to avoid the admission that it is a great evil; one which, as Mr. HAMPSON said, is becoming more and more recognized by men who have thoroughly entered into the question. But when that admission is made, does it follow, as a logical consequence, that it is an evil to be done away with by such measures as those proposed in regard to solicitation of votes, etc.? Is it not rather one of those evils that have to be endured?

We admit it is to be deprecated that poor persons applying for relief and variously incapacitated from active exertion should come into competition with others, who in place of those conditions possess an habitual disinclination to take back seats anywhere. It is, we admit, wholly undesirable that the candidates for election should ever enter upon the candidature as a sort of race who should get in. Even in the absence of any inequality in power to compete in this way, such contest would be inappropriate and when such differences as those above referred to obtain it is next door to an injustice that the weakest must necessarily go the wall. This, however, is only the natural injustice which prevails in all worldly affairs, and we cannot see that it calls for special regulation in the administration of a charity more than in the regulation of the circumstances by which some people become prosperous, while others become unfortunate.

But there seems to be a further objection to the motion brought forward by Mr. SHAW and Mr. HAMPSON, and that is its being only a half measure at best. Mr. SHAW would not interfere with personal or written solicitations, but only with such proceedings as caused expense to the candidates, so that he would leave altogether unprovided against such an evil and such an undue advantage as might be gained by a person attacking the Benevolent Fund as a matter of business, able and willing to go about and solicit votes with plausibility and without compunction, so as to court success rather by such means than on the ground of any real merit. It is no libel to say that there are such persons, and that charitable institutions are sometimes successfully cultivated by them.

And in addition to these possible sources of injustice in the allotment of the gifts of charity there are the influences hinted at by the *Daily News.* For some of the supporters of charities there can be little reason to doubt that the part they play is one of business. They subscribe partly to satisfy their vanity by seeing their names in print, partly, also, to become conspicuous and for the sake of enjoying the sense of importance arising to some persons from the fact of being solicited to give their votes and from having the power to exercise patronage.

So long as such influences prevail with voters as well as with candidates for election to annuities we cannot entertain the hope that they will not have their effect irrespective of questions as to which of the candidates are the most deserving. As regards the point of relieving candidates from expense, the prohibition of printed cards would not relieve those who are weak or disabled from the greater disadvantage of active solicitation in this way by others better able to carry it out, for now that the reproduction of letters can be carried out rapidly and copiously, it would be easy for any able-bodied persons to prepare a large number of such copies and distribute them themselves.

A further objection to the prohibition of cards and canvassing for votes arises from the dislike some persons would have to be thus shut out from taking an active part in the election of annuitants, and it is quite possible that this feeling might have the effect of preventing some persons from subscribing. Moreover it would deprive some candidates from enjoying the advantage resulting from the assistance of friends who might be disposed to canvass for them, or even to defray the cost of printing and circulating cards. It is difficult to perceive that the handicapping of candidates in regard to such assistance by their friends would be less an evil than that which is assumed to result in some cases from canvassing.

Still it seems there are charities which are administered under conditions that are supposed to do away with the evil of canvassing. Mr. Shaw mentioned the Royal Albert Orphan Asylum as having been carried on without canvassing and the Medical Benevolent Fund as one in the administration of which canvassing was to be done away with in future, so that there is evidently a considerable amount of opinion in favour of the discontinuance of the practice.

Perhaps it may not be altogether useless to suggest a plan by which much of the difficulty arising from the difference of opinion upon canvassing could be got over. If those who disapprove of solicitation for votes were to have added to their names in the list of subscribers to the Benevolent Fund in the Society's Calendar the letters N.C., as indicating that they did not approve of canvassing, this plan would serve the purpose of notifying to candidates that those persons objected to be asked for their votes, and it may be assumed the candidates would abstain at least from applying or sending cards to them. In this way subscribers to the Fund would be able at once to exercise their influence towards preventing the practice of canvassing, and in time it would appear how far this desire prevailed among the subscribers. If this course were adopted by the majority there would then be a very strong argument upon which to base a motion in future similar to that brought forward by Mr. Shaw.

In any case some such individual action directed to the prevention or removal of the evil attending the system of canvassing appears to be most suitable for initiating the reform that is considered to be necessary, and we are of opinion that by attacking the subject in such a way there would be the greatest likelihood of securing a satisfactory result.

PHARMACOPHOBIA.

The pharmacophobia, of which Dr. Dupré has on previous occasions presented such distressing symptoms, has again taken possession of that amiable member of the Society of Public Analysts, and has impelled him, with the aid of his colleagues the editors of the *Analyst*, to deliver himself of a letter denouncing in one breath the Council of the Pharmaceutical Society, the Pharmaceutical Journal, Professor Redwood, Professor Attfield, Professor Tilden, and pharmaceutical chemists in general, for certain indications of heretical views on their part respecting a favourite dogma of Dr. Dupré's, that the British Pharmacopœia, as read by himself, is the sole and only standard of what drugs and medicinal preparations or articles of materia medica, etc., ought to be.

The editors of the *Analyst* characterize this letter as being "sufficiently outspoken in itself to require no comment" on their part, and certainly the arrogant assumption of infallibility it manifests would not require their help to establish an analogy with a Papal bull or an edict of excommunication.

But amid all the vehemence of Dr. Dupré's expression of displeasure, there is a faint sign of misgiving in his mind, that owing to his belonging to Carlyle's majority, he fails "to understand, either the chemistry, the sense, or the morality" of the matters which have so profoundly moved him, and Dr. Dupré, speaking with this sense of having "lime in his sack," really shows such symptoms of amendment, that though we might otherwise have been disposed to characterize this letter of his as another illustration of "*parturiunt montes*," we will, for the present, at least, entertain a hope that it gives some sign of his being possibly cured of "pharmacophobia" at a future time.

THE DIGNITY OF PHARMACY.

A correspondent sends us under this heading two cuttings from newspapers, stating in one instance that a person has bequeathed a legacy to the poor by sending to every chemist and patent medicine vendor a bottle of his nostrum for free distribution, and in the other that advice gratis on all diseases is given by the advertiser. For the special satisfaction of our correspondent, however, we can state that the names of neither of these advertisers are on the Register of Chemists and Druggists of Great Britain, and for his further consolation we refer him to the excellent letter in which Mr. John H. Wilson expresses his opinion of the harm that is done to pharmacy and to the real interests of the trade by promoting the sale of patent medicines.

In regard to this feature of the trade, we may mention that the detrimental influence it exercises upon the status of the pharmacist is being seriously felt even in Germany and in France, where the pharmacist occupies a more professional position than is generally the case here, and the German *Pharmaceutical Journal* speaking of Mr. Schacht's remarks on that subject in his address to the Conference at Sheffield, says they are of interest to German pharmaceutists, since they show that the status of the pharmacist will be inevitably reduced to the level of general trade and industry and will be regarded in that light by the public wherever the business of pharmacy does not advance scientifically in the same degree as other occupations.

Apropos of this subject we also refer our readers to the inquest recently held at Doncaster, as illustrating the mischievous consequences of the irregular sale of medicinal preparations by persons unqualified to deal in them and as furnishing further evidence in justification of the steps taken from time to time for enforcing the provisions of the Pharmacy Act.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, November 5, 1879.

MR. GEORGE WEBB SANDFORD, PRESIDENT.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT.

Present—Messrs. Atkins, Churchill, Frazer, Gostling, Greenish, Hampson, Hills, Richardson, Rimmington, Robbins, Shaw, Symes, Williams and Woolley.

The minutes of the previous meeting were read and confirmed.

Before commencing the business of the day,

The PRESIDENT said he must trespass on the Council for one moment on his own account. When the Council did him the honour in June last to elect him President, he expressed a fear that he should be unable to carry out the duties, and he did feel that those duties were too much for him. It was not altogether a question of time, but of wear and tear, which he found he could not stand, and therefore without saying more, he must beg that at the next meeting the Council would appoint his successor.

After a brief pause,

Mr. HILLS said he trusted that Mr. Sandford would continue to hold office for the present. He could quite enter into what was now stated, but at the same time this came upon the Council very suddenly. He was not anticipating anything of this kind, and he trusted Mr. Sandford would withhold his resignation for the present.

Mr. ATKINS said although a young member of the Council he could not help rising to second Mr. Hills' appeal to Mr. Sandford to reconsider his decision. He ventured seriously to think that however much some of the members of Council might differ on some points with Mr. Sandford, they all united in the most intense respect for him, and in a thorough admiration of his English pluck, and if it came to a discussion on questions of pharmacy few would venture to cross swords with him. He therefore hoped Mr. Sandford would not consider his decision as a Medo-Persian one, but give effect to their cordial regard for him, and their desire that he should retain office. The Council was confessedly passing through a period of considerable difficulty; it required men of long practical experience at the head of affairs, and could not afford to spare him.

The VICE-PRESIDENT hoped Mr. Sandford would not feel himself called upon to relinquish the post they were all so glad to see him occupy. If Mr. Sandford needed more rest he could only say that he would most gladly do everything in his power to lighten his load. He was sure that in ninety-nine cases out of one hundred he should be at one with him in his views, and he should be very pleased if he could bring himself still more into accord with him than he had sometimes been. He would only say that he placed himself entirely at his disposal if he could assist him in any part of his duties.

Mr. WILLIAMS said he understood Mr. Sandford had taken this step, not from any feeling of disagreement which had occurred on the Council, for all that had occurred had been in the most open and friendly manner. The members of Council had only disagreed in the way in which men must always disagree, and he understood that it was the strain upon Mr. Sandford's physical powers, involved in the Presidency, which he found to tell upon him. He could quite sympathize with him in that feeling, but he must say that anything like the resignation at which Mr. Sandford had hinted would be a most serious thing for the Society, and he trusted that he would if possible struggle against this feeling and continue to carry out those duties, which no one on the Council could fulfil so well.

Mr. FRAZER, as the only Scotch member present,—which he regretted, for he was sure Mr. Mackay would feel inxpressible regret at such an announcement,—trusted that some arrangement of the work could be made which would relieve the strain that Mr. Sandford felt too heavy for him, and that the Council would not be deprived of his services as President until the close of the current year of office.

Mr. ROBBINS hoped Mr. Sandford would withdraw his notice, because he was quite sure it would be considered as a loss to the Society almost irreparable. At the present time, especially, when there was a Pharmacy Bill under discusssion, there was no man on the Council who would be able to give so much assistance as Mr. Sandford. He knew the duties were very onerous, but some of them might surely be thrown on the shoulders of younger members.

Mr. GREENISH expressed his earnest hope that if it were compatible with Mr. Sandford's health he would not lay down the reins of office at present. It was a critical period; the Council had important business before it, and there was no man so capable of filling the chair as Mr. Sandford, and he was sure there was no one who would not be glad to save him any trouble or anything which might bring an extra strain upon him.

The PRESIDENT said he should not have risen again except to thank his colleagues for the kind expressions of feeling they had given. He must entirely disclaim any feeling of antagonism to any of his colleagues in retiring. All the members of Council honestly expressed and acted on their own opinions, as it was right they should, and he had always received the greatest kindness and courtesy from those whom he had most strongly opposed, not only during his present term of office but years and years ago. He knew they were all desirous of helping him, and they all had helped him, but the truth was, he had been so long mixed up with this Society that it had become almost a part of himself, and the anxiety was too much for him. He thought of it day and night, and he really felt that it was more than he could stand. However, there need be nothing further said on the subject at the present meeting.

Letters of thanks were read from the Manchester Chemists' Association for the grant of £35, made last month, and from the Chemists' Assistants' Association for the loan of specimens from the museum to illustrate a lecture.

THE WEIGHTS AND MEASURES ACT.

The PRESIDENT laid before the Council an Order in Council on the subject of the standards about to be issued to inspectors.

DIPLOMAS TO PHARMACEUTICAL CHEMISTS.

The following being duly registered as Pharmaceutical Chemists were respectively granted a diploma stamped with the seal of the Society:—

Arnfield, John Cash.
Bevan, William.
Cook, William Richard.
Gascoigne, Charles.
Gibbons, Walter.
Howse, Charles Turk.
Laxon, Matthew.
Leach, Isaac.
Mason, William Brandwood.
Presslie, Robert Dowell.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemist.

The following, having passed the Major examination and paid his subscription for the current year, was elected a "Member" of the Society:—

Mason, William Brandwood ...Bolton.

Chemist and Druggist.

The following who was in business on his own account before August 1, 1868, having tendered his subscription for the current year, was elected a Member of the Society:—

Cooke, Thomas.....................Holt, Norfolk.

ASSOCIATES.

The following, having passed the Minor examination and tendered or paid as Apprentices or Students their subscriptions for the current year, were elected "Associates" of the Society:—

Chambers, Herbert ....Haddenham.
Chipp, James........................Newport, I. W.
Constance, Sidney William......London.
Field, William ....Shoreham.
Fowler, William ....Sunderland.
Fryer, Charles Harry ....Leeds.
Godfrey, Henry.....................Godalming.
Hearnshaw, John William ......Spalding.
Hessell, James ....Rye.
Hoad, Frank ....Rye.
Hornby, Charles Haycock ......Stockport.
Hutchin, William Francis W...Maidstone.
Jones Nathaniel Stevens.........Fulham.
Kilner, Frederick James.........Bristol.
Mason, Frederic Silvester ......Leicester.
Moody, Lewis ....Lincoln.
Morgan, Alfred William.........Rochester.
Morris, Humphrey ....Dolgelly.
Parker, Charles.....................Lancaster.
Powrie, Percival Chamberlain...Mossel Bay, S. Africa.
Watkinson, James ....Farnworth.
Watson, Robert John ....Market Rasen.
Williamson, Bamford ....South Shields.
Willson, Robert ....Boston.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Chabôt, Frank ....London.
Chadwick, Thomas Edward ...Bradford.
Harrison, Jeremiah...............Clitheroe.
Nelson, Harry ....York.
Nettle, William Robert P.......Plymouth.
Orchard, Arthur Bishop C. ...London.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

George Arthur Cannell, 81, High Street, Queenborough, Kent.

William Shipley, 2, Haugh Lane, Lower Broughton, Manchester.

Alfred Wall, 37, Church Street, Woolwich, Kent.

Addition to Register.

The Registrar reported that—

Robert Charlton Turner, Victoria Street, Douglas, Isle of Man,

having made a statutory declaration that he was in business before the passing of the Pharmacy Act, 1868, and his declaration having been duly supported by a medical practitioner, his name had been placed on the register.

Mr. Rimmington and Mr. Robbins expressed the opinion that very few persons could be left who were really qualified for this registration and that stringent inquiry should be made in each case.

The Secretary explained that this was done.

Appeal from the Registrar's Decision.

A memorial was read from Mr. John Hardcastle, 23, Waterloo Road, Hunslet, Leeds, by way of appeal from the refusal of the Registrar to place his name on the register as having been in business prior to 1868. The memorial set out at length the applicant's case, which was that he had an interest in a business prior to 1868, though his name did not appear in it.

The Secretary stated that on writing to the medical practitioner who had signed the certificate, that gentleman had stated that he had no personal knowledge of the facts, and had only relied on the applicant's statement, believing him to be a respectable man. He therefore considered the certificate withdrawn and had declined to register the applicant.

Mr. Richardson thought that many men were being put on the register without due care to scrutinize their claims. Those who lived in the country constantly heard complaints of this kind, and it was felt to be a hardship on respectable chemists and druggists that men not duly qualified should be put on the register.

Mr. Woolley said the respectable portion of the drug trade must do what was right and just. The question in this case seemed to turn on what constituted a partnership.

After some further conversation,

The Vice-President pointed out that in this case the medical practitioner having withdrawn his certificate, the necessary preliminary to registration had not been complied with. The applicant must provide a certificate from some one who was able to support his statements from personal knowledge before his application could be entertained.

The Secretary was directed to write to the applicant to this effect.

Reports of Committees.

FINANCE.

The report of this Committee was received and adopted, and sundry accounts were ordered to be paid.

HOUSE.

This Committee's report referred to sundry matters connected with repairs to the house; but no recommendations were made.

BENEVOLENT FUND.

The report of this Committee included a statement by the Secretary to the following effect:—

338 persons who subscribed in 1878 have not subscribed this year, leaving a deficiency in subscriptions of about £150.

The following grants were recommended:—

£15 to a member, formerly in business, but now in greatly reduced circumstances.

£10 to the wife of an associate who is now in a lunatic asylum.

30 guineas to aid in securing the election of the youngest son of a late pharmaceutical chemist and member of the Society to the London Orphan Asylum.

£10 to a former member, aged 63, who has received five previous grants.

£10 to a pharmaceutical member from 1853 to 1877.

£5 to a registered chemist and druggist conditional on further inquiries by a member of the Council resident in his neighbourhood being satisfactorily answered.

£10 to the widow of a registered chemist and druggist who has had four previous grants.

£10 to a pharmaceutical member from 1868 to 1871. Applicant has had one previous grant.

£10 to the widow of a registered chemist and druggist who has had three previous grants.

£10 to the widow of a registered chemist and druggist who had a previous grant of like amount in July 1878.

One case the Committee had declined to recommend for relief and two others were deferred for further inquiries. One of these referred to the election of an orphan to an asylum.

The report and recommendations were received and adopted.

Mr. WILLIAMS trusted that attention would be called through the Journal to the desirability of friends who had votes for either the London Orphan Asylum, or British Orphan Asylum, reserving them for the two candidates whom the Council wish to see elected.

LIBRARY, MUSEUM AND LABORATORY.

The report of this Committee included the usual report from the Librarian, to the following effect:—

Attendance.		Total during Month.	Highest.	Lowest.	Average.
July	Day	441	23	7	16
	Evening	193	14	3	8
August	Day only	182	13	4	7
September (15 to 30)	Day only	125	12	6	9 nearly.

Circulation of books.	No. of entries. Town.	Country.	Total.	Carriage paid. s.	d.
July	152	59	211	17	0
August	48	30	78	19	9
September (15 to 30)	59	43	102	15	11

The following Donations to the Library had been received and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Aguiar (Dr. J. M. de), Memoria sobre a Araroba, 1879. From Dr. C. Symes.

Attfield (Professor J.), Chemistry, General, Medical and Pharmaceutical, 8 (U.S.) ed., 1879. From the Author.

Bath Royal Literary and Scientific Institution, Catalogue of the Library; with Catalogue of Books belonging to the Bath and West of England Society for the Encouragement of Agriculture, *etc.*, 1879. From the Institution.

Chemical Society of London, List of Officers and Fellows, 1879. From the Society.

Cooley (A. J.), Cyclopædia of Practical Receipts, 6 ed., 1879, pt. 14. From Messrs. Churchill.

Guy's Hospital, Reports, 1879, ser. 3, v. 24. From the Hospital.

Guy's Hospital, Formulæ, 1868 and 1879. From Mr. Henry Collier.

Imperial College of Agriculture, Tokio, Japan, Catalogue of Agricultural Products exhibited in the Sydney International Exhibition, 1879. From Professor E. Kinch, compiler.

Institution of Civil Engineers, Charter, Bye-laws and Regulations, and List of Members, 1879. From the Institution.

National Dental Hospital and College, Report, Prospectus, etc., 1879-80. From the Hospital.

New York City, Department of Public Charities and Correction, Hospital Formulary and Posological Table, 1879. From Mr. Charles Rice, compiler of the posological table.

Royal College of Physicians of London, British Dispensatory, a translation of the London Pharmacopœia, 1747. From Mr. John Saffery.

St. Bartholomew's Hospital, Statistical Tables of Patients during 1878. From the Hospital.

Smithsonian Institution, Annual Report of the Board of Regents for 1877. From the Institution.

Tommasi (Dr. Donato):

Sur la Non-existence de l'Hydrogène naissant, 1 partie, Réduction du Chlorate de Potasse, 1879.

Sulla Non-esistenza dell'Idrogeno nascente, parte 5, Riduzione del Perclorato Potassico, 1879. From the Author.

University College, London:

Catalogue of Books in the General Library and in the South Library, 1879, v. 1-2.

Calendar, 1879. From the College.

University of Durham College of Medicine, Newcastle, Prospectus for 1879-80. From the College.

University of Edinburgh, Calendar 1879. From the University.

University of Glasgow, Calendar 1879. From the University.

Waring (Dr. E. J.), Bibliotheca Therapeutica, 1878-9, 2 v. From the Author.

White (Dr. J. Walls), Salicylate of Iron, 1879. From the Author.

Yorkshire College, Leeds:

Fifth Annual Report, 1879.

Calendar, and Prospectus of the Leeds School of Medicine, 1879. From the College.

Pharmacopée universelle et Uniformité en Médecine; Rapport de la Commission internationale, 1879. From Professor Norbert Gille, reporter.

Dragendorff (Prof. G.):

Analysen zweier Äpfel, 1878.

Beiträge zur Chemie der Päonien, 1879.

Über Mannit als Nebenproduct der Milchsäuredarstellung aus Rohrzucker, 1879.

Haberkorn (T.), Das Verhalten von Harnbacterien gegen einige Antiseptica, 1879.

Keussler (E. v.), Untersuchung der chrysophansäureartigen Substanz der Sennesblätter und der Frangulinsäure nebst Vergleichung derselben mit der Chrysophansäure der Rhabarbers, 1879.

Sitzungsberichte d. Dorpater Naturforscher-Gesellschaft, 1 no., 1879. From Professor Dragendorff.

The Committee had recommended the purchase of the following books for the library:—

Cockayne (T. O.), Leechdoms, Wortcunning, and Starcraft of Early England, 1864–6, 3 v.

Edinburgh New Dispensatory, ed. by A. Duncan, jun., 1803.

Gray (Asa), Botanical Text-book, 6 ed., pt. 1: Structural Botany, 1879.

Répertoire de Pharmacie et Journal de Chimie médicale réunis.

Tyndall (J.), Fragments of Science, 6 ed., 1879, 2 v.

Wanklyn (J. A.) and E. T. Chapman, Water Analysis, 5 ed., 1879.

Wurtz (Ad.), Elements of Modern Chemistry, translated by W. H. Greene, 1879.

The Librarian had reported that in the annual revision which he had just completed the following 13 books were found to be missing:—

Attfield (J.), Chemistry, 7 (U.S.) ed., 1876.

Bevan (G. P.), Industrial Classes, 1876, vol. 2.

British Pharmacopœia, with Additions, 1877.

Burbidge (F. W.), Horticulture, 1877.

Bloxam (C. L.), Metals, 2 ed., 1871.

Canning (W.), Select Practical Notes and Formulæ, 1877.

Church (A. H.), Food, 1876.

Clendon (J. C.), Observations on Extraction of Teeth, 1843. (Lost by borrower.)

Cooke (M. C.), Manual of Structural Botany, 2 ed., 1865.

Cooley (A. J.), Pharmaceutical Latin Grammar, 1868.

De Crespigny (E. C.), New London Flora, 1877.

Flückiger and Hanbury, Pharmacographia, 1874.

Squire (P.), Companion to British Pharmacopœia, 10 ed., 1874.

The Committee had ordered that the list be published in the Journal, and recommended that a reward be offered for the detection and conviction of persons stealing books from the Society's library.

The Librarian had also presented a report of the meeting of the Library Association at Manchester on September 23, 24, and 25, which he had been directed to attend.

The Curator had reported that in August the average daily attendance in the museum had been 4; in September the average had been 17.

During the vacation the museum had been visited by Dr. Berge of Zurich; Professor Baudrimont of Paris, and Herr Wiarogorski, Apothecary, Warsaw.

He had also reported that he had received the following Donations to the museum, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Specimens of "*Matico Aromatica*" leaves. From Messrs. Allen and Hanbury.

Specimen of "*China Cuprea*" Bark, with analysis. From Dr. B. H. Paul.

Fine specimens of Sassafras Root. From Mr. W. H. Ferguson.

A number of specimens from Dr. Dymock of Bombay, including:—

"Rusa Oil" distilled under his own superintendence, and herbarium specimens of the grass from which it was obtained.

Herbarium specimens of *Garcinia pictoria* in flower and fruit.

Seeds of *Lobelia nicotianæfolia.*

Fruit of the Zanzibar Copal Tree.

Very fine specimens of Sarcocoll, with seeds of the plant from which it was obtained.

Specimen of the finest Yarkand Churrus.

Extract of *Myrica sapida.*

Judwar root (*Aconitum* species).

Resin of *Boswellia serrata*, gathered from the tree by Mr. J. E. Gibbs.

Root of *Gloriosa superba.*

Asgund root (not *Withania somnifera*).

Fruit of *Melia dubia.*

Fruit of *Martynia diandra.*

Bark of *Croton oblongifolium.*

Original package of Canton Oil of Peppermint.

Cake of Jaferabad Aloes.

A large number of small specimens from Mr. J. Dittrich, Apotheker, Prague.

Specimens of Crude Japanese Camphor, Pachyma Cocos, Demerara Copal and Peach tree bark, from China. From Mons. Chantre.

Specimens of Vanillon and of the fruit of *Luffa Ægyptiaca.* From Mr. H. W. Langbeck.

Specimens of the root of *Gentiana punctata*, gathered in Switzerland by Mr. O. Corder. From Mr. Corder.

Herbarium specimens of *Nardostachys jatamansi*, Dec. From Mr. T. Ware, of Hale Farm Nurseries, Tottenham.

Specimens of Barks, etc., from British Guiana, used by the natives in medicine. From Mr. F. S. Mason, Student of the Society.

Specimen of Maldon Salt obtained at Maldon. From Mr. C. J. Mead.

Seeds of *Cucurbita maxima*, grown at Porto Mauritzio for medicinal purposes. From Mr. F. R. Squire, San Remo, Italy (received through Mr. C. J. Mead).

Fine specimen of Pituri. From Dr. Bancroft, Brisbane (received through Mr. T. Christy).

The Curator had suggested the desirability of closing the museum for revision during the first fortnight in September in each year.

The Curator had also reported that room for about 500 specimens was required, the cases being already filled. The specimens in the cases in the materia medica museum were so crowded that it was impossible to clean the bottles, or remove them frequently for reference without great risk of breakage, and the specimens more frequently sought after by students could not on that account be displayed to advantage or in such a manner as to illustrate efficiently the materia medica of this country. He considered that the advantage of museum instruction, which to a certain extent is received through the eye, was necessarily lost, the great number of specimens tending rather to confuse the mind than to convey information. He also considered it would be advantageous to remove such specimens as are not official in the British, United States, or Indian Pharmacopœias to other cases, and to place in cases from which light is excluded, essential oils, and such other specimens as are injured and lose their characteristic appearance by exposure to light. It was suggested that this might be done by providing closed cupboards above those at present in use. The doors of such cupboards might be used for exhibiting the drawings of Bentley and Trimen's 'Medicinal Plants,' which had been presented by the artist.

The SECRETARY had presented estimates for printing the Journal Index and the 'History of the Progress of Pharmacy,' and the Committee had recommended with regard to the Index that Butler and Tanner's estimate be accepted and 5000 copies be printed.

An adjourned meeting of the Committee had been held on Wednesday October 28, when Professor Redwood had attended and reported that he had more students attending his class than in former sessions. He also suggested to the Committee that the 'Progress of Pharmacy,' so far as it was ready, should be put into type at once, and stated that if that were done, he thought the book might be ready for publication by the time of the next Annual Meeting.

The Committee recommended that this be done, that Messrs. Butler and Tanner's estimate be accepted, and that 5000 copies be printed.

The Committee also recommended that the suggestion of the Curator for closing the museum during the first fortnight of September in each year be adopted. A loan of certain specimens to illustrate a lecture given on the 29th October before the Chemists' Assistants' Association by Mr. Parker had been authorized.

A discussion arose with regard to the recommendation of the Committee to print 5000 copies of the Index to the Journal for the last ten years, and on the question whether copies should be sent to all members or only to those who applied for them, or whether they should be sold, great differences of opinion were expressed. It was ultimately resolved that 2000 copies should be printed, and distributed to those who applied for them.

A similar discussion arose with regard to the recommendation to put the Progress of Pharmacy in hand at once, and print 5000.

Mr. GOSTLING moved that the work be not put in hand until it was completed, but this motion was lost.

Mr. ATKINS proposed that only 2000 copies of the work be printed, but this proposition meeting with little or no support, he did not press it.

The report and recommendations of the Committee, were then received and adopted with the alteration above noted as to the number of copies of the Journal Index to be printed.

The Hanbury Memorial Trust Fund.

Mr. WILLIAMS said it would be in the recollection of all that the Council had undertaken to be custodian of this fund, and Mr. Flux had kindly drawn up a deed of trust, which was now ready to be signed and sealed. The amount invested was £400. He had now to resign his post as Treasurer of the Fund.

It was then resolved, on the motion of the PRESIDENT, that the deed of settlement of the Daniel Hanbury Memorial Fund of £400 Consols be stamped with the seal of the Society.

GENERAL PURPOSES.

The report of this Committee included the usual report from the Solicitor with regard to cases which had been placed in his hands. The only details admitting of publication are the following:—

The appeal in the case of London and Provincial Supply Association stood No. 46 in the list, and might come on during the present sittings.

John Mayo, 62, Bingfield Street, Caledonian Road, charged with illegally using the title of chemist and druggist, had confessed judgment without going to trial. In this case the Committee recommended that the penalty be not enforced on the costs being paid.

Eliza Hancock, Castle Road, Roath, Cardiff, a widow carrying on business, had also consented to judgment against her.

The Committee had considered various cases of alleged infringement of the Pharmacy Act, and in several recommended that the Solicitor be instructed to commence proceedings.

The Committee also recommended that the Special Committee to consider the Amendment of the Pharmacy Acts should hold a meeting during the present month and report to the Council in December; and that in the meantime the draft should be printed for the use of that Committee.

The Council went into Committee to consider the report.

On resuming, the report and recommendations of the Committee were received and adopted.

An application from Mr. Daniel Tudor Williams, of Aberdare, asking to be allowed to enter for the Modified examination, was refused, he not being duly qualified.

Elections of Annuitants.

Mr. Shaw moved, in accordance with notice—

"That the Council, desiring to protect the interests individually and collectively, and also to prevent unnecessary expenditure of money by the candidates for an annuity from the Benevolent Fund, order that no printed cards or circulars, asking or canvassing for votes, be permitted to be sent to any member, associate or subscriber to the said Fund."

"The Council will, as heretofore, and prior to the election, publish in the *Pharmaceutical Journal*, and also by the special circular, or voting paper to all voters, the full particulars of the merits of each case."

Mr. Shaw said this motion was one which was discussed some eighteen months or two years ago, and last October a discussion also took place upon the same question, when he had stated the desirability of prohibiting canvassing, but at the same time as he had not given notice of his intention of bringing the subject forward it was thought better to give notice so that it should be thoroughly discussed at some future meeting. The election would take place next month, and he should have been glad to have brought it forward last month, but it did not occur to him it was necessary to do so before any canvassing cards were issued. For some years he had been thoroughly convinced of the desirability of relieving if possible the poor candidates for annuities from the necessity of canvassing for votes, and he still retained the same conviction, and would briefly state his reasons. On the previous occasion he had received very important support from several members of the Council. Mr. Hills, Mr. Hanbury, and others had taken great interest in this subject, and desired that this canvassing should be prohibited. What drew his attention to it in the first instance was the fact that a poor widow, who had canvassed right and left for her children, made application to the Council asking to be refunded the money she had spent, and which she could ill afford. It struck him at that time that money spent in that way was quite unnecessary, and he had never since given up the idea of doing away with the practice. With regard to the administration of the Benevolent Fund it was, however, free from some evils which attached to other benevolent institutions; for instance, it was free from the trafficking in votes, from public polling days, where persons bid one against another, and where the rich, of course, succeeded in carrying the day. The Council also exercised a large amount of discretion in preparing the list of candidates. In many institutions everyone who chose to send in a claim was put on the list, and thus there might be forty or sixty candidates, not more than one-tenth of whom could be elected, so that they all had to spend a great deal of money, and perhaps in the end might be disappointed. This year there were only nine candidates for the annuities, and three to be elected, and he thought one-third was but a fair proportion in order to give the subscribers an opportunity of judging of the merit of each case. As to whether canvassing was an evil or otherwise, the discussion which took place in October last was almost conclusive. Mr. Williams then expressed himself that it would be very well to do everything possible to discourage the system, and that showed there must be some evil about it, because they never wished to discourage that which was good and right. The ex-Vice-President also agreed that there was great evil in the present system. If then there was a great evil in it by all means let the system be removed. With reference to other opinions outside of the Council he could not do better than read one or two from prominent members of society. The first was a distinguished member of the House of Commons, who a few months ago stated that canvassing was an unmitigated nuisance, and a system by which an immense deal of money was thrown into the gutter. And another prominent legislator, a member of the House of Lords, said, at a recent meeting, that there were a good many abuses in connection with charities, which it was desirable to sweep away, most of all the trafficking in votes and the public polling days. Another gentleman who had spoken very recently on the subject, Mr. Ernest Hart, said on this question nearly the whole of the profession was against the Council of the Royal Medical Benevolent Fund, which was opposing the abolition of canvassing, and he added that that was not the testimony of men of hasty judgment, but of such men as Sir William Gull, Sir William Rutherford, Sir Henry Thompson, Dr. Sievking, and almost every eminent man in the profession, most of whom had spoken strongly on the subject. All this testimony certainly should have some weight. Efforts had been made on different occasions to relieve persons to some extent of the annoyance to which they had been subjected by canvassing cards, and in the case, he believed, of the Royal Medical Benevolent Fund, and also of the British Orphan Asylum at Slough, those who objected to receive the canvassing cards might have their names put in a separate list. The reason for prohibiting this system was that the feelings of poor people thrown destitute on the world ought to be respected. Many of them had scarcely the courage in the first place to apply to the Council for assistance, but directly they had got over that difficulty they asked about the necessity for canvassing, and were apparently under the impression that if they did not resort to it they must be left out in the cold, at least for two or three years, because those who did canvass necessarily stole a march upon them. A case of that kind came before the Committee on the previous evening, when a gentleman interested in one case asked if anything could be done in the way of canvassing and applying for votes for the election. Some time ago, he had had a communication from a widow who informed him that the cost thrown upon her with regard to one of these elections came to £5 13*s.*, and he contended that that sum was perfectly lost. She said she would be very glad if some other plan could be suggested, because she found the expense very heavy. In another case, in connection with the Royal Benevolent Fund, he was informed that a person had spent £20 on one election and £15 on another. Now, if each of the nine candidates spent only £5, that was £45 in the whole, which was totally thrown away. Again, the most destitute and most deserving often failed in consequence of the unequal struggle, and he referred to the elections for the few previous years to show that those who canvassed really obtained the most votes, though it did not follow that they were the most deserving candidates. He had often asked himself, but had asked in vain, what was the difficulty in putting a stop to this system. With regard to personal or written solicitations he would not interfere with them; all he wanted was to relieve the candidates from the expense. It had been said that the subscribers naturally desired to be asked for the votes they were entitled to give, but he should hardly think they would stand on a ceremony of that kind. If papers were sent round with full particulars, as they always were, he could not see what additional reason there could be for any gentleman expecting or requiring to receive six or nine canvassing cards as well. The editor of the *Daily News* had said that it was whispered that there were persons who enjoyed the sense of importance of being canvassed, but he should hope that that was not one of the requirements which their subscribers insisted on. The impracticable arguments which had been made use of over and over again, he could not see the force of. Twelve months ago, he had alluded to the Royal Medical Benevolent Fund, and at the Annual Meeting in May last, he was glad to see that out of about 5000 subscribers, a resolution was passed by about 3000 voting for the abolition of canvassing which the Council had previously declined to carry out, so that in future it was to be swept away. He could not learn from the Secretary that any increase in subscriptions was ever noticed in connection with the sending out of cards, and his motion would not interefere with any subscribers obtained by personal solicitation or writing. There were about twenty institutions already in existence in which canvassing was prohibited on pain of disqualification. For instance, at the Royal Albert Orphan Asylum there were 220 orphans now being fed, clothed and educated, and that institution was entirely dependent on voluntary contributions and had been ever since the commencement conducted on the non-canvassing principle. If such an institution could carry on operations so successfully there could be no danger about the matter. He would not detain the Council longer, but would simply ask for a vote in favour of the proposition he had brought forward.

Mr. HAMPSON, in seconding the motion, said he had supported it before and felt it right to do so again. The first time the subject was brought before the Council he waited for arguments on the other side and having failed to find them he felt more thoroughly convinced that Mr. Shaw had adopted the right view on this matter. Mr. Shaw had very clearly and convincingly introduced his motion and had brought ample evidence to show that the abolition of canvassing cards and circulars was possible, because it was carried out in other institutions. The system of canvassing was a great evil and that evil was becoming more and more recognized by men who had thoroughly entered into the question, and it was in every sense a thing to be deprecated. But that which convinced him was simply this. In these elections they had a certain number of poor persons applying, some of whom were ill in bed, some were scarcely able to move about, and the majority were without friends and without funds. It was a sort of race for who should get in; and who was the most likely to get in? The person who had the most money and who was probably the least eligible, because he was most able to canvass and bring influence to bear on behalf of his own case. The weakest must necessarily go to the wall. He thought no other argument was required to show that canvassing was objectionable; it handicapped the weakest person, and in many cases votes which would have been given to the weakest and least able were given to those who less deserved them, or who might well have waited for another year. It was on behalf of those who required the aid of the Fund most that he supported Mr. Shaw's motion.

Mr. ROBBINS thought the motion would hardly accomplish the object Mr. Shaw had in view, because there was one great and unaccountable omission in it of any penal clause, and without that it would do a deal of mischief. It simply said the Council ordered that the candidates should not canvass; but supposing some of the candidates obeyed the order, which no doubt they would, others might disregard it, and their friends might disregard it, and they would thus steal a march on those who conformed to the order of the Council. Unless there were a penal clause such as that the election of any candidate who should be proved to the satisfaction of the Council to have resorted to canvassing should be declared null and void, it could not be stopped, and if one did it not only with impunity, but with advantage to himself, next year it would be copied by others. On the other hand if such a penal clause were introduced it might occasion a difficulty, because the candidate himself might keep in the background, but his friends might come forward. In fact now the expense was often incurred not by the candidate but by his friends.

Mr. ATKINS said his first objection to the motion was that it was thoroughly impracticable. He should say that by all means the Council should do what it could to discourage the practice, but it should not talk about prohibition, at least unless it introduced the penal clause, and if that were to be done it would require very careful consideration. Mr. Hampson talked of the poorest and weakest suffering, but he though that argument was capable of a two-fold application. They were just the persons who often by kindness of friends had their claims brought forward. Mr. Shaw would admit the writing of a private letter, but how could he draw a legal distinction between a private letter and a printed card? If instead of writing a letter to a dozen friends he used one of the many systems of manifold copying, would that be considered a breach of the regulation? He was frequently influenced in giving his votes by the private letters he received, and he feared if the Council were to prohibit this principle of recommendation it would interfere with those private letters. If the prohibition were carried he should feel great doubt whether he ought to write a letter in favour of A. or B. lest he might prejudice somebody else who was more deserving. If the Council did all it could to deprecate excessive advertising on the part of poor persons, which no doubt would be the result of that debate as it had been of previous ones, he believed it might do good, but he could not support the motion as it stood.

Mr. WILLIAMS thought the motion was most inconsistent and arbitrary. What right had the members of the Council to order such a thing, which affected not themselves only, but all the subscribers to the Fund? With regard to the expense, he had already received several private letters, written no doubt under the idea that it was improper to canvass with cards, but this was a far more expensive form of canvassing than that of having a few cards printed. He did not like cards, and he often said he should discourage their use as much as possible, and he thought what had been done on previous occasions would tend to discourage them. He had thought if the Council were to turn round and say that a person who did, either by himself or by friends, issue a circular or card or canvass for votes, that that person should be disqualified, it would be most absurd and would do a great deal of injury to the Fund. He supposed Mr. Shaw intended to follow up his present motion by another, of a penal character, because if the Council made an order it must take some step to secure the order being carried out. But he thought that anything of that kind was so absurd that the least reflection would convince the members that it would be most improper to do such a thing.

Mr. GREENISH said he sympathized with Mr. Shaw very much in this matter. He thought it very desirable that the money spent in canvassing cards should be saved to these poor people if possible, but he must confess he did not see his way out of the difficulty, nor did he think Mr. Shaw had made it very clear. Instances had come under his notice where, quite irrespective of the applicants, the case had been taken up by ladies, who had undertaken the printing and the distribution of the cards, and had taken the whole of the trouble and expense upon themselves; in fact he was not sure that the applicant was even aware of it at the time. Mr. Shaw and Mr. Hampson had said that under those circumstances the weakest went to the wall, but they had no proof to that effect, and he did think that rather than pass this motion things had better remain as they were.

Mr. CHURCHILL was very sorry to see the benevolent gentlemen on each side of him opposing Mr. Shaw's motion, especially as the matter was not new to them. He could understand gentlemen of conservative tendencies being at first opposed to such a motion, but he could not see the difficulties in the way that they saw. It had been argued that it would be very arbitrary on the part of the Council to issue such a regulation, but he saw no more difficulty in issuing such a regulation than there had been in issuing those which were already in force with regard to the disposal of the Benevolent Fund and the election of annuitants. Such a provision as the following added to the regulations would, as he thought, be a simple and practical way of working the measure :—

"That the election of any annuitant shall be void who shall have canvassed for votes by means of cards, circulars or advertisements, or on whose behalf any person shall have canvassed by means of cards, circulars or advertisements."

The PRESIDENT asked if Mr. Churchill moved that as an amendment?

Mr. SHAW said he should be most happy to add it to his motion.

Mr. CHURCHILL said all the members of Council knew the very little effect on their judgment which those circulars sent out broadcast produced, and he believed that almost all members who took any trouble to consider the election at all voted for those whom they knew and for those whom they believed to be the most afflicted, and the necessities of each could be perfectly well set forth in a few lines in a circular prepared by the Council. He could see no difficulty at all, if their hearts were in the matter and they really wished to discourage canvassing, in passing such a motion as that.

Mr. FRAZER asked if he understood Mr. Shaw to accept Mr. Churchill's suggestion.

Mr. SHAW said, yes, he did.

Mr. FRAZER said if so he pitied the Benevolent Fund. Assuming that to be accepted the Council might order the candidates, but it could not order their friends over whom it had no control, and the friends might issue cards, and yet it was proposed to disable these worthy objects, it might be the very best people in the whole of the applicants, because of this arbitary law, and they would just be excluded through the injudicious action of their friends. Besides, if this were stopped private canvassing could not be. This already went on to a large extent through the representatives of large London houses and it would be carried on with redoubled force if such a motion were passed.

Mr. HILLS suggested that Mr. Shaw should withdraw his motion altogether as it could not be used now for the next election. There would then be more time to think of it and devise a more perfect means of conducting elections. He did not think the machinery for carrying it out was altogether settled, and therefore he thought it would be well to withdraw the motion for the present, especially as next May there would be an election of the Medical Benevolent Institution under the new plan, from which valuable experience might be gained.

The PRESIDENT said he could not vote on this question without expressing the opinion he had often expressed before on the same subject. Mr. Shaw had put the Council in possession of certain facts, as he described them, and said in some institutions all applicants were admitted, which was very different to the case of this Fund, because here a selected list was prepared by the Council. He must remember that in orphan asylums all applicants were not admitted, but only those who were eligible, and he must also remember that those societies he referred to gave no relief except in one way; whereas in this case not only were the deserving candidates selected for annuities, but casual relief was also given. If the Council could pick out some deserving candidates and put them first on the list and give them some sanction, saying they were the ones who should be admitted, there might be some reason in Mr. Shaw's proposition, but it would be a very difficult thing without that. Mr. Shaw had quoted observations made by other members of the Council some time ago, but had not quoted them in full, or it would have been seen that they were not in favour of his proposition. Again, he spoke of a certain Medical Benevolent Society in which the Council resisted the desire of the members to abolish the present system. He should submit to Mr. Shaw that the Council was in the best position to judge—far better than the members outside who only received the cards. No doubt to many persons it was almost a nuisance to receive these cards, because they had so constantly to say "no," and to meet this difficulty Mr. Shaw said in another institution the names of those who did not wish to be canvassed were placed on a separate list; the same could be done here. If this motion were passed the candidates might write, or their friends might write, and the mere writing of the friends might invalidate the election of the candidates.

Mr. SHAW said it was the printing, not the writing, he objected to.

The PRESIDENT said if writing were excused it would give those who had friends,—and they were probably those who were least in want,—an advantage over others. There was also this great difficulty, that he did not know how the electors were to become acquainted with the different cases unless brought before them in some way by the candidates or their friends. He should attach rather more importance to Mr. Shaw's views if he had not heard him that day vote for a grant of thirty guineas to be applied for the election of a candidate to an orphan asylum, in January next, for he could not see how he could reconcile the one thing with the other. The Secretary had just put a letter into his hands dated 20th October, saying that Mr. —— would be obliged by receiving particulars of the subscriptions to the Pharmaceutical Society with a view of assisting a candidate at the ensuing election to which he wished to subscribe. That was exactly what the Council was doing with regard to the orphan asylum he had mentioned. Besides he did not think there was anything in the motion which would really prevent canvassing.

Mr. SHAW said he had accepted Mr. Churchill's addition, which would render the resolution operative.

Mr. WILLIAMS asked what there was to prevent an enemy issuing cards. For instance, if A. B. and C. were candidates, A. might issue cards for B. and C. in order to prevent them getting elected.

The VICE-PRESIDENT said it had been contended by Mr. Shaw that these cards were an unmitigated evil, but in his opinion it was not so. If he were only a subscriber to the Fund, and not a member of the Council, he should be much obliged for any information which anyone interested in the candidates chose to give, and he therefore deprecated altogether this condemnation of the system of cards. He could see there was something to be said for a system which put the entire election into the hands of the Council, and that plan was adopted by some charitable institutions; but there was, he thought, more to be said for the opposite system, which allowed the elections to be an occasion for stimulating subscriptions and keeping up interest and enthusiasm amongst the subscribers. It was possible a little miscarriage of justice occurred, but it could only be one of degree, because the Council took care only to nominate fit candidates. In his opinion it would be a great danger to the Fund if the Council cut away from the large body of subscribers the interest they naturally felt in the exercise of their privileges. To limit the canvassing to one particular form was most unphilosophical, and he thought Mr. Hampson could scarcely have realized what it meant when he spoke so strongly in favour of the proposition of nullifying the success of the candidate because some one had canvassed in his behalf.

Mr. SHAW said he would not take up any time by a reply; and the motion was then put to the vote with the ollowing result:—

For—Messrs. Churchill, Hampson and Shaw.

Against—Messrs. Frazer, Greenish, Rimmington, Robbins, Sandford, Schacht and Williams.

The motion was therefore lost.

Mr. Hills was present at the division, but did not vote.

Mr. SYMES said he would withdraw one motion of which he had given notice, seeing that it would throw further duties upon the President. He was convinced from what he had said to-day that he had already a great deal of work to undertake, and he would be the last to add to it, if the business could be got through in a satisfactory manner. With regard to a second motion of which he had given notice, he was afraid it was now too late to bring it on that day, as many gentlemen who had promised to support it had left, and if it could be understood that it would come on earlier at the next meeting it would be better to defer it. It was not the first time he had found matters of importance left to the end of the meeting, and voted on by quite a minority on account of gentlemen having to leave, and it had been suggested that notices of motion might come earlier in the agenda. He thought this would be an improvement, where such matters were of importance, and he would leave his motion for the next meeting.

Mr. FRAZER said he had no wish to interfere with Mr. Symes's decision as to postponing this important question, but it was only fair to remind him that as long as the present rule affected matters coming at the close of the regular business they must come on at the end of the day, and he might be in the same position next month.

Mr. WILLIAMS said the question was whether it would be right to postpone the regular business of the Society for notices of motion. If this were done there might be a long argument taking up much time, at the end of which there would hardly be a quorum left to transact the regular and necessary business.

REPORT OF EXAMINATIONS.

October, 1879.

ENGLAND AND WALES.

Candidates.

	Absent.	Examined.	Passed.	Failed.
Major, 22nd	0	7	3	4
" 23rd	0	8	3	5
" 29th	0	8	3	5
	—0	—23	— 9	—14
Minor, 22nd	0	15	10	5
" 23rd	0	18	9	9
" 24th	1	24	12	12
" 29th	2	16	5	11
" 30th	1	23	11	12
	—4	—96	—47	—49
Modified, 22nd	0	4	2	2
	4	123	58	65

SCOTLAND.

Candidates.

	Absent.	Examined.	Passed.	Failed.
Major, 28th	0	1	1	0
Minor, 28th	3	10	6	4
" 29th	0	13	5	8
" 30th	0	8	7	1
	—3	—31	—18	—13
Modified, 30th	0	1	1	0
	3	33	20	13

Preliminary Examination.

Candidates.

Absent.	Examined.	Passed.	Failed.
7	387	204	183

Certificates received in lieu of the Society's Examination:—

5 College of Preceptors.
1 Faculty of Physicians and Surgeons of Glasgow.
2 Royal College of Surgeons of England.
1 Society of Apothecaries.
4 University of Cambridge.
1 University of Edinburgh.

APPOINTMENT OF BOARD OF EXAMINERS.

The PRESIDENT reminded members that next month the Board of Examiners would have to be appointed, and therefore gentlemen should be prepared with names, if they had any to suggest.

PHARMACEUTICAL MEETING.

Wednesday, November 7, 1879.

MR. THOMAS GREENISH, TREASURER, IN THE CHAIR.

An evening meeting of the Pharmaceutical Society was held on Wednesday last. The chair was taken at half-past eight o'clock.

The minutes of the previous meeting having been read and confirmed—

The CHAIRMAN called attention to the large number of specimens, presented to the museum, which were displayed on the table, and invited the Curator to give some particulars with respect to them.

The CURATOR first drew attention to a valuable collection of essential oils. These specimens had been used to illustrate a paper on essential oils read before the School of Pharmacy Students' Association, by Mr. Bush, who afterwards presented them to the museum of the Society. Some of them were rare and costly, and they were of further interest on account of the rotatory power of several of them having been referred to in a paper read at the meeting of the Pharmaceutical Conference at Sheffield by Dr. Symes. See *ante*, page 211. A very fine collection of North American drugs, presented by the Philadelphia College of Pharmacy and comprising over one hundred specimens, was on the table. Among these might be noticed several which were of recent introduction. The specimens were remarkably characteristic and formed a valuable acquisition to the museum of the Society. This was more especially the case since there existed some difficulty in procuring many of the North American drugs, except in the compressed and comminuted form in which they were prepared by the Shakers of New Lebanon and in which state it was impossible to study the character of the bark. Another interesting specimen was that of a portion of the stem of the Arabian myrrh, and an account of which had already been published in the Journal, vol. ix. p. 893. Next there was a specimen of Mozambique opium, the cultivation of which had only recently been successfully commenced. It contained 4 per cent. of morphia and 4·3 of narcotine, with a large percentage of water. Another interesting specimen was an ostrich stomach, from South America, where it was used in the same way as pepsine. The ostrich of South America was the *Rhea Americana*, not the common ostrich (*Struthio Camelus*), from which it differed in having three toes instead of two. Whether the digestive power of the two birds was different he could not say, but with regard to the dried stomach of the South American ostrich, he had been told by a gentleman who had endeavoured to prepare pepsine from it, that it had hardly any digestive power. The Curator next drew attention to a number of specimens presented by Dr. Dymock, of Bombay, who had been for some time past a very liberal contributor to the museum.

One was a specimen of Jaferabad aloes, which was sold in the bazaars in India in the form of flat cakes. Dr. Dymock informed him that what had been recently sold in Bombay was fictitious, which accounted for his former statement that it had the same reaction as Barbadoes aloes. The specimen now sent would not turn red by nitric acid, whereas all the Aden aloes would. Another specimen was the gum called sarcocoll, which derived its name from the fact that it was formerly used for healing and cleansing wounds. Taken internally it was a somewhat dangerous purgative. There was also an original package of Chinese oil of peppermint from Canton. Menthol had lately attracted attention as an antiseptic, and Professor Flückiger had pointed out that the oil of Chinese peppermint differed from the English in its chemical reaction; the odour, also, was slightly different. Another of Dr. Dymock's specimens was some oil of ginger-grass, or rusa oil, prepared under his own superintendence, and also specimens of the grass from which it had been prepared. This grass, he had found on inquiry at the Kew Herbarium, was not the true ginger-grass (*Andropogon Schœnanthus*, L.). He had noticed that the oil had a slightly different odour to that of ginger-grass, almost as if oil of caraway had been mixed with it; and it was interesting to find from Dr. Symes's experiments that whereas the true oil had a very low rotatory power (+1°·72) the rusa oil of Dr. Dymock's was much greater (+39°·65)* There therefore would appear to be more than one grass yielding ginger-grass oil. Another specimen of some interest at the present time was the fruit of *Luffa ægyptiaca*, which was coming into extensive use as a flesh glove, for which it answered remarkably well, and was very lasting. Mr. Harold Senier had kindly lent a specimen of the perfect fruit, which had been grown at Clapham by Mr. R. Heath, from which it might be observed that the "Loofan" gloves were merely the fruit with the outer skin and seeds removed and the fruit slit open. From a botanical point of view the fruit was interesting on account of presenting an instance in which the parietal placentation characteristic of the Cucurbitaceæ could be readily seen. He next called attention to several specimens of spurious matico, which he had selected from some offered at the London drug sales in September, and had mounted for the herbarium. One of these specimens was *Artanthe adunca*, and another was a singular variety of the true matico (β. *cordulatum*, D.C.), which differed from the typical plant in having leaves which although hairy were nearly smooth, and had not the wrinkled appearance of the true drug. Whether it differed in medicinal or surgical properties from official matico he could not say. A third was a species of pepper, which had been imported under the name of "*Matico aromatica*," but which had appeared at the drug sales under the name of matico. It had a strong aromatic odour, somewhat resembling anise, and could not possibly be confounded with matico on account of the leaves being perfectly smooth and of a more ovate outline. Another interesting specimen was the *Nardostachys Jatamansi*, supposed to be the spikenard of Scripture, and was, he believed, the first which had blossomed in this country, and which had been grown at Mr. T. Ware's nursery at Tottenham. There was also a specimen in flower of a cinchona (*C. pubescens*), presented by Mr. J. E. Howard. Dr. Dymock had also sent a specimen of the *Garcinia indica*, or cocum butter-tree, specimens of which, he believed, were rare in herbaria in this country. Next came some white quebracho bark, which had recently been found to afford relief in dyspnœa. There were two kinds of quebracho, the white and the red, the latter being used extensively in America for tanning, and had lately been imported into France for the same purpose in considerable quantities. He would also draw attention to a valuable collection of minerals presented by Mr. Talling, of Liskeard, and to some absorbent cotton wool, prepared by an American firm, which would be found to sink in water immediately, whereas ordinary cotton wool would not.

A vote of thanks having been passed to the donors,

Dr. Symes, alluding to the ostrich stomach, said he had found next to no digestive power in it, and he had lately heard that a Paris chemist had made a similar report. It was, however, constantly prescribed and used in Buenos Ayres, which showed the power of imaginative remedies. Those who got their living there by killing oxen had but one meal a day, when they were in the habit of eating seven or eight pounds of roast beef, and naturally they wanted a digestive, and they often took a dose of this after a meal. With regard to the ginger grass oil, he mentioned at Sheffield that he had examined it, and found it did not agree with the statement in the 'Pharmacographia,' that it had no rotatory power, for he found this had a rotatory power of about 39°. Relying on the high authority of Dr. Dymock, he then said that the 'Pharmacographia' might be wrong, but it now appeared pretty plain that Dr. Dymock had been misled by a spurious grass.

Mr. Martindale said the Chinese oil of peppermint was mentioned by Christison as well as Pereira, under the name of po-ho-yo. It was sold on the Continent in little bottles under the name of Japanese drops and was supplied to the Japanese market by the Chinese. As formerly sold it generally contained a quantity of stearoptene, floating in the liquid, but specimens he had seen lately were clear. However, he noticed that the sample then shown had some sublimed on the cork. Chang, the secretary to the Chinese Legation, had told him that it was nothing but Chinese oil of peppermint or some species of mint, and was used for facial neuralgia.

Mr. Davies called attention to a series of specimens showing the results obtained in dispensing a prescription containing tincture of sumbul, carbonate of ammonia, sal volatile and camphor water, with tincture of sumbul, obtained from various sources. In some cases there had been a green coloration, due possibly to the presence of umbelliferon, and in others not, and there were other differences. The question he wished answered was whether true tincture of sumbul gave a green coloration with alkalies. He also showed specimens of the roots from which the tinctures had been made.

Professor Bentley said he had not seen the specimens of root, and should not be able therefore to give any opinion as to their nature. But it was well known that a good deal of false sumbul had been in the market, attention having been first called to it by Dr. Dymock, who particularly mentioned ammoniacum root as a common article of commerce in India. This at once led to the discovery that the Indian sumbul root of Pereira was really ammoniacum root coloured and scented. The question of the change of colour should be thoroughly investigated by a practical pharmacist, especially as sumbul was coming largely into use and there was a difficulty in getting it.

Mr. Holmes was glad that attention had been called to this subject and hoped Mr. Davies would continue his investigations. He had specimens of both the genuine and spurious root and could spare him enough to experiment upon. Mr. J. B. Allen had called his attention to the false sumbul root, some time before Dr. Dymock's paper appeared in the Journal, and it was also due to Mr. F. J. Hanbury to say that he first called attention to the fact that tincture prepared from this root had a strong taste and odour of ammoniacum. At that time he compared the false sumbul with the ammoniacum root in the museum, which had been previously presented by Dr. Dymock, and found that they were identical, so that there could be no doubt that the false sumbul was nothing but ammoniacum flavoured with musk. It differed in appearance by having a slight yellowish-red colour, whereas sumbul was always white. With regard to the specimens of the root which Mr. Davies had placed on the

* In the list on page 211, rusa oil appears under the name of ginger-grass and oil of ginger-grass as Turkish oil of geranium.

table, they had to him the appearance of having been heated, and as he believed that heat developed umbelliferon in roots which, like sumbul, contained it, that might account for the green colour of the mixture in some specimens; the tincture from false sumbul (ammoniacum) had a much darker appearance than that from true sumbul

Professor BENTLEY said he had now examined the root, and had no hesitation in saying that the principal part of it was true sumbul.

Mr. ALLEN said that more than twelve months ago, when dispensing a prescription similar to that mentioned by Mr. Davies, and using the tincture he had in stock, he found the colour of the mixture was not what it should be. On getting a fresh supply of the tincture he found the colour was much darker and the smell more distinct, and after consulting Mr. Holmes, he was of opinion that it was not genuine. With some difficulty, he obtained from the wholesale house a sample of the root from which the tincture had been made, and on submitting that to Mr. Holmes he thought it was spurious. On again writing to the manufacturers, they owned that probably the tincture had not been made from the genuine root, but said that at the time it was made true sumbul could hardly be obtained.

Mr. CLEAVER thought the questions brought forward by Mr. Davies were of great importance. The tincture of sumbul varied from a very light colour to very dark; and he had himself tried in vain to get a tincture which had the same appearance as tincture of sumbul used to have years ago. The root used to show a distinctly resinous appearance on the surface on being broken, but he never saw that now, and the odour was quite different from what it used to be. He believed genuine sumbul was hardly to be obtained. As to the green colour he hardly liked to venture an opinion, but from experiments made on a genuine sample some years ago, he believed it ought not to appear.

The CHAIRMAN suggested that Mr. Davies, in following out these experiments, with the help of Mr. Holmes, should obtain an unquestionable sumbul, make the tincture himself, and then experiment on it with the same mixture, and at some future time report the result to the Society.

Mr. DAVIES said he had made several tinctures from the roots now shown. For some time the colour did not appear, and even after being macerated for some seven or eight days the tincture came out nearly clear. Nearly all the tinctures were of different colour, and he should like to know whether they were generally made by maceration, as Mr. Squire recommended, or by the B.P. process, because possibly the difference in colour might be due to the method employed.

The CHAIRMAN said perhaps the amount of interest shown in the subject would induce Mr. Davies to make further experiments and bring the result before them in the form of a paper.

A paper was then read on—

TARAXACUM.

BY CHARLES SYMES, PH.D.

This paper is printed on page 361 and gave rise to the following discussion:—

Mr. NAYLOR said, in working on large quantities of taraxacum his experience coincided with that of Dr. Symes with reference to the time of the year at which the root should be gathered. He thought the preparations kept best if the root were gathered towards the end of November or even later. With reference to the addition of more spirit to the succus taraxaci, he did not quite agree with Dr. Symes or see any particular advantage to be gained by so doing, for he had always found the quantity prescribed ample, provided the roots had been gathered at the proper time, and that care was observed in the preparation. No doubt the liquid extract would be of great service, but he questioned whether it would retain its medicinal properties to the same extent as the succus.

Mr. POSTANS said it seemed curious that there should be so much difference of opinion with regard to the best time for gathering these roots. He had had some experience in the preparation, and was rather disposed to think that in the summer, or towards the autumn, was the more proper time. It was a generally accepted opinion that the milky juice became thicker and the bitter principle more bitter during the the heat of summer, and therefore if they were to take taraxacine as the active principle, from July to September would be the best time. He quite agreed that the quantity of juice obtained at this period might not be equal to that expressed later on, but he considered that it would contain in proportion more taraxacine. The Belgian and the old Edinburgh Pharmacopœias got over the difficulty by ordering that the whole plant should be used; but it seemed to him that in the absence of physiological experiments these differences of opinion might well exist, and he hoped Dr. Symes would continue his experiments in several forms. It would be useful if he could obtain some juice from roots gathered at different periods, and then enlist the co-operation of a medical man who would test them therapeutically. They had been told that the extract was a useless preparation, and that it was used chiefly as as excipient for pill masses. Why was that? It occurred to him that perhaps the heat used in the evaporation of the extract had a great deal to do with it. The Pharmacopœia ordered that the juice should be expressed, then heated to 212°, and subsequently evaporated to an extract at 160°, and it occurred to him that perhaps that temperature destroyed the taraxacine. Possibly they would get a better extract if the succus containing the spirit were itself evaporated at a low temperature. He did not agree with Dr. Symes that they should have a liquor. He thought the succus an excellent preparation; it answered every purpose, and it was undesirable to multiply liquors in such a way that it would be difficult for dispensers to know when the liquor was desired by a physician and when the succus. As they had at present only one official preparation he should imagine the succus was in all cases intended.

Mr. HOLMES said he had sometimes found that instead of the extract dissolving entirely in hot water, it left a large proportion, as much as 25 per cent., undissolved, which he believed to be inulin. Dr. Symes spoke of the root being sweet after a frost and said it was caused by the alteration of the starchy matter. He did not know whether starch was present in the root or only inulin. If there were only the latter he should be glad to know whether the sweet root still showed the presence of inulin, whether it had disappeared and given place to sugar, or whether the sugar was produced from altered gum. With regard to fresh and dried root, the milk contained a certain amount of caoutchouc which would be insoluble on drying, and he would be glad to know whether the dried root on that account might not present some advantages over the fresh.

Mr. UMNEY said those who had had practical experience in pressing large quantities of taraxacum root could have hardly failed to notice that at any rate with regard to the density of the juice the root collected in the month of November was far superior to any other. They had it on record by Professor Bentley that the juice prepared from roots collected in the earlier spring had a more delicate flavour, and perhaps contained an equal amount of taraxacine. That he was not prepared to contest, but he could not follow Mr. Postans in thinking that the root should be collected between July and September. He could not conceive that the proper time to gather a root was whilst it was in the greatest state of activity. However, his own observations convinced him that juice expressed in the autumn was superior, and that it then has a much greater specific gravity than that pressed at any other time; at that time the hydrometer would indicate 1·065 up to 1·075 specific gravity, whereas in spring it would be as low as 1·030. Dr. Symes had referred to the imperfect keeping power of the succus of the Pharmacopœia and every one must have been annoyed at times by its turbidity in spite of all precautions. Perhaps the chief cause of that was to be found in the constituents of the root itself; but there was one thing which should not be lost sight of. When a magma, and this crude juice and spirit was nothing less, was thrown upon a filter the difficulty of filtration was immense, and he had for years adopted the method of filtering the juice out of contact with air as much as possible; in this way acetification was prevented and evaporation of spirit reduced to a minimum, and the juice was obtained in the most elegant condition. For this purpose he always discarded the ordinary filtering paper and resorted to a canvas bag five or six feet long having a tin cylinder round it to keep away the air. When the juice was thus filtered there was very little difficulty in keeping it. In this country, for almost half a century, there had been a fluid extract of taraxacum quite different from the Pharmacopœia. One or two houses had certainly made it for twenty-five years by taking the dried root, macerating it with cold water, taking the aqueous liquid and raising it to boiling point to coagulate the albumen, evaporating down to a certain point and adding spirit of wine so that one fluid ounce of the resulting product was equal to one ounce of the root. Such a preparation was frequently sent out, although the quantity was small as compared with the succus. It was very dense, but from a medicinal point of view, an inelegant preparation, for he should say it consisted almost wholly of glucose. Some five or six years since, soon after the publication of the United States Pharmacopœia, when everything seemed to be embodied in glycerine, he exhibited twelve or fourteen fluid extracts, one of which was fluid extract of taraxacum prepared by that process, and they might remember some of the senior pharmacists considered it one of the most inelegant preparations they had ever seen. He must stand up for the old succus taraxaci of the Pharmacopœia. When properly prepared and one-third its volume of spirit added to it, it was an elegant preparation, but it required precautions in making. For instance, after the roots were crushed they must not, as was sometimes the case, stand five or six hours before pressing, but should be put into the press at once, the juice taken out and spirit added; otherwise the juice might be expected to turn sour, and when acetification had once commenced it was difficult to know where it would end.

Mr. Martindale said the preparations of taraxacum had always been troublesome to pharmacists. In the London Pharmacopœia there were three: the decoction, the compound decoction of broom and the extract. The fresh root was ordered for the decoctions, and he remembered as an apprentice being sent out to gather it when required; sometimes he had seen roots not at all genuine brought in,—species of hawkweed, etc. In the present Pharmacopœia they were ordered to make the decoction from the dry root, which had not the disadvantages of the fresh root, but unfortunately it was liable to be maggot-eaten. Then they had the succus, which Dr. Symes thought might be improved by concentration, but he questioned whether therapeutically taraxacum was really worth taking so much trouble with. Dr. Rutherford, who had conducted a series of experiments with it upon dogs, came to the conclusion that it was a very feeble biliary stimulant. Dr. Garrod also considered that its efficacy was very doubtful. He thought, therefore, it would fast fall into the category of obsolete drugs, and he had himself lately found very little demand for it. With regard to the concentrated preparation of the American Pharmacopœia, he thought there was rather too much concentration. One part in two fluid parts might be of service in some drugs, but in many of them one in one was not possible. It did not fairly represent the drug, especially if it were of an active character.

Mr. Postans said it would be useful to know whether Dr. Rutherford's experiments were continued with the isolated taraxacine, and if the results were the same.

The Chairman said it was sufficient for them that taraxacum held a place in the Pharmacopœia. They had better leave the question of therapeutics to medical men.

Professor Bentley said it was now nearly a quarter of a century since he brought before the Society his views on the collection of taraxacum. He then stated his reasons for thinking that spring was the best season, but he thought Dr. Symes must have misunderstood in one particular what he then said. He did not mean to say that the preparation made in the spring was superior from a pharmaceutical point of view, but that judging from the bitterness of the juice, and its greater activity, of which he had personal proof, he wished pharmacists to consider whether it would not be better to make the extract in the spring than the autumn. What he had also specially referred to was the period mentioned in the Pharmacopœia, for it seemed to him unquestionable that it could not be right to allow so long a period as from September to February. He had always said that however opinions might differ as to the period of collection, it could not be proper to gather it after a frost, because at that time the root became sweet instead of bitter. He was glad to find that on this point he had been confirmed by Dr. Symes. Mr. Holmes had called attention to the question whether the root contained starch or inulin, but he imagined Dr. Symes meant to convey that inulin had been converted into sugar. Overbeek had found as much as 2 ounces of inulin in a pound of the dry root in the autumn, but very little in spring, when it had doubtless been converted into saccharine matter. No one could doubt that the preparation had a more elegant appearance when made in the autumn, but he did not think it was yet settled whether that made from the spring root had not greater medicinal activity. It was not a question for them whether taraxacum was a good therapeutical preparation; it was largely used, and pharmacists were simply called upon to present it in the best form, and to advise physicians as to the best mode of administering it.

Professor Redwood congratulated the Society on having had so throughly pharmaceutical a paper, and on a subject on which he thought discussion might well be renewed. Although the matter had apparently fallen into abeyance after the discussions which took place many years ago, yet that had not been strictly the case. Hardly any preparation had received more attention from the Committee of that Society (of which he had the honour to be Secretary), which was appointed first on the recommendation of the College of Physicians, and subsequently of the Medical Council, to furnish the results of their practical experience on matters in the Pharmacopœia, than taraxacum. Whatever responsibility attached to the instructions given in the Pharmacopœia relating to either the time of collection or the preparation of the extract, rested mainly on that Committee. With regard to what had fallen from Professor Bentley, he must say the Committee took great pains to inform themselves on various points besides those which had been referred to. The most suitable time of collection was considered, and it was also deemed desirable to fix upon a period when the root was found to yield the juice in what was considered the greatest state of activity. But the further question was also considered of the practicability of getting the root at the times most suited for using it. It was well known that taraxacum was not cultivated specially; but that which came into the London markets was collected from ground otherwise occupied, so that it was necessary to fix upon a period when the roots could be taken up without disturbing the more important crops occupying the same ground. It was therefore considered that even if November were the best month for collecting the roots, it might not be practicable to get the supply required in that particular month, and that in the subsequent months of December and January equally good roots might be collected. It was therefore deemed advisable to give rather a wider range of time, because it was obvious that something depended on season and climate, and the period which might be most suitable in one part of the country might not be most suitable in another. The point he wished specially to mention was that the whole matter had been carefully considered by a Committee appointed by that Society.

Mr. CLEAVER said he could scarcely agree with Dr. Symes's statement that juice from roots collected in the autumn was very thick and almost immediately solidified, though it was certainly denser than that collected in the spring. He did not think it was so bitter, however. The latter was perfectly opalescent after a short time, and the bitterness was far more marked. With regard to preparations he feared that of late they had been drifting too much in the direction of elegance without due regard to efficiency. He had found that if taraxacum root were exhausted by water, by weak alcohol, and by strong rectified spirit, three entirely different preparations were obtained, which would keep for different lengths of time. That exhausted by water quickly changed into a sweet preparation; that with proof spirit had the odour of taraxacum, and kept for a considerable length of time; but with rectified spirit there was obtained a light coloured preparation, having little of the characteristic odour of fresh taraxacum, but which had a decided bitterness. If that were evaporated, a liquid was obtained which would, after a little time, deposit a substance which had been called caoutchouc, but the nature of which he did not know; the residue was bitter, and with the addition of a little spirit would keep bitter for almost any length of time; at any rate he had kept it for eight years without any alteration. With regard to the extract as at present ordered, when first made it had a very bitter taste; if treated with alcohol the result was a bitter preparation, and a sweet one was left behind. What it was would be for future pharmacists to determine. The succus if properly made was an elegant preparation, and one which kept for any length of time. In many places he believed it was made by merely expressing the juice without heating and adding alcohol, and though it might sometimes keep, at others it would acidify rapidly. The addition of alcohol caused a large coagulation of some matter which on exposure to air on the filter acidified and rapidly altered.

The CHAIRMAN thought the pharmacy of these preparations was very empirical until they knew the constituents of the substance on which they were operating. They had in taraxacum a bitter, and a peculiar substance, inulin, which did not turn blue with iodine, though it was related to starch and was found in the compositæ. It did not appear in grains like starch, it was soluble, and was found in this plant in spring, but much more largely in autumn. One of the most interesting papers on this subject was one which appeared in 1848 or 1849, by Dr. Wilson, of Edinburgh, founded on various experiments performed by Messrs. Smith, who obtained from the juice expressed a large quantity of mannite. Being desirous of ascertaining whether this existed in the dandelion root or was produced by fermentation, they sent out a man to dig some roots, and within six hours they were pressed, the juice reduced and spirit added In that juice mannite was not found; but if itw ere left. for even twelve hours, more or less mannite was found. Two German chemists had previously found mannite in the juice, but they were uncertain whether it existed in the root or was produced by fermentation. He thought there was a great deal of truth in Mr. Giles's opinion that the time which elapsed between the collection and use of the roots was of the first importance, and the season of collection rather secondary. There could be no question, however, that the root should be collected in November, as it then contained more of the bitter principle with a large amount of inulin, while in spring there was very little of the latter principle. He would rather qualify Mr. Giles's view, however, by saying that it was the time between the pressing and reducing which was of prime importance. The conversion of the inulin through fermentation into a saccharine substance was the real cause of the difficulty they had to meet.

Dr. SYMES, in reply, said his suggestion as to the addition of a little extra spirit was readily explained by Mr. Umney's remark, that by filtering in a closed vessel protected from the action of the air he saved loss of spirit. It was quite possible that the loss by evaporation in the ordinary way was the reason why he found an addition advantageous. He quite agreed that it was not the province of pharmacists to discuss the physiological action of taraxacum; but its great importance was shown by the fact of which he had been informed since his paper was in print, that one wholesale house, last year, between September 25 and November 28, pressed 129 cwt. of root, giving 641 gallons of strained juice. His informant, who was chemist to the house in question, also told him that he found November was the best season. He should not have quoted Professor Bentley's remarks of twenty-five years ago, but for his high authority, as anyone might change his opinions in that time, and Mr. Cleaver still held the same opinion that the spring was the best time, and he found the same thing stated in a very useful book, the Museum Catalogue. Again, they had the Pharmacopœia, giving a period from September to February, passing through those very months when there were severe frosts, which all agreed, was the least proper season. In using the term "starchy matter," he, of course, referred to inulin. Some years ago, he had tried to obtain taraxacine in the crystalline form, but had never succeeded, though he got it in a colourless solution very much concentrated. He found, as matter of experience, operating with large quantities, that the juice pressed in the autumn was very dense and abounded in inulin, which was capable of being filtered out and separated. On examining similar roots a month later he found they yielded much less inulin, there was more sugar and less bitterness, and further on in the winter and early spring he found that inulin had largely disappeared. Some of the inulin he had isolated as a buff-coloured powder. With regard to the fluid extract, he knew that extractum taraxaci fluidum was frequently prescribed and then the difficulty arose that they had no fluid extract; but probably the American preparation was meant. The succus could not be used certainly as a fluid extract. The chairman had remarked that they had not a very definite substance to deal with, and Professor Attfield had suggested to him that possibly some gentleman connected with the Conference might investigate the matter chemically, and he hoped that might be done, because those who were daily occupied in business had not time to follow out investigations requiring so much time.

A vote of thanks having been passed to Dr. Symes, the meeting was adjourned to December 3.

EXAMINATIONS IN EDINBURGH.

October 28, 29, *and* 30, 1879.

Present on each day—Messrs. Ainslie, Borland, Gilmour, Kemp, Kinninmont, Stephenson and Young.

Professor Maclagan was present on the 28th on behalf of the Privy Council.

MAJOR EXAMINATION.

October 28.

One candidate was examined, and was declared qualified to be registered as a Pharmaceutical Chemist:—

Presslie, Robert Dowell ....Aberdeen.

MINOR EXAMINATION.

October 28.

Ten candidates were examined. *Four* failed. The following *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Chalmers, Thomas ....Lanark.
Chambers, Herbert ....Haddenham.
Cowie, George ....Glasgow.
Dow, William ....Kinross.
Easton, John ....Moffat.
Goddard, James Godfrey ......Great Yarmouth.

October 29.

Thirteen candidates were examined. *Eight* failed. The following *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Gould, William E. ....Birmingham.
Hardie, James Miller ....Dundee.
Heslop, Henry Hills ....London.
Hogg, Robert William ....Gateshead.
Mauchlen, Robert ....Glasgow.

October 30.

Eight candidates were examined. *One* failed. The following *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Pringle, George ....Pathhead.
Tatam, Saml. Blackmore Chas..Ottery St. Mary.
Taylor, Robert Allan ....Kingston, Glasgow.
Walker, Alexander ....Cullen.
Wallace, Andrew..................Edinburgh.
Waters, George.....................Alnwick.
Welford, Richard..................Blackburn.

MODIFIED EXAMINATION.

October 30.

One candidate was examined, and was declared qualified to be registered as a Chemist and Druggist:—

Campbell, William ....Manchester.

PRELIMINARY EXAMINATION.

The undermentioned was received in lieu of the Society's examination:—

Certificate of the University of Edinburgh.

MacGregor, William ....Edinburgh.

Provincial Transactions.

BIRKENHEAD CHEMISTS' ASSOCIATION.

A meeting of this newly formed association took place on the 29th of October at the Ranelagh Hotel, where the members dined together at nine o'clock p.m. Considering the recent formation of the Society and the somewhat unfavourable circumstances under which this meeting took place, the attendance was good. The principal chemists of the town and district were mostly in attendance or sent in apologies for absence, the others perhaps only waiting for the consolidation of the Society, or further information, before joining. The objects sought are chiefly more unity of action in all matters affecting the interests of the trade, mutual improvement and the strength of combination against the many assaults now made upon the legitimate business of chemists. The meeting, as well as the preceding ones, was perfectly unanimous and a very pleasant evening was spent, all the members feeling the better for social intercourse and separating with much higher opinions of each other than ever can be attained whilst unworthy selfishness and suspicion are allowed to prevail, a state of things which does not exist to the same extent in any other calling whatever, and which is inflicting the deepest injuries upon the best interests of chemists in general. The association is only in its infancy, but it has begun with every prospect of success, and the members look forward for the assistance of all the chemists in the town and district. In former years the chemists of Birkenhead were very closely united and very frequently met together for mutual benefit and social discussion; but the rapid extension of the town and sudden influx of many chemists from other districts had, unfortunately, an unfavourable influence upon the strong bond of unity, and serious loss to all has resulted.

Parliamentary and Law Proceedings.

Prosecutions under the 17th Section of the Pharmacy Act, 1868.

At the Hull Borough Police Court, on October 30, 1879, before Mr. E. C. Twiss (Deputy Stipendiary), William and Thomas Cussons and others, trading as the Hull and East Riding Supply Association at Lansdown Terrace, Beverley Road, Hull, were charged "that they did, on the 22nd day of October, 1879, unlawfully sell to William Frederic Haydon, secretary of the Chemists and Druggists' Trade Association of Great Britain, 23, Burlington Chambers, New Street, Birmingham, certain poisons, to wit, chloral hydrate and morphia, contained in certain pills enclosed in a bottle wrapped in certain papers, neither the bottle nor the wrappers of which poisons were labelled with the word 'poison,' nor with the names or addresses of the sellers of the same, contrary to the statute in such case made and provided."

Mr. Henry Glaisyer, solicitor, Birmingham, appeared on behalf of the Chemists and Druggists' Association for the prosecution, and Mr. Thomas Priestman, solicitor, Hull, for the defendants.

Mr. Glaisyer said this was a summons issued under the provisions of the Pharmacy Act, 1868. The 15th section of the Act prohibited all persons other than those registered under the Act from retailing, dispensing or compounding poisons, and from using or exhibiting certain titles, and the 17th section enacted "that it shall be unlawful to sell any poison either by wholesale or by retail unless the box, bottle, vessel, wrapper, or cover in which such poison is contained be distinctly labelled with the name of the article and the word 'poison,' and with the name and address of the seller of the poison, and that any person selling poison otherwise than is herein provided shall upon a summary conviction before two justices of the peace be liable to a penalty not exceeding £5 for the first offence, and to a penalty not exceeding £10 for the second or any subsequent offence, and for the purposes of this section the person on whose behalf any sale is made by any apprentice or servant shall be deemed to be the seller." On the 22nd of the previous month, Mr. Haydon visited Hull, and went to the defendants' establishment, situated in the Beverley Road, where he purchased a bottle of compound chloral pills. The pills were supplied to him in a bottle, upon which was not placed the word "poison," or the name or address of the sellers of the poison. Having made the purchase, he analysed the pills and found they contained chloral hydrate and morphia in considerable quantity, both being within the meaning of this Act.

Mr. Thomas Priestman, for the defendants, said they had no defence except ignorance of the law which, of course, was no valid defence. His clients had no intention of doing wrong, and they were quite prepared to withdraw from their stores everything they had no legal right to deal in, and they were sorry that they had offended against the law. He hoped only a mitigated penalty would be imposed, provided his clients at once give up selling such articles.

Mr. Twiss: What do these pills contain?

Mr. Glaisyer: They contain chloral hydrate and morphia.

Mr. Twiss: And these are poisons within the meaning of the Act?

Mr. Glaisyer: Yes, sir.

Mr. Twiss: I suppose that as a matter of fact there is poison in almost in all patent pills?

Mr. Glaisyer: The article sold in this case is not a patent medicine.

Mr. Twiss: You say, Mr. Priestman, that your clients have been selling these pills without a knowledge of the statute?

Mr. Priestman: Yes, sir; and they did not know the articles contained in the pills were poisonous.

Mr. Twiss: But if your clients deal in such things they must take the responsibility attached to their sale. Of course this case is taken up in the interests of the public, and I think under the circumstances I must fine the defendants 40*s*. and costs.

A penalty of 40*s*. and costs was inflicted.

Sale of Vermin Killer by Unregistered Persons.

At Walton-le-Dale (Lancashire) Police Court, on October 31, 1879, before Messrs. Whittaker (Chairman) and Thomas Whittaker, John Hayhurst, general dealer, Bamber Bridge, was charged "that he did on the 21st day of October, at Bamber Bridge, unlawfully sell to William Frederic Haydon, secretary of the Chemists and Druggists' Trade Association of Great Britain, certain poison, to wit, rat poison, a preparation of strychnine, in a certain packet, the cover of which packet did not set forth the name or address of the seller of the same, and that the said sale was effected, the purchaser being unknown to the seller and not introduced to the seller, and that the date of the sale, the name and address of the purchaser, and the name and quantity of the article sold, not being entered by the seller in a book kept by him for that purpose, in contravention of the statute in such case made and provided."

Mr. Glaisyer, solicitor, Birmingham, appeared for the prosecution, and the defendant appeared in person.

Defendant pleaded guilty, but said he had not had his attention called to the fact that he must not sell such poisons. He purchased them in the ordinary way of business, and did not know he could not legally sell them. He kept the poisons as a convenience both to himself and his neighbours.

Chairman of the Bench: It is pretty well known that poisons in a pure state may be sold only by chemists.

Magistrates' Clerk: You are not in the habit of keeping a book, I suppose, for the purpose of registering the sale of such poison?

Defendant: No, sir; I was not aware it was necessary for me to do so.

Chairman of the Bench: This kind of poison is pretty generally sold, I suppose?

Defendant: Yes, sir; such articles may be purchased in almost all the small shops in country districts.

Chairman of the Bench: You know as well as I do that there have been suicides from the taking of such preparation?

Defendant: I have heard of such things.

Chairman of the Bench: We shall fine you in the mitigated penalty of 10*s*. and costs. You must be more careful for the future.

Poisoning by Syrup of Poppies sold by an Unregistered Person.

On Wednesday, October 17, an inquest was held at the Guildhall, Doncaster, before Mr. Arthur J. Shirley, the borough coroner, on view of the body of a child, three months old, named Beatrice Cliffe. Emma Cliffe, mother of the deceased, identified the body. Deceased was a healthy child; it began to be unwell on Friday afternoon and was troubled with a cough. It was also sick. She gave it a little of Mr. King's cough mixture. She gave it a quarter of a teaspoonful with a little warm water and sugar, and repeated the dose two or three times. On Sunday, when she gave the child two doses of the medicine it became worse, and in the evening a neighbour named Mrs. Mawson told them she had a recipe which she thought would cure it. Next morning witness went for the recipe, which Mrs. Mawson had obtained from a neighbour, and she copied it in pencil. She gave the paper to her daughter and told her to go to Mr. Spight's for some medicine. When her daughter returned she sent to Mrs. Mawson's to inquire how the medicine was to be taken, as Mr. Spight had not put a label on the bottle. Mrs. Mawson came herself and told witness the dose was not quite a teaspoonful, which was to be repeated three times a day. Witness gave the child a dose and for about an hour the child seemed quite lively, but after that time she fell asleep and slept for two hours. Witness then took the child up, and after giving her the breast, gave her another dose of the medicine. After that witness put her on the sofa, and she fell asleep. About eight o'clock witness undressed her. While doing that, the child's arms dropped on one side and her face looked very pale. Getting alarmed witness sent for Dr. Wilson, who applied a mustard plaster to the child's chest. It seemed to revive a little, but did not thoroughly wake up, and died on Tuesday morning. The child had frequently slept a long time, but it had never had any medicine before. Her husband took a little of Mr. Spight's medicine on Monday night, and said it made him feel queer.

Dr. Wilson deposed that on Monday evening Mr. Cliffe's daughter came to his house and told him the baby was very ill, and they wanted him to see it. He got there soon after eight o'clock, and found the child lying on Mrs. Cliffe's knee, looking very pale and ill. Its cheeks were cold, and on examining its eyes he found the pupils were very much contracted. He asked what had been given to it, as there was every symptom of opium poisoning. He was shown a paper, containing the following prescription:—1 ounce cold drawn linseed oil, $\frac{3}{4}$ ounce syrup of squills, and $\frac{3}{4}$ ounce syrup of poppies. He asked what the dose was and was told a teaspoonful. The bottle was shown to him and he said there was no label on it, stating what it contained or how it was to be used. He said it was a very unsafe thing, as syrup of poppies varied considerably in strength. In the meanwhile various means had been adopted to rouse the child from the state of stupor in which it was, and for a while those means seemed to be successful to a certain extent. The child began to move about a little and open its eyes and looked a good deal better. He stayed about an hour, and as the child seemed to be improving, he left. He applied a large mustard plaster, and had the child's feet placed near the fire. The child was in a profound stupor, and but for the breathing, which was very faint, he would have thought it was dead. Before the child died, his opinion was that it had been poisoned by opium. On Tuesday morning, Mr. Cliffe came to his house and told him the child was convulsed, and when witness arrived at the house a little before ten o'clock, he found that it was dead. Speaking of the medicine, he said each dose would contain 15 drops of syrup of poppies. Syrup of poppies was such an uncertain preparation that he would never under any circumstances administer it to children; it was essentially opium and very often adulterated. It was a dangerous preparation and if used at all should be used with very great caution. On Wednesday morning, he, in company with Mr. Walker, house surgeon, at the Infirmary, made a *post mortem* examination of the body. There was a small quantity of mucus in the bronchial tubes showing a slight attack of bronchitis, and some portion of the lungs were slightly congested. The brain was also slightly congested. There was no disease discovered sufficient to account for death, the bronchitis being very slight indeed. If he had known nothing of the circumstances he would not have been able to say from the examination he made that the child had been poisoned.

In reply to a juryman witness said the medicine should have been labelled "poison."

Mr. Walker, surgeon at the Infirmary, confirmed the evidence of Dr. Wilson as to examination of the body after death.

The inquiry was adjourned until Tuesday afternoon for the purpose of having the remaining portion of the medicine analysed.

The adjourned inquest was held before the borough coroner, Mr. A. J. Shirley, on the 21st ult.

Mr. Hall watched the case for Mr. Spight, druggist.*

The evidence given by the witnesses at the last hearing was read over.

After the evidence of the little girl who fetched the medicine had been read, Mr. Hall said what he wished to put was this. Take it for granted that Mr. Spight made up the mixture (which he denied), that would be no offence. According to the ruling in the case of the Queen *v.* Pocock, there must not only be neglect, but the death must be an immediate result. It would not be sufficient for Mr. Spight to have made up the medicine, for the child's evidence was that she did not tell Mr. Spight for whom or for what the mixture was required.

The Coroner said Mr. Spight was not charged with anything at the present time, and he thought it would be best for the inquiry to proceed.

Replying to Mr. Hall, the girl said it was a week on Monday when she fetched the medicine from Mr. Spight—whom she pointed out in the court. There was a girl in the shop at the time she got the mixture. She only gave Mr. Spight the paper. She did not say anything as to what it was for.

Dr. Wilson, answering Mr. Hall, said that no druggist would be justified in making the mixture up, as there were no directions on the paper as to how it should be used. There was nothing as to this, however, in the books he had read. Supposing a child had bronchitis, the syrup of poppies would have more effect; would tighten instead of loosen the expectoration. Witness was not aware what the mixture (King's) was that was given to the child the day before, but it might, or might not, make the child more susceptible to the opium.

By the Coroner: There ought to have been a label on the bottle. The chemist would have been justified in making up the prescription if it had been initialed by a medical man.

The first witness examined to-day was George Cliffe, the father of the deceased. In addition to corroborating the main portion of the evidence of his wife, he said the reason they discontinued giving the child King's mixture was that it was rather hot, and the child did not take it well.

Sarah Ann Mawson, deposed to recommending the last witness to give his child the mixture contained in the prescription, as it had done her children good. On her bottle there was a direction on the label to give the mixture twice or three times a day. She got her medicine from Mr. Spight, and it produced no ill effects on her child.

Martha Snow deposed to recommending the prescription to Mrs. Mawson. She had given it to her children, and the one in court—a baby—had only a spoonful the last week. She had always got the mixture, till the last lot, from Mr. Spight, but the last time Mr. Spight told her child that he had not one of the things in stock.

By the jury: She had had the prescription made up by Mr. Spight several times.

Sergeant Thompson deposed to receiving the prescription and a bottle of cough mixture, with Mr. King's label on, from Mrs. Cliffe. This bottle of mixture, and the one containing the mixture said to have been got from Mr. Spight, witness took to Mr. Walker, analyst, of Sheffield.

Edmund Spight said he was a grocer and dealer in medicines. [The Coroner here said that witness was not obliged to answer any question unless he liked.] His shop was in Cemetery Road. He knew the little girl, Alice Ann Cliffe, from seeing her several times at his place. She had been for several little things. He believed he would be at home about nine o'clock on Monday night week. Mrs. Spight would be at home, too. He did not remember that morning the girl Cliffe coming to the shop, nor any little girl coming to the shop and giving him a paper. He did not keep at his shop syrup of poppies.

The Coroner: Do you keep any poisons at all?

Mr. Hall: You need not answer that question.

Witness, continuing, said he had never kept syrup of poppies. He did not know that he had seen the prescription produced, but similar ones had been brought to him to make up, and he substituted certain things—burnt sugar and simple syrup—for the syrup of poppies. He never sold syrup of poppies at all. Syrup of poppies was made by boiling poppy heads with sugar. He kept the linseed oil and syrup of squills, but not the syrup of poppies. He was quite certain the girl Cliffe never went to the shop on Monday week; nor did he to his knowledge see the prescription produced that week. It was not usual for people to sell burnt sugar and simple syrup for syrup of poppies. They did not do this where he was last employed.

By the jury: The label on the bottle produced (by Mrs. Mawson) was his, and he always labelled the bottles in which he supplied cough mixture. He had now at his place a bottle containing burnt sugar and simple syrup. He might have told Mrs. Snow that he had not one of the ingredients she wanted, but if he did it was because of its being the race week, and he would be busy. He would then have the same thing as he had now. He did not remember the girl coming at all, but if he had sold the mixture he usually sold, he should, as was his habit, put a label on the bottle. To his knowledge he had never had any syrup of poppies in his shop—at least, not for the last three years. On the day the child died he told the officer (Serjeant Thompson) that he had had the prescription brought to him.

Henry Herbert Walker, of Sheffield, and the analyst for the borough, said the two samples of medicine he received from Sergeant Thompson he had analysed. In King's mixture he found a small trace of opium, but not sufficient to be weighed. The other constituents were quite harmless—such as anise. The mixture said to have been obtained at Spight's he analysed, with the object of detecting opium, and he found two grains in the whole bottle—about 16 teaspoonfuls. There would be about a tenth of a grain in each teaspoonful, the teaspoonful to hold a drachm, or about 60 drops. In analysing he found both morphia and meconic acid—two of the constituents of opium.

By the jury: He did not analyse to estimate the other contents of the bottle, though he found traces of both the oil and simple squills. He should think that two grains of opium was a large quantity to find in three quarter ounces of syrup of poppies.

By Mr. Hall: He was told to examine the mixtures for deleterious substances. The officer might have told him to analyse for opium. He did not know whether one-tenth of a grain of opium would, or would not, kill a child. He made both analyses at the same time, but in separate vessels. It was by testing the substance that he found it was opium, but in testing it the quantity was so small, that he lost it.

Dr. Wilson, recalled, said that a tenth of a grain of opium in a teaspoonful of mixture given to a child, and repeated, would produce the symptoms from which this child suffered. His opinion was that the child died from opium poisoning.

By the jury: One-tenth of a grain of opium had been known to poison a child, though it was often given without producing ill effects.

By Mr. Hall: Although the child, was a healthy one, one-tenth of a grain given at ten o'clock, and another at three o'clock, would produce the symptoms he found. In his opinion, no prescription of this character ought to be given except by a medical man. Dr. Wilson explained that if there had been three-quarters of an ounce of syrup of poppies, it would contain three-quarters of a grain of opium, whereas the portion of mixture remaining was found to contain two grains.

* Mr. Spight is thus described in the report in the local newspaper, but there is no such name in the Register of Chemists and Druggists.—ED. PH. J.

This was all the evidence, and the coroner told the jury that the case resolved itself into two points. The first was the death of the child. Did it die a natural death, or from the administration of opium? If death was caused by the latter, then the question was where did the opium come from, and who was responsible for its being given to the child. After reading over the main parts of the depositions, he stated that the evidence of the mother, Dr. Wilson, and the analyst, all pointed to the fact that the child had not died a natural death. Then came the second point. Was there any person responsible for the death; that was if it had been caused by poison? The evidence of Mrs. Mawson and Mrs. Snow was that Mr. Spight had frequently made up this prescription, though their children had never suffered from it. The little girl had given her evidence remarkably well, though it was singular that her evidence should so much differ from Mr. Spight's. The girl remembered nearly everything, while on the other hand, Mr. Spight said she was not at his shop. Mr. Spight was on his oath, and they ought to give due weight to his evidence. First, then did the child die a natural death, or was its death caused by the administration of opium? If the latter was obtained at Spight's shop, and if so, was Spight justified in selling it as he did? If they found that the medicine was obtained from Spight's, and that the child's death was caused from the gross negligence, carelessness, or ignorance of Spight, they must say so. On the other hand, if they found that the death arose from the administration of opium, but there was no proof as to where it was obtained, then they must bring in a verdict of death from misadventure.

The jury retired, and after being absent about half an hour, they brought in a verdict that the deceased died of opium poisoning. The jury believed that the girl went to Mr. Spight's for the mixture, and obtained from him a mixture containing opium. The jury, however, found that Mr. Spight was not guilty of gross or criminal negligence, but that more care should be taken in supplying mixture.—*Doncaster Chronicle.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

A Question of Policy.

Sir,—Some years ago when "Allen's Hair Restorer" was introduced to the public, and boldly and skilfully advertised, chemists, tempted by the large profit offered to the retailer, "pushed" it with their utmost ability, and since careful people generally consult their chemist as to the innocuousness of such preparations, it may, with all due deference to the skilful methods of advertisement, be safely inferred that but for the recommendation of chemists, it would not have realized such an immense consumption.

The growth of stores and cutting houses has, however, taken the sale in a great measure out of the hands of the chemists; the chemist has sown that others may reap; for, once he has assured his lady clients that it is perfectly harmless and effectual, and they have become habituated to its use, at no time can he effectually retract that opinion, and he has therefore the pleasure of seeing the very customer who "sucked his brains" on the scientific and medical view of the preparation, obtain her supply at the store, and point at his exorbitant charges from that identical article. "Once bit, twice shy" used to be held a good proverb, but it seems of small value now, for I have just had placed in my hands an almanack for 1880, skilfully and ingeniously compiled by a gentleman, "who as a stranger in the land" commenced business a little more than a year ago in a cellar, or as he more euphoniously puts it "a sub-basement." Business energy, a believing public and the chemists as missionaries, have created for his article a sale almost unprecedented.

Remember, I make no complaint against this gentleman or his article, but simply take it as an example.

The almanack is graced with woodcuts, prominent among which is a portrait of a venerable dame, who if she be not as mythical as Mrs. Harris, would put to shame all the medical profession, botanists, and scientific discoverers in the world.

Out of the thirty testimonials from agents, I find some three from pharmaceutical chemists, thirteen from chemists and druggists, in company with eleven from persons not on the register, many of whom are herbalists, storekeepers and general hucksters.

Fancy a chemist being proud of the scores of bottles he has sold, while the very next testimonial tells of the sales of a "medical botanist," whatever that may mean.

By the time these energetic chemists and their select companions have helped to build up an immense sale for this article, the public will buy it at a discount at the stores.

Now, do the chemists of England hope to sell medicines like Dutch cheeses? and if they do not, let me ask them why they persist in helping to push a principle of quackery which will eventually kick its benefactors—why they put a rod in pickle for their own backs?

Surely chemists should stay their cry against their murderers when they themselves are following such a suicidal policy.

John H. Wilson.

P.S. It would be an interesting statistic of business cuteness to know how many chemists have sent up a list of the names and addresses of their corpulent customers to an enterprising American now located in London.

Paregoric minus Opium.

Sir,—The *exposé* of the Chesterfield firms is only one of the very many which ought to take place. We have amongst us a great number of men who do not care what their customers are (grocers or what not), or what their requirements may be; we have wholesale "pharmaceutical chemists" supplying grocers and shopkeepers with all manner of drugs, including scheduled poisons, also supplying the stores, thereby injuring the chemists who, I venture to say, are their oldest and most legitimate customers. Surely, sir, it is time the Pharmacy Act was more stringently enforced. I think any grocer selling scheduled poisons should be prosecuted at once without a warning letter, and that the party supplying him ought also to receive a certain amount of punishment, for grocers, etc., would soon obey the Act if they could not find parties willing and solicitous to supply them.

A. P. S.

E. O. Jones.—We cannot recommend any book as specially fitted for the study of the subject of a particular examination. There should be however no difficulty in obtaining a good and cheap manual of chemistry.

"*Inquirer.*"—The preparation is a proprietary one, and we are not aware that the formula used in making it has been published.

"*Bella.*"—It is beyond our power to assist you in respect to a recipe for the production of whiskers and moustache.

"*A Friend of Mr. Brown*" is recommended to address his question to the Registrar.

"*Borax.*"—The recipe for Boracic Acid Ointment (Lister) has already appeared several times in this Journal. It will be found in vol. viii. of the present series, p. 743, and some remarks on the manipulation on pp. 782 and 822 of the same volume.

C. T. Brooks.—The answer to your question would depend upon the nature of the salt you desire to obtain. In any case the information you require may be obtained by reference to any manual of chemistry.

R. D. Gibbs.—The Secretary of the Institute of Chemistry is Mr. C. E. Groves, and the address, Somerset House Terrace, W.C.

H. Layng.—For the removal of chrysophanic acid stains see vol. viii. p. 1018.

Communications, Letters, etc., have been received from Messrs. Pearson, Dingle, Baldock, Richards, Ward, Furness, Heath, Landerer, Hart, Allen, Toomey, Young, Bradshaw, Brookes, Stevens, Bell, Sec. Chemists' Assistants' Association, P. T. W., M. P. S., M. B., H. L., H. W., Excelsior, Jacques, Quidnunc, Juvenis, Lavandula.

NOTES ON INDIAN DRUGS.

BY W. DYMOCK.

(*Continued from page* 282.)

ZARÁWAND-I-GIRD (Pers. and Bomb.), ARISTOLOCHIACEÆ.

This is the imported root of *Aristolochia rotunda*, Linn., a small plant with slender stems and almost sessile, obtusely cordiform leaves. The flowers are solitary in the axils of the leaves, tubular, yellow without, and orange brown within. The whole plant is acrid, aromatic and bitter. The root is tuberous, placentiform, hard and heavy when dry, more or less mammellated; on the under surface of a reddish-brown colour; on the upper surface are the remains of several stems or small pits showing where they were attached; on the under surface one central scar marking the attachment of the rootlets. The substance is very hard and horny and has a bitterish somewhat aromatic taste, and camphoraceous odour. Zarawand-i-gird, or mudahraj is considered by Persian writers on materia medica to be the female of *Aristolochia longa*. Meer Muhammad Husain tells us that at Ispahan it is called Nukhud-i-alwandi. Mahometan physicians describe it as resolvent, stimulating, pectoral, stomachic, cephalic; they prescribe it in jaundice and gout.

ZARAWAND-I-TAWIL (Pers. and Bomb.), ARISTOLOCHIACEÆ.

This is the imported root of the *Aristolochia longa*, Linn., a plant much resembling *A. rotunda*, and having a similar habitat. It differs from the latter plant in having petioled leaves, yellow flowers striped with brown, and a cylindrical root which has much the same taste and odour as that of *A. rotunda*. Mahometan physicians describe it as resolvent, deobstruent, diuretic, emmenagogue, alexipharmic and vermifuge.

CROTON OBLONGIFOLIUM, *Roxb.*, EUPHORBIACEÆ. *The root bark. Vernacular.*—BARAGACH (Beng.), GANASUR (Bomb.), GONSURONG (Goa).

History, Uses, etc.—The medicinal properties of the root of this tree appear to be little known. I have been unable to find any notice of the drug in works on Indian Materia Medica. Roxburgh, though he describes the tree as common in forests near Calcutta, is silent upon the subject. Dalzell and Gibson in the 'Bombay Flora' (p. 231), remark that "the plant is used medicinally by the natives to reduce swellings." When on a visit to Goa in 1876, my attention was drawn by the native doctors to the root bark of a small tree as being one of the most valuable medicines they possessed; this plant, unknown to me at the time, proved on subsequent investigation to be *C. oblongifolium*. The Goanese and the inhabitants of the Southern Concon administer the bark in chronic enlargements of the liver and in remittent fever. In the former disease it is both taken internally and applied externally. As an application to sprains, bruises, rheumatic swellings, etc., it is in great request. In large doses it is said to be purgative. Flückiger and Hanbury ('Pharmacographia,' p. 5-10) state that the seeds are said to be sometimes substituted for those of *C. tiglium*. The tree is rare in the Bombay Presidency, and has only been found in the Southern Concon. In Goa it is common.

Description.—Trunk straight; bark ash-coloured and pretty smooth; leaves petioled, alternate, and thickly set about the ends of the branchlets, spreading or drooping, oblong, serrate, obtuse-pointed, very smooth on both sides, from 6 to 12 inches long; petioles round and smooth, with a lateral gland on each side of their apices; stipules small, caducous; racemes terminal, generally solitary, erect, shorter than the leaves; flowers solitary, a few female ones mixed with many male ones, small, of a pale yellowish green; bracts three fold, one flowered, on the inside of each of the small lateral bracts is a round permanent gland, as in *Sesamum Indicum;* male calyx deeply 5 cleft; petals six, smaller than the calyx, very woolly; filaments twelve, distinct, nine in the circumference and three in the centre, woolly towards the base; female calyx and cord as in the male; stamens none; germ globular; styles three, each divided into two very long, variously bent segments; capsules globular, fleshy, six-furrowed tricoccous (Roxb.). The root is twisted, often somewhat flattened, bark thickish, externally light brown and scaly, internally yellowish, mottled with brown, substance compact and resinous; odour terebinthinate and highly aromatic; taste peppery and camphoraceous; wood white, compact and hard.

Microscopic Structure.—Sections of the bark show that the epidermis consists of about five rows of elongated cells placed horizontally, their walls are much thickened by a dark brown deposit which produces a patchwork appearance. The parenchyma is loaded with large globular or oval highly refractive bodies of a yellowish colour; there are also numerous dark purplish brown particles which are sometimes single, but usually arranged in irregular concentric rows. They appear to be due to a deposit in the vascular system of a resinous nature.

EUPHORBIA NERIIFOLIA, *Linn.*, EUPHORBIACEÆ. *The juice and root. Vernacular.*—SEHUND, THOHAR (Hind.), MANSASIJ (Beng.), NEWERANG, MINGUT (Bomb.), ILAIK-KALLI (Tam.).

History, Uses, etc.—This plant, called Snuhi in Sanskrit, is sacred to Mansá, the goddess of serpents. In some parts of India in July and August, on Tuesdays and Thursdays, the natives approach this tree with offerings of rice, milk and sugar, praying to be delivered from snake-bites. They also employ the root mixed with black pepper as a medicine for the cure of snake-bites internally and externally. Dutt informs us that in Bengal, on the fifth day after the full moon of the month Srawan, it is planted in the courtyard of Hindu houses and worshipped. The plant abounds in an acrid milky juice which is a popular application to warts and other cutaneous affections. The native doctors purify arsenious acid by packing it in a hole made in a piece of the stem, closing the hole and exposing the stem to the action of fire until it is charred. The milky juice of *E. neriifolia* is described by Sanskrit writers as purgative and irritant; it is usually administered internally by soaking other purgatives and aromatics in it, so that by absorption of the juice their purgative properties become increased.

A similar method is adopted when the juice is applied externally, a tent or issue pea being prepared with some finely powdered drug and steeped in it. Ainslie tells us that the native practitioners prescribe the juice as a purge and deobstruent in those visceral obstructions and dropsical affections which are consequent of long continued intermittent fever, the quantity given for a dose being about one-fourth of a pagoda weight (20 grs.). Externally, mixed with margosa oil, it is applied to limbs which have become contracted from rheumatism (Confer. 'Mat. Ind.,' vol. ii. p. 97). In Bombay the root is mixed with country liquor to make it more intoxicating, and the juice is used to kill maggots in wounds. There is also a curious custom here in connection with this plant. At the time of the Diwali the Hindus cut a portion of the stem, hollow it out, and fill it with oil in which they place a wick. The little lamp thus formed is lighted and carried from house to house with the object of depositing it unextinguished in the house of some friend or acquaintance, saying at the same time, "a son-in-law for you." That is wishing them good fortune (Nevadunga). The people of the house pretend not to want it and try to extinguish the light by throwing water at it. These lamps are also placed upon little heaps of cow-dung and worshipped. The author of the 'Makhzan-uladwiya,' under the name of Zakoom (Euphorbia), describes four Indian species, which are probably *E. antiquorum*, Linn., *E. neriifolia*, Linn., *E. nivulia*, Buch., and *E. tirucalli*, Linn. The milky juice of the first, he says, is mixed with the flour of *Cicer arietinum*, roasted and administered in pills as a remedy for gonorrhœa. It has a strong purgative action. The juice of the second and third species is heated and dropped into the ear for the cure of ear-ache; heated with salt it is given as a remedy in whooping cough, asthma, dropsy, leprosy, enlarged spleen, dyspepsia, jaundice, flatulence, colic, calculus, tumours, etc. The fourth species yields a milky juice having similar properties.

Description.—Shrubby, often arboreous; branches sharply five-angled, stipulary thorns; twin leaves, subsessile, oblong, about 3 inches long, appear in the rainy season; flowers greenish-yellow, February—March. The root is thick, soft and woody, often of considerable size and much contorted. Bark thick, of a light brown colour, warty and fissured, rootlets numerous, juice milky. The milk dries into a greyish waxy mass if collected, and the bark shrivels up and becomes papery like that of some other milky shrubs.

Chemical Composition.—The milky juice of the euphorbias mentioned in this article does not appear to have been chemically examined, but it probably differs little from that of *Euphorbia resinifera*, which yields the euphorbium of commerce, an article which is always obtainable in the Bombay shops under the name of Farfizun, and the chemical composition of which is described in Watts's 'Dict. of Chemistry.'

PHYLLANTHUS EMBLICA, *Linn.*, EUPHORBIACEÆ. *The fruit. Vernacular.* — ANVULA (Hind.), AMLAKI (Beng.), AVALKATI, AWLA (Bomb.), TOPPI (Tam).

History, Uses, etc.—The emblic myrobalan (in Sanskrit Amalaki and Dhatri) is an important article of the Hindu materia medica. It is used both fresh and dried; in the former condition it is considered to be refrigerant, diuretic and laxative, in the latter astringent. A sherbet of the fruit, sweetened with sugar or honey, is a favourite cooling drink for sick people; it is said to be diuretic. Emblic myrobalans are an ingredient in many compound preparations described in Sanskrit works. A selection of these prescriptions will be found in Dutt's 'Hindu Materia Medica'; the following translated from Chakradatta may be taken as an example:—

Dhátri lauha.—Take of powdered emblic myrobalans 64 tolas, prepared iron 32 tolas, liquorice powder 16 tolas. Mix them together and soak in the juice of *Tinospora cordifolia* seven times successively. This preparation is given in jaundice, anæmia and dyspepsia, in doses of from 20 to 40 grains.

Mahometan physicians esteem this myrobalan equally with the Hindus; they describe it as astringent, refrigerant, cardiacal, and a purifier of the humours of the body. It is much prescribed by them in fluxes, and is also applied externally on account of its cooling and astringent properties. The Arabic name is Amlaj and the Persian Amala. Ainslie tells us that the flowers, which have an odour resembling that of lemon peel, are supposed by the Vytians to have virtues of a cooling and aperient nature, and are prescribed in conjunction with other articles in the form of an electuary ('Mat. Indica,' ii., p. 244). In the Pharmacopœia of India it is stated, upon the authority of Dr. Æ. Ross, that the root by decoction and evaporation yields an astringent extract equal to catechu, both for medicinal purposes and in the arts; the chips of the wood or small branches thrown into impure or muddy water, according to the same authority, clear it effectually.

Description.—Fresh emblic myrobalans are globular, fleshy, smooth, six-striated, of a yellowish green colour, and sometimes as large as a walnut; they contain an obovate, obtusely triangular, three-celled nut, each cell of which contains two triangular seeds. The taste of the pulp is acid, astringent and somewhat acrid. The dried fruit is the size of a hazel nut, sub-hexagonal, wrinkled, of a grey black colour if it has been collected when immature, but yellowish brown if mature; the latter upon pressure breaks up into six parts, each of which consists of a section of the pulp and nut and contains one triangular brown seed. Two kinds of Aunla are found in commerce, one entire and the other cut up and the nut removed.

Commerce.—The fruit is collected in many parts of India. Value Rs 32 per kandy of 7 cwt.

HIPPION ORIENTALE, GENTIANEÆ. *Syn.*, STEVOGLIA ORIENTALIS, *Grisebach;* CICENDIA HYSSOPIFOLIA, *W. and A. Vernacular.* — CHOTA KIRAYATA (Hind.), MAMEEJWA (Bomb).

This is common in moist situations in many parts of the country. In Western India it abounds in Guzerat, but is rare in the Concon. Where abundant it appears to be generally accepted as a useful bitter. According to Cleghorn it is much used by the natives of Madras as a stomachic, as, in addition to its tonic properties, it is also somewhat laxative ('Indian Annals of Med. Sci.,' vol. iii., p. 272). *H. orientale* is brought to Bombay from Guzerat along with other simples. The plant is collected when in flower and tied up in small bundles which contain a pound or more.

Description.—Six to eight inches high, stem ascending, simple, four-sided, leafy from the base; leaves opposite, subsessile, linear-lanceolate, or oblong, three-nerved; calyx with bracts; the lobes obtuse, longer than the capsule; flowers small, white, sessile in the opposite axils, do not fall when the plant is dried. Taste strongly bitter.

GUL-I-GHÁFITH, GENTIANEÆ.

This is the name under which the flowering top of a small gentian are sold in the Bombay market

The drug is imported from Persia. Under the name of gháfith, Arabian and Persian writers describe a plant which they say is called in Latin *Eupatorœ*; it is thorny and has long, broad, fleshy leaves. The stem is said to be hollow and rough and to rise from the centre of the leaves; it bears violet or purple flowers. The whole plant is extremely bitter; it grows in the hilly districts near Shiraz. As a medicine it is said to be attenuant and deobstruent, especially useful in hepatic and splenic obstructions. It is also a valuable tonic and febrifuge and is said to have anthelmintic and emmenagogue properties. Applied externally it promotes the healing of wounds and sores. The gháfith or ghafis of Bombay consists of quadrangular flower stalks two to four inches in length, terminating when perfect in five flowers; one of these is terminal, the remaining four are in opposite pairs and on longish peduncles, with bracts as long as the peduncles. The corolla is funnel shaped, about an inch in length, erect, five-partite; calyx five-partite; stamens five, alternate with the corolline segments; style single; stigmas, two; fruit three-fourths of an inch long, one-celled, containing numerous small seeds; calyx and corolla persistent. The lower portion of the plant is sometimes to be found; it has the leaves of a gentian. The entire plant must be from six to eight inches high; it is very bitter. It would appear that this drug has been adopted as a substitute for the original gháfith of the early Arabian writers, which is by some considered to have been the *Eupatorium cannabinum*, or hemp agrimony, a tall plant with unbranched stems, downy leaves, and terminal crowded corymbs of dull pale purplish flowers. The description given above agrees pretty well with that of hemp agrimony, if we take thorny to mean hispid, as it sometimes undoubtedly does in Persian descriptions of plants. Value annas 3 per lb.

Kanturiyun, Gentianeæ (?).

Under this name small woody stems, from the tops of which spring numerous round, slender, jointed branches, are sold in Bombay. They come from Persia and are supposed by the Hakeems to represent the lesser centaury of the Greeks (*Erythræa centaurea*).

The stems in question are certainly not those of *E. centaurea*. They are round with tumid joints, which are furnished with bracts and resemble the stems of a grass. Towards the upper part the stem becomes obscurely angular, and terminates in a single flower or capsule about one inch in length and very much like that of *Ophelia multiflora*. The leaves are linear, like those of a grass. The whole plant is intensely bitter. Value annas 3 per lb.

Jintiyana, Gentianeæ.

Under this name gentian root imported from Europe is sold in Bombay and is generally accepted by the Hakeems as representing the gentiana of Pliny and Dioscorides. Mahometan writers describe jintiyana as having purplish flowers, and give pakhánbed as the Hindi synonym. The pakhánbed of Bombay is apparently the root of an iris, and is quite distinct from gentian. European gentian root is obtainable in the Bombay market for about ¼ Re. per lb.

(*To be continued*).

CARICA PAPAYA AND PAPAYOTIN.*

BY DR. THEODOR PECKOLT.

(*Concluded from page 346.*)

The Milky Juice.

This occurs in all parts of the plant, but in large quantity only in the unripe fruit, from which it disappears on ripening. But it is extremely troublesome to collect from the root, still more difficult from the stem, and the leaf stalks yield only traces. It is also very scanty in the colder months, and can only be obtained in somewhat remunerative quantities in the months from August to April.

The fruit whilst on the tree is scratched to the point longitudinally and sufficiently deep to pierce the skin; the juice then oozes through in drops and as soon as the drops become scanty another place must be wounded. If the fruit be removed from the tree in order to collect the milk only a few drops at the most will be obtained and even these frequently coagulate on the surface of the wound.

The fruit from which the milk has thus been taken ripens much more quickly than the unwounded fruit, and tastes as sweet, but is almost without juice and the ripe seeds do not germinate. From a medium sized fruit the juice was carefully collected, and as on the following day it yielded no more, the product was weighed in the previously tared glass and found to be 33 grams. The fruit then taken from the tree weighed 785 grams; it yielded therefore about 4 per cent. of milk, and considerable trouble was required in order to obtain from 30 fruit of similar size about a kilogram of milk. The cost of the fruit was of little consequence, as in Brazil a ripe fruit can be purchased for about three pence; but each fruit requires uninterrupted attention, as the drops of milk soon coagulate in the incision and require to be assisted through by means of fresh scratchings; add to this the inconvenience arising from the height of the tree, and the collection will be seen to be a troublesome and thankless work.

The milk of the green fruit at the time of its exudation resembles sheeps' milk; it has a strongly acid reaction and with three times its volume of water gelatinizes. It is odourless, tastes astringent and slightly bitter and has a specific gravity of 1·023 at 26° C.

Analysis I.—33 grams of fresh fruit milk were repeatedly shaken with ether, until a portion evaporated without residue. The ethereal solution when evaporated left behind a white wax-like fatty substance—*Mamao wax*. The residue insoluble in ether was exhausted with absolute alcohol and then with 80 per cent. alcohol; the alcoholic liquid distilled and evaporated left a soft resin, a light brown resin and extractive matter. The portion insoluble in ether and alcohol formed when dried a snow white powder. A little dissolved in water rendered it turbid, through floating flocks. The entire residue was dissolved in a little water and filtered; on the filter was left a caoutchouc-like substance, soluble only in carbon bisulphide, and traces of an albumenoid substance.

To the watery solution absolute alcohol was now again added as long as turbidity was produced, the precipitate collected on a filter, well washed with alcohol and dried over chloride of calcium. This product, as well as the similar one obtained in the following analyses, I have preserved in my collection as *Papayotin*. I would only now remark that this substance can effect the solution of albumen and flesh, which property I did not light upon in the reactions that I carried out at that time, and I did not guess that the substance could have such therapeutic importance. I will refer to the reactions subsequently.

* From the *Zeitschrift d. allg. österreichischen Apotheker-Vereines*, vol. xvii., pp. 361 and 373 (Aug. 20 and Sept. 1, 1879).

The dried papayotin weighed 2·590 grams and formed a brilliant white light amorphous powder, similar to magnesia carbonica.

The alcoholic liquor filtered from the papayotin gave still a very small quantity of extractive matter containing sugar.

Analysis II.—A quantity of milk was perfectly dried and the loss of moisture estimated. The viscous resin-like residue was completely exhausted with ether, and then with absolute alcohol and rectified spirit, and the solutions examined and weighed. The residue insoluble in these formed when dried a light brown powder, having an unpleasant faintly turpentine-like smell and weighing 5·388 grams. Dissolved in water and mixed with absolute alcohol it also gave a precipitate which when separated and dried formed a light brown powder, but it had lost the unpleasant turpentine odour. The papayotin had in this case, through the influence of heat, formed a substance that I have preserved in my collection as *Parapapayotin*, the reactions of which will be described subsequently.

Analysis III.—82 grams of fresh fruit milk were treated with four times as much cold distilled water, filtered from the insoluble portion (*a*), and the aqueous solution mixed with absolute alcohol as long as any turbidity was produced. The precipitate separated by filtration, washed with absolute alcohol, and dried over chloride of calcium, formed 3·085 grams of snow-white papayotin, not quite so light as in No. I.

The residue (*a*) was now exhausted first with spirit of wine, and the portion insoluble therein treated with cold and then with boiling absolute alcohol, and finally the portion still insoluble treated with ether and with carbon bisulphide. Results were obtained similar to those in Analyses I. and II. The alcoholic liquid from which the papayotin had been filtered was treated with a spirituous solution of acetate of lead and examined.

Analysis IV.—50 grams of milk were several times extracted with warm water, the filtered watery solution evaporated by a gentle heat to a syrupy consistence, and after cooling and again filtering precipitated with absolute alcohol and the precipitate dried over chloride of calcium. The papayotin weighed 2·152 grams, but was slightly greyish-white.

Analysis V.—Some milk was completely exhausted with cold and warm distilled water, the solution precipitated with tribasic acetate of lead, and the filtered liquid examined. The white lead precipitate was suspended in water and freed from lead by sulphuretted hydrogen; it was then divided into two portions, one of which was precipitated at once with alcohol, the other evaporated to the consistence of a syrup and then precipitated. The results were similar, except that the papayotin precipitated without evaporation was somewhat whiter than the other. The yield was 3·530 per cent.

In 100 grams of fresh fruit milk I found the following substances:—

Caoutchouc-like Substance	4·525 grams.
Wax-like Fatty Substance	2·424 „
Soft Resin	0·110 gram.
Light Brown Resin	2·776 grams.
Albumenoid Substance	0·006 gram.
Papayotin (average)	5·303 grams.
Extractive Matter (with disagreeable taste)	1·283 gram.
Extractive Matter (containing sugar)	1·059 „
Organic Acid (Malic)	0·443 „
Pectic Substance and Inorganic Salts	7·100 grams.
Moisture	74·971 „

Analysis VI.—Milk from the Stem.—The stem yields extremely little milky juice at any time, but this milk has more consistence than that from the fruit and resembles cream. With much trouble I obtained 13 grams of milk, which was shaken with distilled water and filtered; the dried resinous residue, containing caoutchouc, weighed 1·430 gram.

The aqueous solution treated with absolute alcohol in the manner already described and the precipitate dried over chloride of calcium, gave 0·515 gram of shining white papayotin, or equal to 3·961 grams. The alcoholic liquid yielded 0·580 gram of extractive matter, etc.

These are the results which up to that time (1868) I had obtained with the *Carica Papaya.* But as I now hoped to obtain the papayotin in larger quantities, in order to use it therapeutically, before closing this paper I made some experiments with fresh leaves and green fruit, in order to prepare this product in an easier way than from the milk which is so troublesome to collect.

Analysis VII.—Green Leaves.—1400 grams of fresh leaves bruised to a paste in a marble mortar, and pressed in a small hydraulic press, yielded 460 grams of dark-green juice, or equal to 33 per cent. The juice was treated with absolute alcohol until no more turbidity was produced, allowed to settle and filtered. The precipitate, containing chlorophyll, was well washed with alcohol and allowed to drain completely, then again exhausted with cold distilled water. A sample of the filtered liquid gave immediately upon precipitation with alcohol a mass of dirty impure papayotin. The aqueous solution was therefore treated with tribasic acetate of lead as long as a precipitate was produced, the precipitate separated, well washed with water on a filter, suspended in water and freed from lead by sulphuretted hydrogen, filtered and the colourless liquid evaporated at a temperature of about 50° to about one-half, filtered and precipitated with absolute alcohol. The precipitate separated and dried over chloride of calcium gave 0·550 gram of snow-white papayotin: equal to 0·117 per cent.

Analysis VIII.—Unripe Fruit.—Three green fruits, freed from seeds, weighed 1550 grams. When rubbed to a paste upon a fine iron grater and pressed they gave 730 grams of juice, which was filtered and precipitated with absolute alcohol; the precipitate was redissolved in a little water and again precipitated. The precipitate collected upon a filter and dried over chloride of calcium gave 1·820 grams of white papayotin, or 0·117 per cent.

In the preparation of papayotin the use of strong heating is to be avoided, in order to obtain a good looking and active product. It should not be dried by means of heat; even in the air it often forms upon the filter a mass, and this happens especially when heat has been used in the preparation. Drying over chloride of calcium is therefore recommended.

Neutral acetate of lead does not completely precipitate papayotin, and the tribasic acetate of lead is preferable. The precipitate ought not to remain too long in the alcoholic liquid, or the papayotin will partially form a smeary mass.

From the different modes of preparation the following quantities of papayotin were obtained from 100 grams of material:—

I. Milky juice of fruit, with cold ether 7·848 grams of papayotin.

II. Milky juice of fruit, with warm ether 5·338 grams of parapapayotin.

III. Milky juice of fruit, with cold water, 3·762 grams of papayotin.

IV. Milky juice of fruit, with warm water, 4·304 grams of papayotin.

V. Milky juice of fruit, with warm water and lead, 3·540 grams of papayotin.

VI. Milky juice of stem, with cold water, 3·961 grams of papayotin.

VII. Fresh leaves, with cold water, 0·039 gram of papayotin.

Juice of leaves, with cold water, 0·119 gram of papayotin.

VIII. Green fruit, with cold water, 0·117 gram of papayotin.

Juice of green fruit, with cold water, 0·249 gram of papayotin.

The finest papayotin I obtained according to Nos. I. and III., and from the milk from the stem. The papayotin prepared from the leaves almost equalled these, as did that from the fruit juice. Notwithstanding the small yield, the preparation from the leaves is the most advantageous, because the alcohol can be recovered and used for other purposes, whilst the leaves are to be obtained without cost in large quantities. Subsequent experiments have also made probable the utility of the extract from the alcoholic liquid.

I have now taken up the subject afresh, in order to examine more completely the fruit, leaves (fresh and dry), and stem bark, and shall possibly make some more therapeutic experiments.

Papayotin forms an amorphous snow-white non-hygroscopic powder, without smell, sweetish, faintly saline, astringent, but almost tasteless. Upon platinum foil it burns to ash with a peculiar smell. It is insoluble in ether, alcohol, chloroform, petroleum spirit, as well as in volatile and fatty oils. In glycerine and in water it dissolves readily. The aqueous solution lathers when shaken similarly to a saponin solution, has an acid reaction, and becomes turbid after twenty-four hours.

An aqueous solution gave the following reactions:—With alcohol, acetate of lead, mercuric chloride, tannic acid and solution of carbonate of soda, a white precipitate. With silver nitrate a white turbidity, immediately becoming yellow; after twelve hours the precipitate is deep yellow, and the liquid brown. Chloride of sodium gives no reaction, but with alcohol a precipitate. Perchloride of iron after standing some time gave traces of a yellow precipitate. Solution of iodine a light brown precipitate. Phosphoric acid, only after standing twenty-four hours, a white precipitate. Commercial potash and soda also gave a precipitate, only after a long time; less time was required by ammonia. With acetic acid, lactic acid, cupric sulphate and iodide of potassium no reaction. Trommer's sugar test coloured it a beautiful violet-blue, which after boiling became red-violet; there was, however, no reduction of cuprous oxide. With starch it gave no reaction, and no sugar reaction when boiled with starch. With fat oils it gave no reaction, even after continued boiling together.

The dried papayotin behaves towards reagents as follows:—It does not dissolve in acetic acid either cold or when heated, or even when diluted with an equal volume of water, and it behaves similarly towards lactic acid. In ammonia it is insoluble, and becomes coloured yellowish after some time; in potash and soda ley it is also insoluble, becoming brown. In nitric, as well as in hydrochloric acid, it gives a clear solution in which water produces no change and alcohol no precipitation. In sulphuric acid it does not dissolve, but is coloured yellowish. In phosphoric acid it is insoluble, but is dissolved upon the addition of water.

0·28 gram of papayotin, No. III., dissolved in water and mixed with 0·2 gram of roasted meat in a test-glass, disintegrated the meat in two minutes to a pulp, and at the end of ten minutes had perfectly dissolved it without the use of heat.

Papayotin, No. VI., from the milky juice of the stem, and No VIII., from the juice of the fruit, behaved with equal activity. Papayotin, No. 1, behaved similarly, but required in the cold fifteen minutes for solution, as did also No. VII. from the leaves.

1·3 gram of papayotin, No. IV., was dissolved in water and mixed with 0·8 gram of roasted flesh. Only after twenty minutes the flesh formed a pulp, and after three-quarters of an hour a partial solution; with the aid of a gentle warmth it still required ten minutes for a perfect solution. Papayotin, No. V., behaved similarly.

0·7 grams of the substance I have named "parapapayotin" (No. 3) were added to 0·4 grams of cooked flesh. Although after about twenty-five minutes the flesh had become disintegrated to a pulp, no solution was effected even when heat was applied.

Papayotin prepared by direct precipitation from the watery solution by alcohol is the most active and dissolves an equal weight of flesh and albumen. On the other hand, papayotin in the preparation of which the smallest amount of heat has been used is much weaker.

The most powerful preparation I have yet obtained was one in which the milk was allowed to drop from the fruit into glycerine. The glycerine appears to retard the decomposition of the milk and to diminish the troublesome gelatinization; the papayotin is also precipitated whiter and there is a larger yield. The glycerine solution keeps very well, and I have frequently used it therapeutically, as the amount of papayotin in the milk can always be calculated more or less approximately. I have used it many times in ailments of the stomach where pepsine was indicated with good results. When I did not use the glycerine solution I gave the dried papayotin in doses of 0·2 to 0·25 gram at each meal-time.

Coagulation of Milk.—Messrs. Gehe and Co., having obtained from me some *Carica Papaya* milk, noticed especially the property it has of curdling animal milk immediately, which induced me to make the following experiments:—

Some drops of milky juice falling direct from the fruit into a glass of unboiled cow's milk coagulated the milk only after a quarter of an hour.

The aqueous concentrated and filtered solution of the fruit milk dropped into cow's milk caused immediate coagulation.

Concentrated solution of papayotin added to milk coagulated only after an hour.

Boiled cow's milk behaved similarly.

For the sake of comparison experiments were made with the milky juices of other Brazilian plants which I had at my disposal in my garden; for instance: *Euphorbia antiquorum*, L., *E. cereiformis*, L., *E. hypericifolia*, L., *E. brasiliensis*, L., *E. pulcherrima*, Willd., *Ficus repens*, *Curcas multifida*, Endl., *Artocarpus incisa*, L. fil., and *A. integrifolia*, L.

Generally, the milky juices having an acid reaction coagulated cow's milk similarly to that of *Carica Papaya* the milky juices having a neutral reaction effecting coagulation only after a longer time. An exception was the clear water-like juice of *Curcas multifida*, which reddens litmus paper strongly, but does not truly coagulate milk, the milk forming after mixing a thick cream-like fluid, as if the casein were in concentrated solution. Even after twelve hours there was no separation of serum; a small quantity of clear watery liquid passed through fine filter paper, and the residue formed on the filter a white butter-like substance, which in the air dried to an odourless white pulverizable mass.

Uses of Carica Papaya.—The ripe fruit is eaten raw and with sugar, similarly to melon, or made into a confection with sugar and lemon juice and boiled for jam. The unripe fruit is peeled, freed from seeds, well washed, finely grated and boiled with sugar to a pulp. It is also cut into pieces and preserved with hot vinegar like gherkins.

In the province of S. Paulo a syrup is made by boiling the juice expressed from ripe fruit with sugar, which has a reputation as a sedative and expectorant. Dose, a tablespoonful every two hours. The milky juice taken internally is said to cause intestinal inflammation; but it is given in small doses against worms, especially ascarides, where an aqueous solution is to be preferred, and I have used it with extraordinary results.

Used externally for spots and as a wash for freckles it is said to make the skin smooth and delicate.

The pungent cress-like tasting seeds are also used as a vermifuge.

The fresh leaves have been used by the Indians since unknown times to wrap flesh in, in order to make it savory and tender. Further they are used as a washing material in the purification of linen, and a paste as a poultice for unclean wounds. The leaf-stalks are used as pipe stems and the bast for cord.

The root has a nauseous stale radish-like taste. I have not yet examined this certainly interesting part of the plant.

DRUG SMOKING.

BY REGINALD E. THOMPSON, M.D.

The following remarks and formulæ are extracted from a paper on "The Therapeutical Value of Drug Smoking," especially in reference to asthma, which appeared in the *Practitioner* for August:—

The chief difficulty in treating an individual case of asthma arises from individual peculiarities, which makes the choice of the appropriate neurotic a matter rather of hap-hazard selection, numerous experiments being sometimes necessary before an indication is obtained as to the special drug required; one drug will have a so-called magical effect in one case which may prove inert when used in another, and hence in endeavouring to meet the exigencies of a number of individuals it becomes necessary to combine a number of remedies, and such a combination of drugs becomes more universal in its application in proportion to its complexity, the chance of its proving effectual in any individual case being greatly enhanced by such a composition.

It is a matter of some difficulty to analyse with any certainty those mixtures of vegetable and other substances which are sold as remedies for asthma, but an examination of them shows conclusively that they are composite, different leaves being found on submitting any sample to microscopical analysis; some of them contain opium, others do not; most of them contain lobelia, and it may be stated with some certainty that all of them have stramonium for their basis.

If such remedies are tried in a number of cases it is surprising how one remedy at one time appears to be of the greatest service, another at another time; much depends, doubtless, upon the method of preparation and preservation, and upon the care with which the drugs are selected, and the best secret remedy I know (Himrod's) is evidently well prepared and preserved, the leaves of which it is composed being fresh and green.

Remedies for asthma are supplied in three forms: a powder which is burnt and the fumes of which are inhaled, cigarettes composed of tobacco combined with various drugs, or of paper dipped in a solution of the drugs.

The best method of preparing drugs for the powder form of remedy appears to me to be this: the leaves of the vegetables used should be procured in good condition and perfectly fresh; they should then be soaked in a solution of nitre (25 per cent.), and the leaves then dried by gentle heat and powdered. I have made use of the various neurotics in this manner in asthma, first separately, in order to ascertain the individual value of the remedy, and then in combination, and the experiments have now been carried on for many months, and I am disposed to place them in the following order of merit:—

Opium.
Stramonium.
Cannabis Indica.
Conium.
Lobelia.

The three first on the list appear to be the most potent by fumigation, but when administered in the wet method (if I may use the term) cannabis indica is so uncertain and so apt to produce delirium, especially in women, that I prefer conium, a drug from which I have obtained extremely good results when administered by the mouth.

With belladonna I could not satisfy myself that any good results were to be obtained by fumigation, and I consider it far inferior to those given above in whatever way it is administered.

The powder may be used by those patients who are not accustomed or object to smoking cigarettes, or it may be added to the tobacco of those who prefer the use of the pipe.

As regards the composition of the powder, I have had good results from gr. ix. of stramonium and gr. i. of cannabis indica, this being a quantity, which will cover a shilling, sufficient for one fumigation.

But if the patient does not object to smoking, I much prefer to administer the remedies in the form described in my previous paper, namely, paper cigarettes impregnated with tinctures so that the dose may be accurately apportioned.

It will be understood that in suggesting remedies which serve to alleviate the spasmodic dyspnœa of asthma I do not consider that they constitute a mode of treatment calculated to improve the general condition of the patient, or that they are more than palliatives of an urgent symptom: constitutional treatment by ferruginous tonics and cod-liver oil, or it may be by iodide of potassium or arsenic, must be resorted to, if it be intended to give the asthmatic patient permanent relief from distressing disease. With acute conditions of the disease, with bronchial complications of such a nature as to contra-indicate the use of iron, there is probably no treatment better for a majority of cases than the use of iodide of potassium with stramonium; in many cases of like character I have derived very good results from the administration of hemlock in combination with the hypophosphite of soda, but for the prevention of the disease I know no treatment to compare with iron and cod-liver oil.

But for soothing and diminishing the dyspnœa, neurotics may be used with great effect, and the following combination is that which, up to this time, has given me the best results.

The same form of cigarette is used as described in my former contribution on this subject, and the paper is soaked in the following drugs according to the recipe here given:—

Extract of opium	gr. $\frac{1}{64}$.
Extract of stramonium	gr. $\frac{1}{32}$.
Tincture of Indian hemp	♏ $\frac{1}{2}$.
Tincture of hemlock	♏ $1\frac{3}{4}$.
Tincture of lobelia	♏ $1\frac{3}{4}$.
Tincture of tobacco	♏ 9.
Oil of anise	♏ $\frac{1}{8}$.
Nitre	gr. $\frac{1}{4}$.

Or for a sheet of Swedish paper sufficient to make sixty-four cigarettes the formula may be given thus:—

Tincturæ tabaci	ʒ x.
Tincturæ conii	ʒ ij.
Tincturæ lobeliæ	ʒ ij.
Tincturæ cannabis Ind.	♏ xxxij.
Extract. opii	gr. i.
Extract. stramonii	gr. ij.
Olei anisi	♏ viij.
Potassæ nitratis	gr. xvi.
Spir. v. r.	ad ℥ iiss.

This formula, which is a complex one, has only been obtained from repeated experiments, leading step by step to the addition of some effective remedy, and to the elimination of less effectual drugs.

As it is sometimes desirable not to give opium or Indian hemp, I have had cigarettes made with stramonium and lobelia only; so that altogether I have three different kinds for use: opium cigarettes containing a small quantity of opium and stramonium; a compound opiated cigarette containing the drugs given in the formula above, and a stramonium cigarette without opium.

CALOMEL AND CORROSIVE SUBLIMATE.*

Much has been said and written about the decomposition of calomel in such compounds as pills, powders and mixtures. We have been told that bichloride of mercury can be formed if calomel is mixed in the dry state with sugar, bicarbonate of sodium, sugar of milk, when such compounds are kept for months, or in less time in aqueous mixtures containing magnesia or bicarbonate of sodium. Others, again, have told us that experiments and researches had shown that in such compounds no bichloride was formed even after a long time.

What in most cases has been overlooked by the latter writers is the effect of the atmosphere.

The atmosphere in drug stores contains very often vapour of ammonia, etc., and may in one corner of the store be more moist or contain more fumes of ammonia, etc., than at other corners or sections of the room, and such vapours and gases may, under certain circumstances and when least suspected, affect compounds containing calomel.

Suppose a glass-stoppered bottle, containing a preparation of calomel, is opened for the purpose of dispensing some of its contents, air will be admitted into the bottle, and if such air is contaminated with ammonia, nitrous acid, ozone, etc., these gases will be brought into contact with the calomel.

Dr. H. Hager gives his opinion and the rules for keeping preparations containing calomel in the following:

"Calomel should be kept in well closed glass or porcelain vessels, protected against the light. Neutral or acidulous aqueous mixtures containing calomel should not be kept longer than one week. The presence of bichloride of mercury in powders of sugar and calomel has been proved after such powders had been kept for a longer time. Most vegetable substances show a more or less acidulous reaction, and therefore offer so much the greater a chance for the formation of corrosive sublimate.

"In trying to prove by experiments that no corrosive sublimate had been formed in such cases as above referred to, all the circumstances and the effect of the atmosphere have not been taken into consideration.

"It is unquestionable that prudence requires calomel in composition with organic substances to be kept no longer than one week, or such compounds kept longer than one week not to be dispensed.

"The transformation of calomel into corrosive sublimate will in dry compounds be restrained by the presence of carbonate of lime or carbonate of magnesia."

These rules should be observed and adhered to, but above all, attention should be paid to the preparing of powders and pills containing calomel or corrosive sublimate.

In making these pills a prolonged contact of the mass with iron vessels or spatulas should as much as possible be avoided. Too often such masses are left too long in an iron mortar, or in so-called porcelain-lined dishes, which are so defective that the porcelain lining is worse than none, if the lining ever was porcelain. Dishes and iron kettles are found too often to be lined with lead compositions instead of porcelain.

If the mass is beaten in a porcelain mortar, attention should be given to the spatula and the pill-cutting machine.

If calomel pills are divided with cutting plates of brass, just brightly polished, the calomel on the outside of the pill will always be decomposed, as every one can see on pills made of a white mass of calomel; black oxide of mercury and an amalgam of mercury with the metals of the brass being formed. The formation of black oxide of mercury on the outside of pills can be avoided to a great extent if no brightly polished brass cutting plates are used. The brass cutting plates should not be polished with any polishing powder; a good washing with water, or, if resinous substances are adhering to the brass, a washing with alcohol and a rubbing with a piece of cloth only, should be given.

It is evident that in pills which have not been dried out well the decomposition of calomel will proceed more rapidly than in such as have been perfectly dried. A carefully prepared pill, containing calomel, if perfectly free from moisture and properly protected by an outside coating against light and the action of the atmosphere and then enclosed in well corked bottles, may be as good after months as when first made.

If calomel powders are mixed in a porcelain mortar care should be taken not to use a spatula of iron or of steel which has not been properly tempered, for if the steel is too soft black stripes can be seen in the mortar where the soft iron or steel passed along, forming black oxide of mercury and metallic mercury in the calomel.

If pills of corrosive sublimate have to be made, too much care cannot be exercised in the selection of the utensils used for their preparing. A porcelain mortar and a horn spatula should be employed, and such pills should be divided on cutting plates made of wood or horn, and not used for any other but corrosive sublimate pills. It is a common thing to see a pill mass of corrosive sublimate scraped together with a steel spatula and cut on a brass cutting machine, or cut into pills on a porcelain or glass pill tile with a steel spatula. In all these cases black oxide of mercury and the metal itself can be seen on the steel and brass. Separate horn spatulas are the best for making calomel powders and pills, as well as pills of corrosive sublimate.

The decomposition of calomel has been deemed of such an importance that the eminent Dr. H. Hager has repeatedly written about it. We have quoted above from an article written by him in reference to calomel, and concluding these remarks we invite the earnest attention of all pharmaceutists to the matter.

Jolly has shown that corrosive sublimate was formed in a dry compound of calomel with sugar containing traces of lime. Vulpius found corrosive sublimate in a dry compound of calomel with carbonate of sodium and sugar of milk, and especially in compounds of cane sugar and bicarbonate of sodium, also in aqueous mixtures of the same. These researches prove that the atmosphere of a drug store, contaminated with ammonia and other gases, will not be indifferent to compounds of calomel, and the daily experience of the dispensing pharmaceutists shows that iron and brass should not be brought into contact with masses and compounds of corrosive sublimate or calomel.

* From the *Druggists' Circular and Chemical Gazette*, October, 1879.

FOLIA CAROBÆ.*

The *Pharmaceutical Zeitung*, Bunzlan, Berlin, publishe the following communication by Dr. Ottokar Alt, Hamburg:—

My attention was first called to this drug by Mr. Camillo Weber, licensed apothecary of Leipzig, Rio de Janeiro and Montevideo, who is now engaged in business in Hamburg. During his sixteen years' residence in Brazil and South America he has seen the carobæ employed by the resident physicians in the various forms of syphilis with the happiest results, and he induced J. von der Heide, apothecary of this city, to introduce it here (Hamburg). In my large practice I had ample opportunity to employ it, and I am so extremely well satisfied with the results that I take the liberty of calling the attention of my colleagues to this comparatively new drug. The results of the employment of the drug were favourable in all the forms of syphilis, but they were really surprising in old syphilitic eruptions, and with patients who had taken large quantities of mercury.

In cases which were accompanied by pains in the limbs the carobæ was borne well with an addition of iodide of potassium. In Brazil the carobæ is considered one of the best alteratives, diuretics and sudorifics, with most extraordinary tonic properties.

I will add a few words about the leaves. The drug

* *New Preparations*, reprinted from the *Pharmacist* for October, 1879.

which is known as corabæ comes from Brazil, and consists of long, ovate leaves, dark green above and light green beneath, and strongly veined.

The leaves are derived from a tree, which, according to Sprengel, is the *Jacaranda procera*, and belongs to the family of *Bignoniaceæ*. It attains a height of thirty to forty feet; its root is externally of a dark red, internally of a whitish-yellow colour; its stem is considerably branched; the flowers are red and white in beautiful terminal cymes and have an agreeable honey-like flavour; the fruit is a woody bivalved capsule, containing several winged seeds. The aborigines of Brazil, and more particularly their medicine men (called Curanderos), have long known the beneficial effects of this tree, and finally the attention of Brazilian physicians was called to it. Joan Alves de Canerio, an eminent physician, submitted it to the Academy of Medicine at Paris, upon which it was taken up in the Materia Medica. The various and elaborate experiments made by Drs. Carron de Villard, Bompani, Santo, Barros Pimental, and by Messrs. Level, Spicks and Martins (the latter of whom has given the tree the name of *Cybistas Antisyphilitica*), have been crowned with the most complete success. It was also found that the carobæ produces appetite: it was first given in the form of a decoction, 8 grams of leaves to 360 grams decoction *pro die*. Syphilitic ulcers were sprinkled with the powder of the leaves or painted with a concentrated extract. Diseases of the skin were treated by lotions or baths with simultaneous internal applications. I owe these communications to the above named Mr. C. Weber, who was called upon by Drs. Santo, Barros Pimental and Bompani to make a preparation that would keep and obviate the tedious manipulation of making an infusion. He thereupon made an aqueous alcoholic extract which was free from all inert matter likely to ferment; the preparation, which keeps well, contains in fifteen grams one half gram soluble extract matter. The small addition of alcohol gives it a pleasant, wine-like taste.

This extract is everywhere well received, and is also prepared here (in Hamburg). The dose is a tablespoonful three times a day in water.

NICOTINE AND NICOTINIC ACID.*

BY R. LAIBLIN.

The following modification of Schloesing's process for preparing nicotine is recommended:—Coarsely-cut tobacco is digested for a day with cold water, and the mixture subsequently boiled by injection of superheated steam, filtered, and the residue pressed. The same series of operations is repeated, and the mixed filtrates are evaporated to one-third of their volume. A quantity of lime, one-tenth of the weight of the tobacco used, is now added, and the mixture distilled by a current of steam as long as nicotine (recognized by its odour) comes over. The distillate is exactly neutralized by oxalic acid, the amount used being noted, and evaporated to a thin syrup. The exact amount of potash necessary to neutralize the oxalic acid is now added, and the crude nicotine which separates is collected. The remaining liquid is exhausted with ether, and the nicotine thus extracted added to that first obtained. That portion of the crude base which distils over below 250° is converted into oxalate by adding powdered oxalic acid to its ethereal solution; and the purified oxalate, which separates as a syrup, after being washed with ether, is disolved in water and again decomposed with potash as above. The product is finally heated to 110° for six hours by a paraffin-bath, and a slow stream of dry hydrogen passed through it to remove ammonia, ether, and water. The temperature is then gradually raised to 210° to complete the removal of the water, and on fractionally distilling the residue, pure nicotine comes over between 240—242°. It must be preserved in sealed tubes. One centner of tobacco thus treated yielded 600 grams of pure nicotine ($=1\frac{1}{2}$ per cent.), besides impure base.

Nicotine is not decomposed into well-defined simpler bodies by heating with hydrochloric acid at 280–300°. No addition product is formed by the action of nascent hydrogen on the brominated hydrobromide, $C_{10}H_{13}N_2Br_5$.

Nicotine is readily oxidized by potassium permanganate in the cold, but only when the salt is added to its solution as long as it is decolorized is it possible to obtain crystalline oxidation-products. By employing a suitable process, which is fully described, potassium carbonate and nicotinate are the sole products found. The nicotinate is dissolved out by absolute alcohol, and converted into silver salt by precipitation. Nicotinic acid may be obtained from this by decomposing it with hydrogen sulphide.

Nicotinic acid was first obtained by Huber, by oxidizing nicotine with chromic mixture, and was subsequently recognized by him as *carbopyridenic acid*, $C_5H_4N.COOH$ (*Ber.*, 3, 849). Weidel also (*Annalen*, 165, 328), by acting on nicotine with nitric acid, obtained an acid which he identified with Huber's and which the author, by a crystallographic comparison of salts, proves to be identical with his own; he, however, assigned to it the formula $C_{10}H_8N_2O_3$. By analyses of the acid and a variety of its salts (silver, calcium, potassium) and other compounds with hydrochloric acid and auric and platinic chlorides, the author decides in favour of Huber's formula. He also shows that when nicotinic acid is distilled with soda-lime, it yields a quantity of pyridene nearly equal to that which might be expected from a carbopyridenic acid. Moreover, nicotine yields carbopyridenic acid in almost molecular proportion.

Nicotinic acid forms crystalline compounds with hydrochloric and hydrobromic acids, of the formula,

$$C_6H_5NO_2.HCl \text{ and } C_6H_5NO_2HBr.$$

Ethyl chlorocarbonate acts violently on pyridene, but does not form ethyl nicotinate; the only products are ethyl chloride, ethyl carbonate, and pyridene hydrochloride. Neither is ethyl nicotinate formed by acting with ethyl iodide on silver nicotinate. When the compound of nicotinic chloride with hydrochloric acid (see below) is treated with absolute alcohol, a violent action occurs, and the product evaporated in a desiccator deposits crystals of nicotinic acid hydrochloride. The mother liquor from these crystals gives with caustic soda an oily liquid, probably containing the ether, which no doubt existed in combination with hydrochloric acid.

If nicotinic acid, or better, potassium nicotinate, is treated with phosphorus pentachloride, energetic action ensues, and a volatile crystalline compound sublimes, the analysis of which corresponds approximately with the formula $C_5H_4N.COCl.HCl$. This chloride is insoluble in ether, chloroform, benzene, and petroleum-ether. When heated with water it is reconverted into nicotinic acid; but no amide could be formed from it by the action of ammonia.

When the double chloride of zinc and nicotine,

$$C_{10}H_{14}N_2.2HCl + ZnCl_2 + 4H_2O,$$

is distilled with soda-lime, a large quantity of gas is given off, containing ammonia, methylamine, free hydrogen, and traces of hydrocarbons. The liquid distillate consists principally of nicotine, but contains also a considerable quantity of pyrrol, which was separated by fractional distillation, and analysed as the cadmium double salt. By carefully adding water to the fraction 245—270°, containing much nicotine, an oily liquid was separated, which, when dissolved in hydrochloric acid and fractionally precipitated by platinic chloride gave a carmine-red easily decomposable double salt, $(C_{10}H_{11}N.HCl)_2.PtCl_4$. The free base is a yellowish liquid of extremely penetrating and repulsive odour, boiling between 250—270°. The smallest quantity of it, dissolved in hydrochloric acid, gives an intensely red solution when boiled with platinic chloride. It is probably formed from nicotine by the direct separation of ammonia, $C_{10}H_{14}N_2 - NH_3 = C_{10}H_{11}N$.

* *Liebig's Annalen*, 129—182. Reprinted from the *Journal of the Chemical Society*, October, 1879.

The Pharmaceutical Journal.

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COUNSEL'S OPINION ON THE INTERPRETATION OF THE DENTAL ACT.

THE evident signs of party feeling manifested in the letters relating to the subject of "Registration under the Dental Act" render the encouragement of any further discussion of this subject as undesirable as it is, we think, unnecessary for the purpose of proving that the registration of chemists and druggists who had been in the habit of extracting teeth was but a wise precautionary measure for preventing their being interfered with for so doing after the Act came into force. Some addition, however, has lately been made to the opinions expressed on the provisions of the Act which it will be desirable to place before our readers for their information.

The British Dental Association has submitted to an eminent legal authority certain questions respecting some sections of the Act, and by the courtesy of MR. JAMES SMITH TURNER, the Honorary Secretary of that Association, we have been furnished with a copy of the answers to these questions. Perhaps the opinion which is of most import for consideration is the one to the effect that "the *occasional* performance of one class of dental operations, such as the extraction of teeth, does not constitute *bonâ fide* practice of dentistry." In regard to this opinion we would remark that it distinctly avoids the point of most importance in its bearing upon the claim of chemists and druggists to be registered under the Act, and this, we think, is shown by the use of the word we have italicized. The claim of chemists and druggists to registration was urged not upon the ground that they "occasionally" extracted teeth, but because they had habitually carried on that practice as part of their business. In doing so, they acted as "dentists," and having regard to the unquestionable object of the Dental Bill to restrict the practice of dentistry, there was good reason to apprehend the practice of extracting teeth by chemists and druggists might have been interfered with, if they did not become registered.

It is a mistake to suppose that the chemists and druggists so engaged ever offered any opposition to the Dental Bill: the fact is they merely claimed a recognition of their rights as having been engaged in the *bonâ fide* practice of dentistry long before the Bill was introduced into Parliament, and it was to provide such a recognition that the amendment relating to the practice of dentistry in conjunction with pharmacy was introduced into the Bill.

Chemists and druggists do not as a rule seek to compete with those dentists who claim to be perfect because they carry out all the mechanical and constructive operations connected with the art which in their opinion alone makes it worthy to be termed "dentistry." Some chemists and druggists may do even this much, however, with credit to themselves as well as satisfaction to others, but the great majority have little to do with the art of supplementing dental deficiencies, and they are essentially dentists only in the popular sense of extracting or stopping the teeth which have been acquired in the ordinary course of nature.

Another of the legal opinions given in reply to the questions of the British Dental Association is to the effect that a person, who—being at the passing of the Act engaged in the practice of dentistry, and also in some business not mentioned in the Act—declared himself to have been engaged in the practice of dentistry separately, is liable to have his name erased from the Register. That is to say he would, according to this opinion, be held to have obtained registration improperly. If, therefore, the amendment relating to the practice of dentistry in conjunction with pharmacy had not been made part of the Act, a person engaged in the business of a chemist and druggist could not have obtained registration and with that the right to call himself "dentist," however much his practice of dentisty had conformed to the standard of perfection which some now seek to maintain is alone worthy of recognition.

It seems therefore evident that chemists and druggists who at the time of the passing of the Dental Act were engaged either in the extraction of natural teeth or the provision of artificial ones were right in their apprehension that this part of their business might be interfered with by the provisions of the Act, if they did not obtain the registration that would admit of their continuing to call themselves dentists as they had previously done. The action taken with that object was merely a reasonable protection of rights that had been obtained by usage, and that were on that account entitled to respect, notwithstanding any reasons there might be for regarding the organization of the dental art as desirable so far as the future was concerned. Nor can we, apart from these considerations, conceive it possible to have any more thorough justification of the course taken in this matter by the Council of the Pharmaceutical Society on behalf of chemists and druggists than the above-mentioned opinion of counsel on the interpretation of the Act. In saying this much we do not at all desire it to be inferred that we sympathize with persons who may have obtained registration as dentists by improperly representing their connection with pharmacy in a manner that will not bear the test of *bona fides*; but it is the business of the Registrar under the Act to deal with such cases according to their merits.

INSPECTION OF APOTHECARIES' WEIGHTS AND MEASURES.

Our readers will probably have noticed that at the last meeting of the Council the President drew attention to a Government paper describing the denomination, shape and material of local standards of apothecaries' weights and measures. The fact that this paper has been issued will suffice to indicate that progress is being made towards carrying out the provisions of the new Act in regard to the inspection of apothecaries' weights and measures used in pharmacy, and that before long it may be expected the local inspectors will be at work subjecting chemists and druggists' weights and measures to examination. It is therefore advisable that attention should be at once given to this matter in order to avoid liability under the 25th section of the Act, which provides that every person who has in his possession for use for trade any weight, measure, scale, balance, steelyard or weighing machine which is false or unjust shall be liable to a fine of £5, and in the case of a second offence to a fine of £10.

In the paper now issued by the Government, directions are given by which local authorities will be enabled at once to obtain the standards requisite for testing and verifying weights and measures, and in our next issue we purpose giving a statement of the chief points of these directions, with wood cuts illustrating the several standards, and any other information that can be obtained on the subject. It is also intended that at the next Evening Meeting of the Society in December a set of standard weights and measures shall be placed upon the table to show the mode in which the verifications of weights and measures is to be carried out in practice.

We have reason to believe that in some instances the weights and graduated measures sold for pharmaceutical purposes are far from being so correct as they should be, even when new, and consequently it may readily happen that serious inconvenience and annoyance might arise if such weights and measures came under the examination of the inspectors under the Act. We cannot therefore too strongly urge upon chemists and druggists the necessity of protecting themselves in this respect by giving immediate attention to the verification of their weights and measures. The duty of providing means for such verification belongs to the local authorities of every county and borough, by whom also times and places are to be appointed when the inspectors are to attend for the purpose of verifying and stamping weights and measures sent to them for the purpose. In regard to this function of the local authorities, it is provided by section 29 of the Act that any person who uses, or has in his possession for use in trade, any measure or weight not stamped as required shall be liable to a fine of £5.

PETROLEUM TESTING.

We have received some inquiries respecting the new form of test and apparatus for testing the inflammability of petroleum, in accordance with the new Act that is to come into force on January 1, 1880, but are not yet able to give any information on the subject inasmuch as we find that the statement made in a note appended to the Act, that "a model apparatus is deposited at the Weights and Measures Department of the Board of Trade,"* does not yet represent the fact indicated, but we have been promised information that will enable us very soon to satisfy the requirements of our correspondents.

PROVISION FOR ORPHANS.

At the last meeting of the Council it was decided, on the recommendation of the Benevolent Fund Committee, to render assistance in securing the election of Hugh Peter Victor Wiggin for admission to the London Orphan Asylum, Watford, in January next. This child is one of five left unprovided for through the death of Mr. John Wiggin, Pharmaceutical Chemist, of Ipswich, who was more than thirty years a member of the Pharmaceutical Society. Another case is that of Edward William Hall, who seeks admission to the British Orphan Asylum, Slough. This child is one of four left unprovided for by Mr. Frederick George Hall, who was formerly in business as a Chemist and Druggist at Brompton. Subscribers and others willing to assist the Council in securing the election of these children are requested to send proxies to the Secretary, Mr. Elias Bremridge, 17, Bloomsbury Square, W.C.

MUNICIPAL HONOURS.

Among the gentlemen who have been elected to the honourable office of Mayor for the municipal year just commenced, we notice the names of Mr. William Ballard, Pharmaceutical Chemist, Abingdon, Mr. Charles W. Jones, Pharmaceutical Chemist, Carmarthen, and Mr. Herbert J. Orchard, Local Secretary of the Pharmaceutical Society, Newport, Isle of Wight.

THE MEETING OF THE SOCIETY OF ARTS.

The opening meeting of the session will be held on Wednesday next, November 19, when an address will be delivered by the Chairman of the Council, Lord Alfred S. Churchill. At the ensuing meeting, the unsavory, but important subject of London sewage will be dealt with by Major-General Scott. On December 3, "Scientific and Unscientific Apprenticeship" will be the subject of a paper by Mr. Thompson, Professor of Applied Physics at University College, Bristol. Among the subjects likely to be of interest to our readers that will be brought forward at the meetings after Christmas, we may mention "Domestic Poisons," "Gas Furnaces and Pottery Kilns," "Utilization of Slag" and "Explosive Agents." The first course of Cantor lectures is to be given by Dr. C. Graham, on the "Chemistry of Bread and Bread Making;" the second course by Mr. Bolas, on the "Manufacture of India Rubber and Gutta Percha."

* See *Pharm. Journ.*, *ante*, p. 199.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The third general meeting of the thirty-first session was held at the Royal Institution on November 6. The President, Mr. Charles Symes, Ph.D., in the chair. The minutes of the previous meeting were read and confirmed. The following donations were announced:—The current number of the *Pharmaceutical Journal*, from the Society, the *Analyst*, from the editor, and the 'Registers of Pharmaceutical Chemists and Chemists and Druggists' from the Pharmaceutical Society. The President announced the purchase of the following books for the library:—Roscoe and Schorlemmer's 'Inorganic Chemistry,' in 3 vols., Schorlemmer's 'Organic Chemistry,' in 1 vol. Mr. J. M. Carter was elected an Associate.

The President announced that arrangements were in progress for holding the associated *soirée* of the literary, scientific and art societies of Liverpool, in St. George's Hall, on Wednesday, December 10, next, and requested members to assist as much as possible in the collection of objects of interest for exhibition on the occasion.

The Vice-President, Mr. A. H. Mason, F.C.S., exhibited a specimen of vincetoxicum root (*Asclepias vincetoxicum*), which had been taken from a bale of senega root, and was used on the continent as an adulterant of senega, hellebore and valerian roots. He said that good western senega root as imported from America was not adulterated, but some roots which were shipped to London from Brussels last year were found to be adulterated with this substance. A most interesting paper had been written by Mr. E. M. Holmes, F.L.S., entitled, "An Adulteration of Senega," published in the *Pharmaceutical Journal*, November 9, 1878.

Mr. Edward Davies, F.C.S., F.I.C., made a most interesting communication on "A Proposed Popular Milk Test," to which attention had been called by Mr. J. Hallawell, at the previous meeting. The communication gave rise to a somewhat prolonged discussion, in which the President, Messrs. Abraham, Hallawell and Mason took part.

The President then called upon Mr. A. H. Mason, F.C.S., to read the paper for the evening, on—

Thymol and Menthol.

BY ALFRED HENRY MASON, F.C.S.

My interest in the subject of this paper has arisen from the following circumstance:—Menthol was required, and an order sent to two of the leading manufacturers of pharmaceutical chemicals in London for some; one supplied a liquid, the other a crystalline substance. Which was correct? To an abrupt question, What is menthol? I received the following reply: Menthol is the crystalline principle of oil of peppermint as thymol is of oil of thyme. And such is a natural reply, though not correct. Thymol is of interest to the members of this Association from the fact that a sample was first exhibited in this country at the meeting of the Pharmaceutical Conference in Liverpool, 1870, by one of our honorary members, Mr. H. Sugden Evans; and secondly, from the fact that the source of the thymol of commerce, which is the fruit of *Ptychotis Ajowan*, comes to our market.

A full description of this fruit is given in Flückiger and Hanbury's 'Pharmacographia' (page 269), but the following information supplied by the exporter to the broker here may be of present interest:—

"Ajowan seed comes principally from the Ahmebabad, but also from above the ghauts Khandish, etc. The ordinary crop amounts to about 2000 candies, that is, 6000 cwts., but last year's crop was deficient, amounting in all to not more than 2400 cwts. The seed arrives in the Bombay market in February and March; it possesses an aromatic smell, and rather a warm, pungent taste, and Burjorjee informs us that it is an excellent remedy for flatulent colic."

In confirmation of this statement, I refer you to a paragraph in the *Pharmaceutical Journal*, February 22, 1879, page 694.

"Some reports appear to have gained currency in Germany that the *rôle* of thymol is nearly played out. But these are met by Messrs. Metzner and Otto in their 'Bericht,' by the statements that during the months of September and October, 1878, their house alone sent out more than a ton of it, that the works are occupied day and night in its preparation, and that the demand for thymol and thymol wadding is greater than ever. This firm appears to use the seeds of *Ptychotis Ajowan* as the source of thymol, but they state that they have advices that not only has the price of these seeds advanced through a bad harvest, but also by the increased consumption of them in India by the natives during the very sickly season of last year."

According to Watts:—Thymol ($C_{10}H_{14}O$), thymylic hydrate, thymylic alcohol, thymylic acid, camphor or stearoptene of thyme oil, is the oxygenated constituent of thyme oil, isomeric with cymylic alcohol, and homologous with phenol. It was first obtained from thyme oil by Doveri, and afterwards examined more particularly by Lallemand; it appears to be identical with the stearoptene of the volatile oil of horse mint (*Monarda punctata*), which was examined by Arppe, and with that of the oil of *Ptychotis Ajowan*, an East Indian umbelliferous plant, examined by Stenhouse, also by Haines. Thymol is obtained from these sources by fractional distillation and recrystallization from alcohol.

From Oil of Thyme.—Thymol crystallizes in rhomboidal plates with angles 97° 30′, striated parallel to the lateral faces and often aggregated into irregular six-sided tables. From oil of *Ptychotis Ajowan* it crystallizes (according to Miller) in rhombohedral crystals, from alcoholic solution in thin plates, which appear monoclinic in consequence of the great development of rhomboidal faces.

Thymol has a mild odour, which (according to Lallemand), is quite distinct from that of thyme oil, and an aromatic peppery taste. In the solid state it is somewhat heavier than water; specific gravity, 1·0285; in the liquid state rather lighter. It does not act on polarized light. Its melting point is variously stated. According to Lallemand it melts at 44° to a colourless liquid, and remains fluid for a long time after cooling, but if pure it solidifies immediately when touched by a solid body. According to Arppe it melts at 48°, and does not solidify till cooled to 27°. Thymol from ajowan melts according to Haines at 53°; according to Stenhouse at 44°. Thymol from thyme boils at 230° (Doveri and Lallemand), from ajowan at 222° (Stenhouse). Thymol dissolves in about 300 parts of water, easily in alcohol, ether and strong acetic acid, and is not precipitated from the alcoholic solution by water. It is not altered by aqueous ammonia, but takes up a large quantity of gaseous ammonia, becoming liquid, but resolidifying after the ammonia has escaped. It dissolves in aqueous potash and soda, forming compounds which are soluble in water and in alcohol, but are very unstable, being decomposed by acids, even by carbonic acid of the air, with separation of thymol.

In the *Journal of the Chemical Society*, vol. xvii., there is published an elaborate paper by Dr. Gladstone, in which he reports his examination of the physical and chemical properties of different essential oils. Of thyme, he says, "This oil from *Thymus Serpyllum* is deep red in colour. The specimen examined was principally composed of a hydrocarbon, like that of turpentine. It contained little, if any, of the thymol, $C_{20}H_{14}O$, which has been described by Doveri and Lallemand as occurring in this essential oil. The hydrocarbon has been named thymene."

Of mint, he says, "*Mentha viridis* yields this oil, which was found to contain a hydrocarbon almost identical with oil of turpentine in odour and other physical properties, mixed with an oxidized oil, to which is due the peculiar smell of the plant. It boils at 225°; sp. gravity 9·575, [?0·9575]; and it was found to be isomeric with carvol; it should therefore by analogy be called menthol." He makes the following note:—"Dr. Oppenheim has suggested this as one of the new names of camphor of peppermint, but the other name, mentholic alcohol, is more consonant with his theory." In concluding this paper, Dr. Gladstone says, "that his observations on the oxidized oils are reserved for a future occasion." This communication was made eight years afterwards and is published in the *Journal of the Chemical Society*, vol. xxv. He states that he is indebted to Mr. Hanbury for some criticisms on his former paper, which relate to the plants from which the oils are derived; amongst others he states that the wild thyme of our heaths, *Thymus Serpillum*, gives an essential oil, but the oil of thyme of commerce is from *Thymus vulgaris*. Under the heading "Carvol and its Isomerides," he states, "in my previous paper it was stated that the oils of spearmint and nutmeg contain oxidized liquids which appear to isomerides of carvol, the principle which gives its peculiar flavour to the oil of caraway. They were named respectively menthol and myristicol. These had been submitted to a fuller investigation, and it was found that oil of dill also yields a substance isomeric, or perhaps identical with ordinary carvol."

There are two ways in which these oxidized oils may be separated; either by fractional distillation, which must always be an imperfect method, or by taking advantage of the fact that they form crystalline bodies with hydrosulphuric acid, which can be easily purified, and which yield the original oil when decomposed by an alkali. The oil from nutmeg, however, was found not to form such a compound.

The following are the physical properties of the substances above mentioned. Menthol 1 was prepared by fractional distillation. Menthol 2 was prepared from the hydrosulphuric compound.

Substance.	Boiling point.	Specific gravity at 20°C.	Refractive index A at 20° C.	Dispersion.	Sensitiveness.	Refraction equivalent-	Arcular polarization
Carvol	227°	0·9530	1·4886	0·0345	46	51·26	+145°
Dill Carvol	—	0·9562	1·4891	0·0333	45	51·15	+108°
Menthol 1	225°	0·9515	1·4839	0·0326	44	50·86	−103°
Menthol 2	252°	0·9394	1·4791	0·0311	42	51·60	−114°
Myristicol	224°	0·9466	1·4·48	0·0312	46	15·20	+31°

Menthol.—This compound has the very characteristic odour of spearmint, totally different from that of carvol, and it retains the same odour when it has been reproduced from the hydrosulphate.

A combustion was made, agreeing with the formula $C_{10}H_{14}O$, vapour density, 5·29. As the composition of the hydrosulphates seemed to be identical, yet yielding a different oil on treatment with alkali, their relative solubility in ether was examined.

At 23° one part of the hydrosulphate from the three sources required the following amount of ether to dissolve it—

From Caraway . . . . 226 parts.
,, Dill . . . . . . 279 ,,
,, Spearmint . . . 216 ,,

From the foregoing it will be evident that the physical properties are almost identical, and there can be little doubt they are isomeric.

It will be noted that the menthol referred to was obtained from spearmint and is a liquid; it is therefore assumed from a chemical point of view, that if a scientific chemist requires menthol, the liquid $C_{10}H_{14}O$ should be supplied.

Peppermint Camphor.—Gmelin does not mention the word menthol, he calls it stearoptene of peppermint oil—solid peppermint oil. Oil of peppermint obtained by distilling *Mentha piperita* with water deposits on standing, or when cooled to—20°, crystals of peppermint camphor. American peppermint oil solidifies at 0° (Dumas); when it is subjected to fractional distillation, the last third of the distillate, if collected apart, deposits crystals on standing. *Properties*—Transparent, colourless, shining prisms, melts at 36·5 Dumas; 27° Blanchet and Sell; 34° Walter. Volatilizes without decomposition; solidifies at 24°; boiling point, 208°, Blanchett and Sell; 213° Walter; vapour density equals 5·62 Walter; formula $C_{10}H_{20}O_2$.

Respecting menthol from peppermint, Hanbury writes, 'Pharmacographia' (page 270):—"When oil of peppermint is cooled to 4° C. it sometimes deposits colourless hexagonal crystals of peppermint camphor, $C_{10}H_{18}+H_2O$ called also menthol. This camphor (the deposit of which in the oil we have not observed) boils at 210° C. and possesses the odour of crude oil; it deviates the ray of polarized light to the left. The proportion of oils of different origin is very variable. Pure crystallized menthol is sometimes found in commerce under the name of Chinese oil of peppermint. It is distilled at Canton from a plant which appears to be *Mentha arvensis*." (Mr. Holmes, *Pharmaceutical Journal*, September 13, 1879, p. 201, disputes this statement.) "The oil was exported from Canton in 1872, to the extent of 800 pounds; it was valued at 80*s.* per pound." (A specimen of this was presented to our museum at that time by Messrs. Cyriax and Farries, of London.) With this substance was sent over a bottle of liquid oil, and a most exhaustive report was made upon these by Mr. John Moss, F.C.S. (*Pharmaceutical Journal*, 3rd series, vol v. p. 366; see also 'Year-Book of Pharmacy,' 1875, p. 198).

In 1862 Oppenheim made a communication to the Chemical Society on this substance, and specimens which came over from Japan about that time were found to be adulterated with 10 to 20 per cent. of sulphate of magnesia. I am indebted to Messrs. Morson and Son for the specimen exhibited, they having retained a portion of the original importation referred to.

Peppermint camphor is but slightly soluble in water, but imparts to that liquid a strong smell and taste. It is very soluble in alcohol, ether, sulphide of carbon and oils, both fixed and volatile, insoluble in aqueous alkalies.

Peppermint camphor is an alcohol containing the radicle $C_{10}H_{19}$ (menthy); it is homologenous with allylic alcohol C_3H_6O, and isologous with campholic alcohol, or camphol $C_{10}H_{18}O$ (*i.e.*, differs from the latter body by 2 at H); hence the names menthylic or mentholic alcohol and menthol applied to it.

Bearing in mind the reply I received to the question "What is menthol?" my conclusions from the foregoing are as follows:—

Menthol ($C_{10}H_{14}O$) is the oxidized oil of mint obtained from different varieties of the plant, each having a distinct flavour. Menthol camphor ($C_{10}H_{20}O$) is a crystalline principle obtained from Japanese and Chinese oil of peppermint, variety undetermined. Thymol ($C_{10}H_{14}O$) is a crystalline body obtained from the oil of *Ptychotis Ajowan*. I have tried to obtain a sample of thymol guaranteed to be obtained from oil of thyme, but without success. The fact is that true oil of thyme yields so little to potash that it does not pay to make it from that source commercially.

In naming the stearoptene of Japanese peppermint a camphor there is an obvious objection, because it forms compound ethers with acids, and must obviously be an alcohol or body more analogous to phenol than camphor.

As the notice of medical practitioners has been called to this substance from a paragraph published in the *Lancet*, June 7, 1879, page 822, its repetition will be of some interest, as follows:—"Menthol a new antiseptic. Menthol, or peppermint camphor, is a crystalline body deposited from Chinese oil of peppermint on exposure to cold. It is met with in the form of small colourless fragrant prismatic crystals, not unlike sulphate of magnesia. In fact, when first imported from Japan some twenty years ago, it was for some time suspected to be nothing but epsom salts flavoured with peppermint. It is now known to have a definite chemical composition, and to be the camphor or stearoptene of peppermint oil." After describing the physical properties I have previously stated, the writer proceeds:—"From a series of experiments recently undertaken by Mr. Archibald Duncan, a student in the University of Edinburgh, it would appear that it is possessed of antiseptic properties similar to those of its homologue, thymol. At present it can hardly be regarded as a commercial article; but it could be readily imported from Japan, and there is no reason to suppose that its price would be prohibited. (*Note.*—There are at the present time four cases for sale in the London market; probable price 10*s.* or 12*s.* per pound.) An impure sample sent over from Canton in 1872 was valued at 30*s.* per pound. (*Note.*—This is an obvious error, since Mr. Moss and all who reported upon this consignment testify to its purity.) We are not aware that it has been used in therapeutics; but strong oil of peppermint painted over the part has long been a favourite mode of treatment in China for gout and neuralgia, and it might prove useful in these complaints. The Japanese po-ho-yo, or neuralgic remedy, probably contains menthol."

A few years ago my brother-in-law brought with him from China some bottles of this po-ho-yo, which he said was used out there as a specific for headaches, and as he happened to call when I was prostrate with a severe nervous headache he insisted upon anointing my forehead with this magic liquid. I immediately experienced an agreeable burning sensation and perceived a powerful odour of peppermint, fell asleep and awoke minus the headache. When I smelt this liquid menthol I fancied I recognized my old restorative, and I should not hesitate to apply it (of course diluted) should occasion require.

I exhibit a bottle of liquid commonly sold in Paris and Vienna as Gouttes Japonaises, or po ho; it is put up in these little bottles especially for the Japanese market, Chinese oil being preferred by the Japanese to their own. The circulars, in character, which accompany each bottle, set forth its virtues. It is mentioned by Christison as po-ho-yo.

Whatever source they are from, Chinese and Japanese have a more decided effect than either the English or American oils; the latter do not relieve neuralgia to the same extent.

Menthol camphor has for some time been used by dentists for dental cases (see *Practitioner* for November, 1877, page 383). Mr. Macdonald recommends it for sciatica and neuralgia, intercostal neuralgia particularly (see *Lancet*, vol. ii., 1879, page 448). He used a solution 1 in 60, adding a little oil of cloves. This solution is being prescribed in London, and also of varying strength up to 1 in 10 spirit of wine, according to the requirements of the case.

A little menthol camphor was put into a carious tooth, from which the patient was suffering great pain; this it relieved at once, but for some time afterwards the patient was so elated that she appeared as though she had had a little of something else.

It appears to be a powerful diffusible stimulant.

Records of its internal administration are not published, but experiments have been made to test its efficacy in conjunction with thymol.

Thymol is acknowledged to be an antiseptic of value to the practitioner, and is employed in the form of ointment combined with vaseline, and also combined with rectified spirit and glycerine for nasal douches and gargles. It is intensely caustic, and unless freely diluted, say 1 part to 4000, it is irritating when administered internally.

The introduction of these substances into medical practice at the present time naturally gives the study of the composition of essential oils an additional interest. Whilst it is admitted that phenol is an invaluable antiseptic, its poisonous and irritating properties are such that the practitioner naturally looks for something more agreeable as a substitute, and since the recent investigations of scientific chemists have shown that nature's hygiene provides such substitutes, we may naturally look to some of these substances which are isomeric.

I desire to acknowlege my obligations to Mr. Martindale, of London (who has given considerable attention to the study of menthol), for his valuable information in connection with this substance, and to Mr. Williams and Mr. Taubman for assistance (without prejudice) in working out the conclusions I have arrived at in this paper.

An animated discussion followed, which proved the existence of different opinions concerning the nature and physical properties of menthol.

A hearty vote of thanks, proposed by Mr. Conroy and seconded by Mr. Davies, was accorded Mr. Mason for his valuable paper, and the meeting closed.

EDINBURGH CHEMISTS' ASSISTANTS' ASSOCIATION.

The second meeting of the session was held in the Pharmaceutical Society's rooms, 119A, George Street, on the evening of Wednesday, November 5, Mr. Robertson, Vice-President, in the chair. There were about forty members present.

The minutes of last meeting having been read and adopted, the chairman called upon Mr. Maben to read a paper on "French Pharmacy."

Mr. Maben first sketched the regulations existing in France as to the sale of drugs and poisons, dispensing of prescriptions, registration of pharmaciens, inspection of pharmacies, etc., and compared these with the laws of our country, the advantage not always being on the side of the latter. He gave a short account of the curriculum of study, and of the examinations required, before a candidate can receive a diploma. Referring to the metric system of weights and measures, the essayist thought that the government had made a mistake in again legalizing the apothecaries' weights, arguing that the time had come when the decimal weights and measures should be adopted. Mr. Maben then passed rapidly under review the French Codex, noticing briefly some of its more distinctive characteristics. Worthy of admiration as the Codex was, it would be much more appreciated, he thought, if it contained a half fewer formulæ, and if all the more ridiculously complex preparations, examples of which he cited, were omitted.

The paper was criticized by Messrs. Aitken, Henry and Fisher, and on the motion of the chairman a hearty vote of thanks was awarded to Mr. Maben.

The report of the "Shorter Hours" Committee was then read, and after an animated discussion thereon it was resolved to continue the Committee, with power to add to their number.

On the motion of Mr. Robertson, seconded by Mr. Fisher, it was resolved to offer to the apprentice members of the Association a prize, value 10*s.* 6*d.*, for the best essay on a given subject; the subject to be fixed by the Committee, and intimated at next meeting.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The opening meeting of the session was held in Anderson's College, on Wednesday, November 5, Mr. A. Kinninmont, F.C.S., presiding.

After the minutes of the previous meeting had been read and adopted, the President gave a short address on—

SOME POINTS OF PHARMACEUTICAL ETHICS.

He said that he did not intend to discuss the whole question of pharmaceutical ethics, as that had been so well done by Mr. Ince in the Journal many years ago, but he would say a few words on the relation that sometimes exists between the physician and chemist and druggist. He was of the opinion that there was nothing morally wrong in a physician sending his prescriptions to a particular dispenser if there was no monetary value passed between both, but the public and the trade sometimes thought that the physician reaped a golden harvest from every prescription sent to his favourite dispenser, apart from his professional fee, or he would not be so very eager to impress upon the patient the necessity to send the prescription to his particular shop. With reference to private formulæ to be had only at certain shops, he said the chemist was not entitled to give the formula when asked for unless he thought proper to do so, but he had always found the chemist willing to give to his brother in trade the made up material at wholesale rate, so that it allowed the dispenser of it his profit just the same as if he had made it up with the ingredients himself. The speaker then touched upon the retention of the prescription by the patient, and said that he always considered the prescription was by right the patient's and not the dispenser's, although the American druggists thought different, for they took possession of the prescription and pasted it into a book, and if the patient wished a copy of it they would give it to him. As to repeats of prescriptions he thought if any patient wished his prescription renewed again and again, the pharmacist had no right to refuse it, although it might prevent some fees from going to the physician. Mr. Kinninmont closed his remarks by saying that some of the points touched upon caused in Glasgow some time ago some amount of acrimonious feeling to exist among a great number of dispensing chemists in the city, but from the remarks of the various members he was glad to hear that a good amount of it had disappeared.

After his address, Messrs. Brodie, Clarke, Simpson, Hunter and others, discussed some of the remarks, but they agreed pretty well with the President's ideas respecting the subjects touched upon by him.

Mr. Maltman was then elected Treasurer in room of Mr. Hick, who was leaving Glasgow.

On the table were placed the new books that had been bought since last session, along with three volumes of *New Remedies*, presented by the President; and after the election of members, the usual vote of thanks to the President brought the meeting to a close.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, November 6, Mr. Warren De La Rue, F.R.S., President, in the chair.

The minutes of the last meeting was read and confirmed.

A list of presents to the library were read, and the thanks of the Society voted to the respective donors.

The following certificates were read for the first time:—G. S. Albright, W. J. F. Churchouse, M. Cochrane, W. R. Dunstan, J. J. Hummel, E. Hughes, T. S. Humpidge, F. Hatton, A. Leibius, R. Jones, H. F. Morley, H. Newton, J. Parette, G. Stallard, J. M. Wilson.

The President announced that the Council had expended about £300 in purchasing books for reference and circulation; he invited Fellows to offer suggestions as to the purchase of new books and the general improvement of the circulating library.

The Secretary then read a paper by C. O'SULLIVAN—

On the Transformation Products of Starch.—This paper was originally presented to the President of the Société Chimique de Paris, on June 18; extracts therefrom were read on July 4; but as the bye-laws of the Council exclude papers longer than eight printed pages, the author thought it desirable to bring the communication before the Society, especially as it appeared from papers published by MM. Musculus and Gruber that these chemists were, to a great extent, unacquainted with the previous work of the author. The author commences by re-asserting that the molecule of starch under the influence of malt extract splits up in one of four ways:—

$$\text{(C).}\quad C_{72}H_{120}O_{60} + H_2O = \underset{\text{Maltose.}}{C_{12}H_{22}O_{11}} + \underset{\alpha\text{—Dextrin.}}{C_{60}H_{100}O_{50}}.$$

$$\text{(B).}\quad C_{72}H_{120}O_{60} + 2H_2O = 2C_{12}H_{22}O_{11} + \underset{\beta\text{ Dextrin I.}}{C_{48}H_{80}O_{40}}.$$

$$\text{(B}'\text{).}\quad C_{72}H_{120}O_{60} + 3H_2O = 3C_{12}H_{22}O_{11} + \underset{\beta\text{ Dextrin II.}}{C_{36}H_{60}O_{30}}.$$

$$\text{(A).}\quad C_{72}H_{120}O_{60} + 4H_2O = 4C_{12}H_{22}O_{11} + \underset{\beta\text{ Dextrin III.}}{C_{24}H_{40}O_{20}}.$$

Other proportions of maltose and dextrin have been observed, but these are due to either the splitting up of the starch, partially according to one equation and partially according to one or more others, or to the further action of the active agents of malt extract on the dextrin first produced. The proportions of maltose and dextrin represented by the equation of MM. Musculus and Gruber belong to the latter class. These chemists confirm the author's work as far as it relates to maltose, but have made a serious error (about 2 per cent.) in calculating the specific rotatory power, as they have taken 220 mm. of a 1 per cent. solution of maltose to give a deviation of 13·5 divisions on the scale of the Soleil-Duboscq instrument; this number should be 13·75. MM. Musculus and Gruber point out at least three dextrins with different optical activities and cupric oxide reducing powers. The author declares the existence of four distinct dextrins to be highly probable; but states that all, when pure, have the same optical activity, but that none are reducing bodies. Soluble starch has the same optical activity as the dextrins, but like them does not reduce when pure. The author then gives details of the preparations and properties of soluble starch and the various dextrins, criticizing the statements and methods of MM. Musculus and Gruber, as well as the various products obtained by them. In the second part the author investigates the action of malt extract on the transformed products. At first sight it would seem probable that the starch molecule breaks down first into maltose and α dextrin. The latter is then converted into maltose and β dextrin I., which in its turn forms maltose and β dextrin II., etc. The author has made many experiments to elucidate this question, and finds that the above theory, viz., the breaking down of the starch molecule into dextrin molecules, which become smaller at each step, is not supported by all the facts. Continual work with these bodies has forced the author to the conclusion that they are not a series of polymers, but rather a series of bodies of the same molecular weight, in which the difference in their behaviour must be accounted for by a difference of relation in the arrangement of the molecules to one another, probably in solution alone. We may take it, continues the author, that the molecule of soluble starch, or the dextrin, giving a purple with iodine, is simply $C_{12}H_{20}O_{10}$, but that these molecules in solution are arranged in groups of six sixes, all the groups being in an intimate state of tension one with another, so that the motion affecting one under certain conditions affects all under the same condition. In conclusion, the author states that the theory of splitting up and breaking down of the starch molecule as represented by the equations, does not hold all the facts eliminated, and is not in accord with some of them. The theory, on the other hand, of the arrangement of the molecules in groups all dependent one on the other, and capable therefore of undergoing a simultaneous movement, and the re-arrangement of these groups attendant upon the hydration of a definite proportion of the molecules in each of them, holds all the facts at present known, and is in perfect accord with all of them. The author is still engaged on the chemistry of the subject, but points out that the physics ought now to be studied, and the heat absorbed or eliminated during the different transformations determined; thus some idea of the character of the apparent work done will be gained.

Dr. ARMSTRONG then read a note on—

The Formulæ of the Carbohydrates.—The simplest carbohydrates—dextroglucose and its isomerides—are closely related to mannite and dulcite, as shown by their conversion into one or other of these alcohols by the action of nascent hydrogen, and therefore they are derivatives of the paraffin, normal hexane. Of the three possible formulæ which may be assigned to a body formed from mannite or dulcite by the abstraction of two atoms of hydrogen, that which represents glucose as being both an aldehyde and a penthydric alcohol,

$CH_2(OH),CH(OH)CH(OH)CH(OH)CH(OH)COH$,

appears to be the most probable, as it is the only one which accounts for the formation of saccharic or mucic acids from it on oxidation. The carbohydrates of the cane sugar group are probably related to the glucoses in the same way that ordinary ether is related to ethyl alcohol; moreover, it appears most probable that the simplest carbohydrate of the empirical formula $C_6H_{10}O_5$, *i.e.*, dextrin, and if several exist, the lowest of them, bears a similar relation to the carbohydrates of the cane sugar group, and therefore has the formula $C_{24}H_{40}O_{20}$. Suppposing starch to be a body of highly complex formula, the author is inclined to prefer this hypothesis to that advanced by O'Sullivan. There is very little doubt that it bears an altogether different relation to the lower carbohydrates; most probably the relation is of the character of that which obtains between aldehyde and its polymerides; *i.e.*, the groups composing the starch molecule are partly held together by the COH groups, these groups being rendered capable of thus acting by their conversion into HC—O— groups. On this hypothesis a number of $C_6H_{10}O_5$ polymerides, of varying molecular weight, may be conceived to be capable of existing, and bodies such as inulin, glycogen, etc., are not improbable by intermediate terms in such a series. The fact that the dextrins obtained by the decomposition of starch under various conditions are very similar in their properties is not so difficult to reconcile with this hypothesis, if it be assumed, as appears probable, that the polymerization and formation of higher terms in the series are attended with the expenditure of only a small amount of energy: in this case the polymerides would not, probably, differ greatly from each other in properties. It may be argued that as cane sugar and the dextrins are not cupric oxide-reducing bodies, it cannot be assumed that they contain the group COH in their formulæ; probably, however, the power of reducing cupric salts is in no way connected with the presence of COH groups. In conclusion, the author considers that there is little doubt that our present theory of isomerism is insufficient and incapable of explaining the isomerism of mannite with dulcite and of the glucoses with one another. The Le Bel hypothesis appears at first sight to be applicable, but there is much evidence tending to show that this hypothesis does not furnish the entire solution of the problem.

The next paper was read by the Secretary—

On a New Method of Determining Sulphur in Coal. By TEIKICHI NAKAMURA, of the Engineering College, Tôkiô.—The author criticizes the methods generally used: the nitric acid and potassium chlorate method, the potassium hydrate method, and the method of fusion with alkaline carbonates and nitre, and he finds them all more or less inaccurate or inconvenient. He recommends the following procedure: 3 or 4 parts of the mixed alkali carbonates or of sodium carbonate are intimately mixed with 1 part of coal in very fine powder in a large platinum dish. The mixture is heated at first very gently, a spirit lamp being used, to prevent possible absorption of sulphur, instead of a Bunsen; the heat is then raised slowly without attaining that of visible redness until the surface becomes only faintly grey. No smoke or odorous gases should escape during the whole of the oxidation. The temperature is now raised to a faintly red heat for sixty minutes, at the end of which time the mass is perfectly white, or reddish if iron be present. The mass is not to be stirred during the ignition. The residue is treated with water, filtered and the sulphates determined in the ordinary way. The author quotes some results obtained by his process. To the paper is appended a note by Dr. Divers, stating that the above process was worked out some time before the *Chemical News* of January 17 was received, which contains a somewhat similar process by Mr. Pattinson, who estimates the sulphur by heating a mixture of coal and calcium hydrate in a muffle.

At the conclusion of this paper Dr. Gilbert took the chair.

The next paper was read by the Secretary on—

The Bromine Derivatives of β Naphthol. By A. J. SMITH.—The author prepared β monobromnaphthol by adding to a tolerably concentrated solution of β napthol in glacial acetic acid the theoretical amount of bromine mixed with an equal volume of glacial acetic acid; the bromine is added drop by drop and the mixture kept cool. On standing, colourless needles with an adamantine lustre crystallize out. These were purified and analysed. β monobromnaphthol is soluble in alcohol, ether, and benzene, melts at 84° C.; begins to decompose at 130°; when oxidized by alkaline permanganate it yields orthophthallic acid. The author prepared β tetrabromnaphthol in a similar way; on oxidation it yielded monobromophthallic acid. In conclusion the author discusses the bearing of his results on the constitution of these bodies.

The next paper was read by the Secretary—

Notes on the Dissociation of Ammonia Iron Alum. By J. S. THOMSON.—When a dilute neutral solution of a ferric salt is heated it dissociates, and a basic salt is precipitated. This basic salt is readily soluble in dilute sulphuric acid; if an acid of known strength be employed and the quantity necessary to bring about the desired solution be known, an insight into the nature of the decomposition can be arrived at. The author refers to the previous work of Krecke, Wiedemann, Tichborne, Naumann and others. Several series of experiments were made. Taking the mean of these, the quantity of sulphuric acid required to prevent dissociation, for each addition of 10 c.c. of water after 50 c.c., when ammonium iron alum equal to 0·1 grm. Fe_2O_3 is used was found to be 0·0186 grm.; if 0·15 grm. Fe_2O_3 be used, the quantity of H_2SO_4 was 0·02479 grm.; the addition of sulphate of ammonia equal to 0·05 ammonia necessitates an additional quantity of sulphuric acid equal to 0·05005 grm. Ammonia salts exert this influence when present as double salts, ammonia alumina alum and the double sulphates of ammonia and magnesia and of ammonia and zinc were used. Potash salts exert a still more powerful influence in promoting dissociation. A solution of ammonia iron alum containing more than 1 grm. in 14·37 c.c. does not dissociate on boiling; the dissociation begins in more dilute solutions and increases regularly, as the above results prove, with each addition of water

The next paper was read by the Secretary on—

a Methyl Oxysuccinic Acid, the product of the action of Anhydrous Hydrocyanic Acid upon Aceto-acetic Ether. By G. H. MORRIS—Demarçay (*Compt. Rend.*, 82, 337) has described an acid, obtained as above, under the name of oxypyrotartaric acid, as an unstable uncrystallizable syrup, whose barium salt is decomposed by boiling with excess of water. The author at the suggestion of Wislicenus has prepared the body according to the directions of Demarçay. The thick brown syrup thus obtained was purified by solution in water, precipitated with lead acetate, the lead salt treated with sulphuretted hydrogen, the solution filtered, evaporated, and treated with ether, until finally, the ethereal solution after standing a few days in the air-pump vacuum deposited the pure acid in star-like groups of needles, deliquescent and melting at 108°. The following salts were prepared and analysed:—the barium salt, which when pure did not decompose on boiling with water; the calcium, potassium, silver, lead and copper salts, most of which are deliquescent. The author has investigated the action of fuming hydriodic acid, and the products of the dry distillation of the acid. In conclusion, he discusses the constitution of some of the isomers of α methyloxysuccinic acid and assigns the following formulæ:—

$$\text{Citramalic acid} \left\{ \begin{array}{l} CH_3 \\ CHCOOH \\ CHOH \\ COOH \end{array} \right.$$

$$\text{Itamalic acid} \left\{ \begin{array}{l} CH_2OH \\ CHCOOH \\ CH_2 \\ COOH \end{array} \right.$$

and

$$\alpha\ \text{Methyloxysuccinic acid} \left\{ \begin{array}{l} CH_3 \\ COHCOOH \\ CH_2 \\ COOH \end{array} \right.$$

The next paper was read by the Secretary on—

The Action of Phosgene on Ammonia. By H. J. H. Fenton.—When these gases are mixed a white neutral amorphous substance is produced, which has been shown by Regnault and others to consist of ammonium chloride, a substance identical or isomorphous with urea, and in addition small quantities of guanidine, cyanuric acid, etc. (Bouchardat). The author prepared some quantity of this white substance and obtained a small quantity of guanidine, which he identified by its crystalline form, and some urea which was identical with ordinary urea in its behaviour with hypochlorites and hypobromites (*Journ. Chem. Soc.*, July, 1878), and in other respects. The author concludes that either carbamide and urea are identical, or that symmetrical carbamide has not been obtained by this method.

The next paper was read by the Secretary on—

The Rehydration of Dehydrated Metallic Oxides. By C. F. Cross.—The author has obtained various anhydrous basic metallic oxides by igniting the precipitated hydrates. These oxides he exposed at the ordinary temperature to an atmosphere saturated with aqueous vapour; rehydration occurs up to a definite limit of a molecular character, attended in most cases with a change of volume, He has investigated thus the oxides of aluminium, chromium, cobalt, iron and copper.

The following paper was taken as read—

On Alizarin Blue. By G. Auerbach.—About eighteen months since, a blue colouring matter was brought into the market as a substitute for indigo; it is now disused on account of its high price and its unstable nature when exposed to sunlight. The researches contained in this paper were finished in May, 1878. The author gives a *résumé* of previous work on the subject, and recommends the following method of preparation:—1 part of dry mononitroalizarin, 5 parts of concentrated sulphuric acid and 1½ parts of glycerin (specific gravity 1·262), are mixed and heated gently. Reaction commences at 107° C., becomes violent, the temperature rising to 200° C.; much frothing takes place, with evolution of sulphurous acid and acrolein. The whole mass, when frothing has subsided, is poured into water, boiled up and filtered, the residue being boiled out three or four times with dilute sulphuric acid. The mixed filtrates are allowed to cool, and the blue separates in brown crystals. These are purified by mixing with water and adding borax till the solution becomes brownish violet, the blue with the boric acid forming an insoluble compound. This residue is washed, decomposed with an acid, and the pure blue obtained as a violet silky paste. If required perfectly pure, it must be crystallized successively from its various solvents, high boiling naphtha, amylic alcohol and glacial acetic acid. When pure, it forms brown shining needles, melting at 268°-270°; it has the formula $C_{17}H_{11}NO_4$. Salts were prepared and analysed, but the results were not satisfactory, as it was difficult to obtain them quite pure. Bromine derivatives were also prepared and examined. The action of chlorine, zinc dust, acetic anhydride, etc., have also been studied. The author discusses the constitution of the blue and thinks it must be closely related to the aldehydines discovered by Ladenberg, which are formed when aromatic orthodiamides act upon aldehydes.

The Society then adjourned to November 20, when the following papers will be read:—A Chemical Study of Vegetable Albinism, Part II.: Respiration and Transpiration of Albino Foliage. by A. H. Church; Estimation of Manganic Oxide and Potassium Bichromate, by S. Pickering; Contributions to the History of Putrefaction, by C. T. Kingzett; Notes on Manganese Dioxide, by C. R. A. Wright and A. E. Menke.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association was held on Wednesday evening, October 29, Mr. Branson in the chair, at which there was a large attendance. A paper was read by Mr. R. H. Parker on "The Products of the Coniferæ."

The author commenced by giving a brief sketch of the botanical and geographical positions of the natural order Coniferæ, its diagnostic characters and the numerical relation of its species among the Gymnospermia. The substances derived from this order were described individually, according to the genera yielding them, namely, those of Pinus and Abies, Juniperus, Callitris and Dammara; the relation of the various products to one another being demonstrated very clearly by a chart containing the whole of them systematically tabulated. The numerous crude turpentines (oleoresins) and their volatile oils were described physically and chemically. Especial mention was made of ol. pini sylvestris and ol. pini pumilionis, used for the inhalations of the Throat Hospital Pharmacopœia, and the necessity of care being taken to use those obtained from the leaves, since in the case of ol. pini sylvestris that produced from the oleoresin was occasionally supplied. Terebene and camphene received a passing notice, the former being obtained by converting oil of turpentine into two optically inactive hydrocarbons, viz:—terebene, $C_{10}H_{16}$ boiling at 160°C., and colophene $C_{20}H_{32}$, boiling at a much higher temperature, separated by fractional distillation. While dealing with the coniferous oleoresins, the author mentioned the curiously close relation, both chemically and physically, which exists between them and Chian turpentine, the botanical source of which is so remote from the pines. The various pine timbers were enumerated, together with the trees yielding them, and the study of this genus concluded with a reference to the importance of pine forests upon the sanitary condition of the atmosphere; the essential oil from the leaves is volatilized by solar heat and in the presence of oxygen and moisture produces peroxide of hydrogen and several camphoraceous substances, all having great antiseptic properties.

A study of the genus Juniperus was next submitted; the distinguishing specific characters of juniperus and savin branchlets were mentioned, and the chemical and other properties of the drugs obtained from these species. Huile de cade was mentioned, but no definite information could be given as to whether the article appearing in commerce at the present day is obtained from *J. oxy-*

cedrus. Juniperus bermudiana and *J. virginiana* were noticed as the sources of the wood known as "Cedar," largely used for pencils, etc., the essential oil distilled from the wood being the "oil of cedar" of commerce, used for perfumes. Sandarach or "gum juniper," from *Callitris quadrivalvis*, was described, also the means of distinguishing it from mastich. The sources of the fossil kaurie resin (*Dammara australis*) and of gum "dammar" (*D. orientalis*) were stated, together with their commercial applications. In conclusion, the various ornamental conifers of our gardens were refered to, viz.:—*Araucaria imbricata* (Monkey puzzle), *Cedrus Libani, Thuja orientalis* and *T. occidentalis.*

The paper was illustrated by specimens of nearly all the substances referred to, lent from the Museum of the Pharmaceutical Society, by the permission of the Council; by a collection of cones of different species of *Pinus* and *Abies* lent by Mr. E. M. Holmes; by microscopic specimens of sections of coniferous woods, the pollen of *Pinus pinaster*, crystallized derivatives of turpentine, etc.; and by the complete series of coloured plates of the Coniferæ from Bentley and Trimen's 'Medicinal Plants.' A discussion followed in which Messrs. Branson, Collinson, Hardwick, Piper, Sangster, Miller and Wallis took part; and at the conclusion a hearty vote of thanks was awarded to Mr. Parker, proposed by Mr. James, and seconded by Mr. Robinson.

Parliamentary and Law Proceedings.

Prosecution under the 17th Section of the Pharmacy Act.

At Aberdare Police Court, on Tuesday, November 11, Daniel Tudor Williams, whose name was in March last erased from the Register of Chemists and Druggists, by order of the Council of the Pharmaceutical Society, was fined 2*s.* 6*d.* and costs for an infringement of the 17th section of the Pharmacy Act. Last month a penalty was recovered from the same defendant for an offence against the 15th section, on the prosecution of the Council of the Pharmaceutical Society (see before, p. 267). The present summons was taken out by the Secretary of the Chemists and Druggists' Trade Association.

Poisoning by Chloral.

On Thursday, November 6, Dr. Elliott, the Carlisle city coroner, held an inquest concerning the death of Dr. W. Hay, who had been found dead in his bed on the previous afternoon.

Mary Jane Donaldson, six years servant with Dr. Hay, said Dr. Hay's rest was very much broken. She had frequently heard him say he had taken opium pills. She waited upon him at dinner at one o'clock on Wednesday, when he partook of it as he used to do at any other time. She heard him say that he had taken poison without mentioning what it was. When he used to say he had taken opium he did not mention the word poison. She took a bottle of potass water up into his room at half-past three o'clock, as he had signified a desire for it previously to the housekeeper. He was asleep and snoring, but she thought that she would not disturb him. She went about four o'clock, and saw that his face was of a bluish-black colour. She spoke to him twice and got no answer. She found that he did not stir, and put her hand to his forehead and found it covered with a cold perspiration. She then went for medical assistance.

Dr. Barnes said, when he saw Dr. Hay, he had evidently been dead only a short time. Dr. Sullivan and then Mr. Page came in. They went down into Dr. Hay's surgery and had some talk as to the cause of death, coming to the conclusion that it was the result of an overdose of some poison. On the surgery table they found a bottle, produced. It could contain six ounces, but it had now only an ounce in it. The stopper was wet, and led them to believe that it had been recently used. On the bottle was the label "Liq. chloral hydrate. 1 minim equal to ½ grain chloral hydrate." This was an exceptionally strong preparation of the drug and not commonly used. It was a dangerous strength to use—three times more than the usual. There was a measure glass on the table which they found had also been recently used. With a preparation of the drug of the strength stated a person might very easily take an overdose inadvertently. On the previous afternoon, in company with Dr. Sullivan, witness made an internal examination of the body, and found no appearances of disease sufficient to cause death. The appearances were quite consistent with the opinion that death had been due to an overdose of such a narcotic as chloral, and of no other poison that he and Dr. Sullivan were acquainted with.

Dr. Sullivan corroborated at some length the evidence of Dr. Barnes. He explained that on the label on the bottle produced and spoken to by Dr. Barnes, the figure ½ was written with ink and the word "one" which was printed was scored out. He and Dr. Barnes were particularly struck with the small size of the heart. Dr. Hay was a large man, and the heart was not at all in keeping with the size of the body. This explained what he heard the housekeeper say that in going upstairs Dr. Hay used to exhibit signs of shortness of breath. The muscular part of the heart was flabby, and the organ would not be able to undergo much exercise.

The jury returned an unanimous verdict to the effect that Dr. Hay came by his death from inadvertently taking an overdose of chloral. The foreman added that he believed it was quite possible that the deceased had taken a similar dose before, but the heart being perhaps weaker was not able to stand it.—*Carlisle Paper.*

A Boy Poisoned by Eating Yew Berries.

An inquest was held on Monday, October 4, at Chalfont House, Kingston Road, Oxford, before the city coroner (Mr. E. L. Hussey), touching the death of a boy, nine years old, named Charles Wood. Thomas Wood, stated that deceased was his son, and had generally good health. Witness had heard that he and his sisters and a cousin went on Sunday afternoon to Holywell Cemetery, to see their aunt's grave. In the evening about six o'clock as deceased was at tea two of the children (deceased and one of his sisters) said they had eaten a good many yew berries which they got off the trees in the cemetery. The girls had not been ill since. They all had dinner on Sunday at two o'clock, and went to the cemetery afterwards. Deceased went to bed about a quarter to nine and slept in the same room with witness. About three o'clock he heard deceased groaning, and got out of bed, and tried to wake him. Witness put on a mustard poultice to deceased's chest, and also gave him some mustard and water. He vomited very little. The boy afterwards had convulsions, and died about a quarter to four. Witness went to Mr. Symonds, but he did not arrive till deceased was dead. He (witness) had often eaten the pulp of the berries himself, but he never swallowed the stones.

Eliza S. Wood said that deceased was her brother, and he went with her and one of her sisters, and one of her cousins to the Holywell Cemetery on Sunday afternoon. All of them picked some of the red berries off the yew trees and ate them, and deceased put some into his pocket and ate them as they were walking home. Witness spat out the stones, and her sister and cousin also did so. As they were walking home deceased put a handful of berries into his mouth, and crunched them up and swallowed stones and all. She did not know how many berries deceased ate, but she thought more than a hundred. They got to the cemetery about half-past three.

The jury returned a verdict that deceased died from the effects of swallowing poisonous yew berry stones, administered by himself not knowing that they were poison.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[348]. It is not often I feel called upon to differ from the writer of the "Month" in his very able and welcome *résumé*, but I think, with respect to "ferri ammon. sulph." that he has fallen into an error. I think there can be do doubt that the *ferric* and not the *ferrous* salt is intended; both the ammonio-ferric and the potassio-ferric alums have long been used in chronic dysentery, leucorrhœa and diarrhœa. A notice of them will be found in the *Pharmaceutical Journal* for January, 1854. They have been found to be more astringent than common alum, whilst they are free from the stimulating effects of other salts of iron. "Ferri et ammonii sulphas" is officinal in the United States Pharmacopœia. For the benefit of your readers, I beg to be allowed to transcribe the process ordered for its preparation: "Take of solution of tersulphate of iron, 2 pints; sulphate of ammonium, 4½ troyounces. Heat the solution to the boiling point, add the ammonium, stirring until it is dissolved, and set aside to crystallize. Wash the crystals quickly with very cold water, wrap them in bibulous paper and dry in the open air."

It is of course to be borne in mind that the U. S. pint is the old wine pint of 16 fluid ounces.

J. Hart.

The formula has also been received from Mr. F. Stevens.

[365]. *Lavandula* is in error when he says that double the quantity of potass bicarb. ordered in the B.P. should be used.

The ung. potass. iodid. is prepared with pot. carbon. If the ointments are made strictly according to the B.P., and mixed, decomposition ensues at once, ammonia is evolved, and mercuric iodide is formed, therefore a creamy white ointment cannot be produced. Pot. Carbon.

[368]. There ought to be no question as to who was right in this instance. The B.P. tinct. zingib. should be dispensed, otherwise there would be a deviation from the prescription. It should have a milky appearance, owing to the volatile oil in the ginger and sp. ammon. aromat.

Lavandula.

[370]. Place about ℥v of distilled water in a bottle and add the sp. myristicæ and liq. strychniæ, then dilute the tinct. ferri perchlor. with the remainder of the distilled water, and add it to the other ingredients already in the bottle. The mixture will have a milky appearance owing to the volatile oil of nutmegs, and it should *not* be filtered.

Lavandula.

[370]. Would any of your readers kindly say the best way to dispense the following prescription so as to make a smooth ointment?

℞ Ext. Bellad. . . . . grs. vj.
Ext. Opii. . . . . ʒij.
Adipis Præp. . . . . ad ℥j.
Ft. unguent.

J. Y.

[371]. I should be glad if any reader can suggest an excipient for the following pills, so that they may be prepared expeditiously and without making them excessively large:—

℞ Acidi Carbolici . . . . gr j.
Ferri Arseniatis . . . . gr $\frac{1}{16}$
Pil. Assafœtidæ Co. . . . . gr. ij.
Pulv. Guaiaci Res. . . . . gr j.
M. Ft. pil. Mitte xvi.
To be silvered.

P. T. W.

[372]. I shall be glad to have some opinion how the following prescription should be dispensed:—

℞ Phosphorus . . . . gr. $\frac{1}{50}$.
Ferri Redacti . . . . gr. iij.
Quinæ Sulph. . . . . gr. ss.
Fiat pil. Mitte xxx.

Staff.

[373]. Will some one oblige me with the strength of the solution of daturin for hypodermic injection, with the quantity usually injected?

M. P. S.

[374]. Would some of your readers kindly inform me how to dispense the following so as not to separate?—

℞ Liq. Potassæ . . . . ʒiss.
Ol. Jecoris Aselli . . . . ℥ij.
Aquæ . . . . ad ℥viij.
M. Ft. mist.
Sumat cochl. j. amp. bis in die.

T. B. L.

P.S.—I have tried several ways in mixing, but after standing the oil floats.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Question of Policy.

Sir,—I read Mr. Wilson's letter in your last week's issue with the greatest satisfaction, and I feel sure that the question of policy which he has raised is one which should be seriously thought over by every chemist in England.

Surely there can never again be a time so pregnant as the present with questions of the deepest interest to us as a body, whilst, perhaps, of them all, the patent medicine so-called, has taken up the greatest amount of consideration. Many, from amidst our ranks, are, alas! already lost in the whirl of "reduced prices and still further reductions!!" whilst others stand hesitating upon the brink, knowing too well the slippery paths they will, perforce, have to tread when once they have plunged therein. A third section, and I will not believe it is an inconsiderable one, is prepared to look the matter full in the face, and to ask many curious questions concerning it; these will not so much relate to price or profit, but if I mistake not, are rather more likely to be resonant with ominous words, in which quackery, fiction, ignorance, gullibility and social degradation will take no meaningless part.

To speak more plainly, are we, the pharmacists of the future, individually or collectively prepared to give support or otherwise to a trade which cannot stand in the glare of this latter half of the nineteenth century?—a trade founded upon the credulity of the illiterate; at war with almost every intellectual instinct, and in many phases of it, to say the most, of only questionable morality. Long since has this traffic, the offspring of the dark middle ages, and the foster child of the misdirected knowledge of to-day, been checked in other countries. How much longer shall it prosper unchallenged in our own? Must not this be a question of the very first importance to the Parliamentary Committee of the Pharmaceutical Society?

Kilburn, N.W. Charles B. Allen.

The Evening Meetings: A Growl from the Gallery.

Sir,—Numerous correspondents have lately addressed you upon the subject of the unhealthiness of the drug trade, and various have been the theories put forth to account for the early decease of its members.

Will you permit me to swell the list of these hypotheses, by suggesting that a fruitful source of mortality amongst metropolitan pharmacists is to be found in the Evening Meetings.

To be entombed, sir, for a couple of hours on those occasions, in the subterranean cavern known at Bloomsbury as the "lecture theatre," is to drive twenty nails into one's coffin at a blow. Whether it pertains to the duties of either one of the multitudinous Committees of Council to occupy itself with so insignificant a matter as that of ventilation, I cannot tell. If it be so, the Committee in question has apparently quailed before the task of cleansing the air of the Augean chamber downstairs. Be this as it may, I am sure that I only express the opinion of every frequenter of our Evening Meetings, when I say that the suffocating atmosphere of the room in which we are asked to assemble is a disgrace to the Society.

Conceive the odoriferous remains of three chemical lectures, combined with the mingled emanations from as many hundred students, sedulously confined within four walls; add to this the products of combustion from a few thousand feet of gas, and the exhalations arising from the lungs of a dozen orators in the arena below, and a faint idea is presented of the atmospheric surroundings of an unfortunate pharmacist located in the gallery of the "lecture theatre" at Bloomsbury Square, at about 10 p.m. on a Wednesday evening.

When it comes to pass that twelve fellow-citizens are summoned to sit upon the asphyxiated remains of some eminent professor or distinguished member of Council, perhaps more attention will be given to the matter than will probably be awarded to this solitary howl from

One of the "Gods."

The Health of the Drug Trade.

Sir,—Of all the reasons which have been adduced in explanation of the early mortality of chemists none seems to have obtained greater prominence than that of long hours. In fact all the others have gradually disappeared and the subject of "Hours of Business" has insensibly taken the place of "Health of the Drug Trade" in your correspondence columns. Having regard to the high educational status and scientific knowledge which are now required for the satisfactory discharge of our professional duties, this anxiety to have our business hours shortened cannot be wondered at. It has been well said by one of your correspondents that instead of our hours being long they ought to be exceptionally short.

One strong reason for a shortening of hours is the continuous and intense mental application required in the practice of dispensing. This mental application extending over a period of ten or twelve hours is most exhausting and enervating, and is unquestionably prejudicial to both mental and physical health, and in other professions it is never kept up for more than a few hours at a time.

The strongest reason of all, however, is the high educational status and scientific knowledge to which I have referred. To pass from ten or twelve hours' application to the duties of a pharmacist to a period of even more intense application to the subjects of materia medica, theoretical botany and practical and theoretical chemistry, coupled with early rising for the pursuit of practical botany, is enough to shake the strongest constitution, and what shall we say of the very ordinary constitutions of the great majority of chemists? Can we wonder that many of them give way under the strain?

This subject of shorter hours is at present occupying the attention of the Chemists' Assistants' Association of this city, and it is most earnestly to be hoped that their efforts will be crowned with success. Their object is to have all the shops closed by 8 p.m. at latest. This would throw open to assistants and apprentices the splendid educational advantages of the School of Arts, the classes in connection with which are held at 8.30 p.m. The evening meetings of the North British Branch are also held at 8.30 p.m., and it would allow many to attend them who are now debarred from doing so by long hours.

It is most desirable that those occupying influential positions in the community of pharmacists should lend the weight of their influence in the furtherance of so good a cause.

Surely by a mutual understanding and rising superior to petty jealousy something can be done to remove this terrible incubus, which acts as a perpetual embargo to our launching out into the wide, and to too many of us unknown, fields of pharmaceutical knowledge.

Edinburgh. Excelsior.

The Promotion of Amateur Dispensing.

Sir,—It is bad enough when those in the trade do their personal friends a "good turn" (?) by translating into English the Latin prescriptions of their physician in order that a few pence may be economized thereby, but what are we to say when medical men themselves stoop to such paltry tricks? A lady presented me with the following prescription this morning, and asked what the price would be for dispensing it. On my informing her, she coolly took from a pocket book the appended English copy of it, telling me "she could make it up cheaper herself," and that full instructions had been given her by the *surgeon* who wrote the translation. Upon my explaining to her that extra care and precaution were necessary in the compounding of medicines containing strychnine, she replied that she knew all about that and that her friend (the surgeon) told her any druggist would measure that quantity of strychnine for her and mix it with the water.

℞ Mrs. ———

Acid. Phos. Dil.	ʒiij.
Liq. Strychniæ, B.P.	♏ 50.
Ferri Sulph.	gr. 3ß.
Magnes. Sulph.	℥vj.
Spir. Chloroform.	℥iij.
Syr. Simpl.	℥vj.
Aq. M. Pip.	ad ℥vj.

M. Take one teaspoonful 3 times a day (etc., etc.).

The Surgeon's copy of the above.

An ounce of Dilute Phosphoric Acid.—Three drams to be measured off to make the mixture.
Sulphate of Iron.—One pennyworth.
Epsom Salts.—Three parts of an ounce in each bottle.
Spirit of Chloroform.—An ounce, three drachms to each bottle.
Sugar as you like.
Peppermint Water.—Half a pint.

Comments on my part are unnecessary, you readers will readily form their own conclusions and join with myself in the strongest condemnation of this new phase of medical antagonism to the chemist.

Leominster. M. J. Ellwood.

Taraxacum.

Sir,—The importance and usefulness of such a paper as that read by Dr. Symes at the last Evening Meeting and reported in your Journal of November 8, as evidenced by the full and lengthly discussion which followed, must I think be apparent to all; that the subject of taraxacum, albeit an old one, is not yet exhausted, may be seen in the diversity of opinion expressed in said discussion. Although for some long time past, little has been said or written pharmaceutically on the subject, medical men have continued to prescribe and pharmacists to prepare it for use, and apparently its popularity as a remedy is as great as ever. Of course there will be differences of opinion as to its therapeutic virtues, but with this matter, I take it, the pharmacist has little concern. Whether either rabbits or taraxacum have a *raison de'tre* in the scheme of things pharmaceutical, I do not pretend to say, but so long as the medical profession demand a certain remedy, it is the duty of the pharmacist, and likewise to his interest, to supply a preparation which shall most ably represent the drug from which it is prepared and which shall be most eligible for use. Now it has always struck me that the succus taraxaci, even when carefully and honestly prepared, is a most weak and inefficient preparation, prone to change and deterioration, and possessing little to recommend it, from a pharmaceutical point of view; this opinion has been strengthened by the varying amounts of extract obtainable, by careful evaporation, from the succus taraxaci of my own and other makers; and I fully agree with Dr. Symes that the fluid extract of the U. S. Pharmacopœia is a concentrated, efficient, elegant and stable preparation, and representative of the root in a high degree. Some seven years ago, on the appearance of the last revision of the U. S. Pharmacopœia, I prepared a quantity of this fluid extract, by the formula there indicated and I found that both in flavour, colour and density it stood in very favourable contrast with the succus of the B.P. and was to all appearances a perfect representative of the root from which it was prepared. I remember being very favourably impressed with its eligibility and usefulness. A friend who is in possession of a portion of this identical sample, now over seven years old, informs me that it has kept perfectly and that in flavour and appearance it is to all intents and purposes as good as when it was made. I am not prepared to endorse the advantages of the menstruum ordered in the U. S. Pharmacopœia for the preparation of this fluid extract. Glycerine is a very useful solvent in its way, but I think we may have too much of a good thing. The menstruum I would suggest as best adapted for taraxacum is one composed of equal parts of rectified spirit and water, with a small proportion of glycerine; a fluid extract made with this menstruum from roots dug up in November, and carefully dried and powdered, will, so far as being representative of the drug, give every satisfaction; and will be one which every pharmacist can prepare for himself, with satisfaction and profit. We have the authority of Mr. Umney that the fluid extract of the U. S. Pharmacopœia is at least ten times the strength (in the weight of dry root that it represents) of the succus of the B.P., and has therefore a more bitter flavour, and as to the elegance of fluid extracts as a class, that gentleman was personally of opinion that they far surpassed those of British pharmacy. In the face of this opinion I was rather surprised that in the discussion which followed the reading of Dr. Symes's paper he (Mr. Umney) should feel it necessary to forget his former love, and stand up in defence of the succus of the B.P.

I trust that we shall see in the next edition of our Pharmacopœia a class of preparations more worthy the name of liquid extracts than those it at present contains, and that taraxacum will be one of them.

137a, Aldersgate Street, E.C. ALFRED E. TANNER.

Sir,—In some remarks which I made on Dr. Symes's paper, I find that my words convey a wrong impression, *i.e.*, I said that the Belgian and old Edinburgh Pharmacopœias got over the difficulty connected with the best time for gathering the roots by using the whole plant. What I meant to say was that the before mentioned authorities ordered the whole plant to be used.

The question of the time best suited for collecting the roots still remains.

35, Baker Street, W. A. W. POSTANS.

SODA WATER.

Sir,—In view of the recent vexatious prosecutions anent this article, it may be of use to point out an authority in the matter, and one which has apparently been overlooked, as I have not seen any reference to it in the published defence of any of the cases instituted up to the present.

On page 153 of the latest edition of Royle's 'Materia Medica,' under "Liq. Sodæ Efferves." the editor states—"The soda water of commerce, it must be remembered, is merely carbonic acid water, and the preparation of the Pharmacopœia may be extemporized by dissolving 15 grs. of bicarb. of soda in ½ ounce of water, and then adding a half-pint bottle of common soda water."

Such a statement in a standard work is surely entitled to some consideration even by such punctilious pioneers of utopian purity and such sticklers for pharmacopœial standards as our public analysts.

EDWARD HALL, PH.C.

ARSENICAL PASTE.

Sir,—I cordially endorse the caution mentioned by E. W. in a recent issue, as regards the use of arsenical paste as a nerve cautery. In two cases it played me ugly tricks, so much so that I resolved never to use it again, and nothing would induce me to do so. Not only that but as often as not it will set up a severe inflammation of the lining periosteum. In fact, I have no hesitation in writing, it is bad.

Now as to the paragraph to which E. W. draws attention. All I can say is I also saw it in *Lloyd's Newspaper* as copied from the *New York Times*. Still the sad event therein mentioned no more militates against the skill and aggregate talent of the matchless dental profession of America, than the failure in a chloroform case the other day militates against the talent of our medical faculty. The best of us may any hour be subject to a sad failure, the wonder is we do not fail more often. Now, sir, I much fear E. W. has not seen American skill, or instruments. The best part of filling and other instruments and tools used by the majority of British dentists are American. More American teeth are used in this country than *native* make. Only let E. W. just glance at the American dental engine, a matchless marvel of human ingenuity, and then confess that "in America there is a matchless dental profession independent of medical men and chemists." They educate not men there to be surgeons *first*, and then leave such to pick up mechanical dentistry as best they can. No! but educate them in every sense of the word to be surgeon *dentists*. Sever mechanical dentistry from the surgical, and it at once ceases to be the *dental* profession, as the man who cannot execute the first named ceases to be a surgeon *dentist* and becomes a surgeon of an extremely limited form of surgery. I am, sir, no Yankee but out-and-out British, yet love to give credit and honour where both are due and deserved.

185, Oxford Street. GEORGE WARD, L.D.

"*Subscriber* and *Student*," who should have complied with the rule respecting anonymous contributions, will find recipes for depilatories by referring to the indexes of back volumes.

"*Antiseptic*."—Dr. Symes has pointed out (vol. ix., 598) that a strong solution of thymol can be prepared with milk.

W. G.—In such a case a declaration sworn before a magistrate would be received.

T. Robinson.—A recipe for incense will be found in vol. viii., p. 519.

J. T. Greenwood.—See the paper on *Fucus vesiculosus* in the Journal of the 1st inst., p. 343.

"*Student*."—The principal products of combustion would be the same in both cases, and the relative innocuousness would depend rather upon the amount of impurity present in the original material.

"*Juvenis*."—There can be no doubt that the use of the title "Surgeon-Dentist" by a person not registered under the Dental Act is illegal.

M. B.—We have been unable to find a reference to any preparation bearing the name.

H. Boutell.—If you refer again to Mr. Langbeck's translation you will see that you have misread it.

H. J. Pearson.—A list of the subscribers to the Benevolent Fund, arranged under the heading of the towns in which they reside, is published in the Calendar of the Society.

M.P.S.—The opaque turbid appearance sometimes presented by distilled water when it has been kept is probably due to the growth of confervæ.

"*A Pharmaceutical Chemist*."—Before publishing your letter we should be glad to have particulars of the case you refer to, for our private information.

Mr. Modlen, Mr. Pollard and Mr. Evans are thanked for their communications.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Hall, Brown, Turner, Reynolds, Gordon, Robinson, Wershoven, Coleby, Miller, Masson, Stevens, Rogers, G. Faitpierre, X., A. P. S., T. H., J. L. B., The Encloser, Alex, Nu.

NOTES ON INDIAN DRUGS.

BY W. DYMOCK.

(*Continued from page* 383.)

IPOMŒA TURPETHUM, *R. Br.* CONVOLVULACEÆ. *The stem and root.* *Vernacular.*—NISOT, NAKPATAR, PITOHRI (Hind.), NISHOTAR (Bombay), SHIVADAI (Tam.), TEORI (Beng.).

History, Uses, etc.—Sanskrit writers mention two varieties of trivrit or triputa, viz., sveta, white; and krishna, black. The white kind only should be used, the black is said to be poisonous; it is not very clear what the black kind is. Nisot is one of the most common native cathartics, and has probably been in use all over India from a very early date. The usual method of administration is to rub down about a drachm of the root or stem with water and add to it some rock salt and ginger, or sugar and black pepper.

Under the name of turbud Mahometan writers also mention two kinds, white and black, and direct the black to be avoided on account of its poisonous properties, which are said to resemble those of hellebore. As regards the properties of the white kind, they say that it is a drastic purgative of phlegmatic humours and bile; its action is promoted by combination with ginger; it is particularly beneficial in rheumatic and paralytic affections. Combined with Chebulic myrobalans it is useful in melancholy and dropsies. Ainslie tells us that the *Convolvulus Indicus alatus maximus* had long a place in the British materia medica, but of late years has fallen into disuse. He says, "I find it mentioned by Avicenna under the name of turbud; but the first among the Arabs who prescribed it was Mesue (see 'Rei Herbariæ,' Spring., vol. i., p. 249), also Bhazes (c. 173). Alston in his 'Materia Medica' speaks of turbith as a strong and resinous cathartic, and recommended in his days in gout, dropsy, and leprosy. The plant is known to the modern Greeks by the name of τουρπεθ. It is a native of the Society and Friendly Isles, as well as of India, of the New Hebrides and of New Holland. Virey, in his 'Histoire Naturelle des Medicamens' (p. 184), speaks of the root of the *Convolvulus turpethum* as more drastic than the common jalap, which, however, does not seem to be found in India" ('Mat. Ind.,' ii., p. 384).

Wallich, Gordon, and Glass considered this drug to be of considerable value as a cathartic. Sir W. O'Shaughnessy ('Beng. Disp.,' p. 504) found it so uncertain in its operation that he pronounced it unworthy of a place in the Pharmacopœia, but he does not give any particulars as to the method of administration he employed. Further experiments with the drug are required, as there seems to be no doubt of its efficacy in native hands.

Description.—The turbith of commerce consists of the root and stem of the plant cut in short lengths, usually from ½ to 2 inches in diameter; the central woody portion is often removed by splitting the bark on one side. The exterior surface has a twisted rope-like or columnar appearance and is of dull grey colour. A transverse section shows a porous surface of a dirty white colour and loaded with pale yellowish white resin; through this substance pass numerous bundles composed of large vessels and woody fibre. The drug is free from smell, but has a nauseous taste which is only perceptible after it has been some time in the mouth. In some specimens all or a portion of the central wood remains. It resembles a piece of rotten cane. Black nisot presents a similar appearance, but is of smaller size and of a darker colour.

Microscopic structure.—The epidermis consists of tubular brown cells. The parenchyma is starchy; in it are thickly scattered very large resin cells and numerous rosette-like raphides. The many large vascular bundles are composed of large dotted vessels surrounded by wood-fibres; each of the prominent external ridges of the bark contains one of these bundles. The central cane-like woody column of the root or stem, when present, is seen to be divided into four parts by four bands of parenchyma (medullary rays); it consists of large dotted vessels connected together by narrow portions of woody fibre.

The black nisot has exactly the same structure as the white.

Chemical composition.—Turbith resin consists of a small quantity of soft resin soluble in ether, and of a substance insoluble in ether, benzine, sulphide of carbon and essential oils. This substance has been named turpethine and is present in the root to the extent of 4 per cent. It has been examined by Spirgatis, who describes it as a grey powder having a powerfully irritant action upon the mucous membranes of the mouth and nose, and being analogous in its reactions with jalapine and convolvuline. Under the action of alkaline bases it is transformed into turpethic acid and in the presence of hydrochloric acid it becomes converted into glucose and turpetholic acid (*Zeitschr. der Chemie und Pharmacie*, 1865).

BATATAS PANICULATA, *Chois.* CONVOLVULACEÆ. *The root.* *Vernacular.*—BIBAI-KAND (Hind.), BHUI-KUMRA (Beng.), BHUI-KOHALA (Bomb.), MATTA-PAL-TIGA (Tel.), PHAL-MODECCA (Mal.).

History, Uses, etc.—This plant is mentioned by the early Sanskrit writers on materia medica under the names of Vidari and Bhumiku shmánda.

The large tuberous root is considered tonic, alterative, aphrodisiac, demulcent and lactagogue. In the emaciation of children, with debility and want of digestive power, the following diet is recommended. Take of vidari, wheat flower and barley, equal parts, and make into a confection with milk, clarified butter, sugar and honey. Susruta gives several prescriptions for its use as an aphrodisiac. The simplest is as follows: Macerate the powder of the root in its own juice and administer with honey and clarified butter. Vidari enters into the composition of several diuretic and demulcent mixtures (Confer. Dutt 'Hindu Mat. Med.' p. 205). Rheede ('Hort. Malab', ii., pp. 101–102, t. 49) notices the use of the root dried in the sun, powdered and boiled with sugar and butter to promote obesity and moderate the menstrual discharge. In Bombay it is used medicinally for the above-mentioned purposes, and can always be obtained in the druggists' shops. The plant is commonly cultivated in gardens, on account of its handsome rose-coloured flowers, which appear in the rains.

Description.—The root is a forked tuber, sometimes as much as 10 to 12 lbs. in weight; externally it is of a grey colour and somewhat warty and scabrous. When a transverse section is made the cut surface is of a dirty white colour and marked by concentric rings which are formed by the vascular and laticiferous vessels; from the latter a viscid milky fluid exudes. The taste is astringent and somewhat acrid, not unlike raw potato.

Microscopic structure.—The bulk of the tuber consists of a starchy parenchyme. The vascular system is scalariform. The lacticiferous vessels are most numerous towards the cortical part; raphides abound.

Commerce.—The tubers are sold by the herbalists and are very extensively used in Bombay. The largest fetch about two annas.

CORDIA MYXA, *Linn.* C. LATIFOLIA, *Roxb.* BORAGINACEÆ. *The fruit. Vernacular.*—LASORA (Hind.), BAHUBÁRA (Beng.), BHOKAR, SAPISTÁN (Bomb.), NARUVILLI (Tam.)

History, Uses, etc.—The dried fruits of these trees are the Selu of Sanskrit writers, the Sapistan of the Mahometans, and the Sebestens of old European works on materia medica. Both trees are common in many parts of India. On the western coast *C. latifolia* is abundant in Guzerat, where it is called Burgoond, and *C. myxa* in the neighbourhood of Bombay. The natives pickle the fruit of both trees. Medicinally the dried fruit is valued on account of its mucilaginous nature and demulcent properties; it is much used in coughs and chest affections, also in irritation of the urinary passages; in larger quantities it is given in bilious affections as a laxative. Mahometan writers describe two kinds of Sapistan: the greater (*C. cordifolia*), the pulp of which is separable from the stone, and the lesser (*C. myxa*), the pulp of which is adherent. The word "Sapistán" is an abreviation of Sag-pistán which means in Persian "Dog's dugs." In Arabic they are called Dibk and Mukhitah. Both trees are minutely described by Roxburgh. According to Horsfield the bark of *C. myxa* is used by the Javanese as a tonic.

Description.—*C. latifolia.*—Drupe oblate, spheroidal, about an inch or inch and a quarter in diameter, smooth; when ripe, yellow. Pulp in large quantity, soft, clear and very clammy; one-celled. Nut nearly circular, laterally compressed, rugose on the outside, with a cavity at each end, the lower one deeper than the other; exceedingly hard, four-celled, though rarely all fertile. Seed solitary, ovate-oblong.

C. myxa.—Drupe globular, smooth, the size of a cherry, sitting in the enlarged calyx; when ripe, yellow; the pulp almost transparent, very tough, and viscid. Nut cordate, at both ends bidentate and perforated, rugose, somewhat four-sided, four-celled; but it rarely happens that all prove fertile. Seeds solitary (Roxb.). Both kinds of fruit when dry are shrivelled and of the colour of a dry prune. The pulp of *C. cordifolia* can be separated from the nut, that of *C. myxa* cannot. On sawing through the nut a heavy disagreeable smell is observable.

HERPESTIS MONNIERA, *H. B. et K.* SCROPHULARIACEÆ. *The Herb. Vernacular.*—BRAHMI (Hind., Beng.), NIR-BRAMI (Tam.).

History, Uses, etc.—Dutt informs us that this plant is the Brahmi of the native physicians of Calcutta, where it is considered to be a nervine tonic, useful in insanity, epilepsy, etc. Whether he is correct in taking it to be the Brahmi of Sanskrit writers is, I think, doubtful. In Bombay *Hydrocotyle Asiatica* is known by this name. Ainslie says that in Southern India the *Gratiola Monnieria* is considered diuretic and aperient, and useful in that sort of stoppage of urine which is accompanied with obstinate costiveness. Roxburgh mentions the use of the juice mixed with petroleum as an external remedy in rheumatism. These accounts hardly agree with the properties ascribed to Brahmi by Sanskrit writers. *H. Monniera* is a very common plant in moist places, such as the borders of tanks, etc., in the neighbourhood of Bombay, but I have not seen it made use of medicinally.

Description.—Stems several, annual, creeping, round, jointed, smooth, succulent; leaves opposite, sessile, obovate, wedge-shaped or oblong, smooth entire, obtuse, fleshy, dotted with minute spots; peduncles axillary, alternate, solitary, round, smooth, shorter than the leaves, one-flowered; flowers blue; bracts two-awled, pressing on the calyx laterally; calyx five-leaved, the exterior three leaflets large, oblong, the two interior small, linear, all are concave, smooth, pointed and permanent; corolla campanulate, border five-parted, nearly equal; anthers two-cleft at the base, blue; stigma large, somewhat two-lobed; capsule ovate, two-celled, two-valved; seeds very numerous (Roxburgh 'Flora Ind.,' i., p. 141).

BARLERIA PRIONITIS, *Linn.* ACANTHACEÆ KARUNTAKA (Sans.), KATSAREYA (Hind.), KANTAJUTI (Beng.), KALSUNDA (Bomb.), SHEMMÚLLI, VARAMÚLLI (Tam.)

This is a very common plant near the sea shore in Bombay and the neighbourhood. The natives apply the juice of the leaves to their feet in the rainy season to harden them, and thus prevent the maceration and cracking of the sole which would otherwise occur. Ainslie says that the juice of the leaves, which is slightly bitter and acid, is a favourite medicine of the Hindus of Lower India, in those catarrhal affections of children which are accompanied with fever and much phlegm. It is generally administered in a little honey or sugar and water, in the quantity of two tablespoonfuls twice daily ('Materia Ind.,' ii., p. 376). *B. prionitis* is the Coletta-veetla of Rheede ('Hort. Mat.,' ix., p. 77, t. 41), and the *Hystrix frutex* of Rumphius ('Amb.,' vii., t. 13).

Description.—Stem short, erect; branches numerous, opposite, erect, round, smooth; the whole plant two to three feet high; thorns axillary, generally about four, straight, slender, sharp; leaves opposite, decussate, short petioled, oblong, waved, a little mucronate, smooth; flowers axillary, generally solitary, sessile, large, yellow; bracts uncertain, when there are no thorns on the same axil there are two, opposite, linear daggered, besides an undetermined number of very small ones; stamens, the long pair projecting, their filaments compressed; stigma entire, cylindric, open, pitted; capsule conical, two-seeded, one seed in each cell (Roxb.).

JUSTICIA ECBOLIUM, *Linn.* ACANTHACEÆ.

Udwjati (Hind.), Rán-oboli (Bomb.), is a small shrub very common in the Concon. The roots are prescribed in jaundice and menorrhagia.

Description.—Roots tuberous, spindle-shaped, as thick as a quill, several inches in length and covered by a dark brown bark; stems several, straight-jointed and swelled above the joints, woody and round below, quadrangular and tender above; leaves elliptic oblong, attenuated at both ends, pubescent or glabrous; spikes terminal, tetragonal; bracts oval, quite entire, ciliated, mucronate, as long as the capsule; flowers azure-coloured, turning red as they fade; capsule half an inch long, two-seeded.

ACANTHODIUM SPICATUM, *Delile* (?). ACANTHACEÆ. *The seeds.* *Vernacular.*—UTANGAN (Hind.), UTINJAN (Bomb.).

History, Uses, etc.—Under the local name of utinjan, and the Persian name anjurah, an acanthaceous seed is sold in the Bombay shops. From an examination of the capsules which are sometimes found mixed with the seeds there would appear to be little doubt that they are those of the plant placed at the head of this article. Utinjan is a standard native remedy, and is universally kept in the druggists' shops. The author of the 'Makhzan-ul-adwiya' (article Anjurah) gives us the following account of it, from which it would appear that the true anjurah is the *Urtica prima* of Latin writers (*U. pilulifera*, Lin.), and that the seeds now in use in India have somehow come to take the place of the genuine article:—"Anjurah is a Persian word; it is the Kuriz of the Arabs, the Kurnah of Shiraz, the Kajeet of the Turks, the Utangan of the Indians, the Urtik-parim of Latin writers and the Hartikah of Gilan. The plant has numerous serrate leaves which are armed with prickles; the stem is still more prickly; when it comes in contact with the body it causes redness, burning and itching. The flowers are yellow. The seed smooth and shining, flattened, of a brownish colour, larger than those of sesamum and altogether not unlike linseed. They are the officinal part and if good should be heavy and of a brown colour." Medicinally they are considered to be attenuant, resolvent, diuretic, aphrodisiac, expectorant and deobstruent.

Description.—The utinjan of the Bombay shops consists of the seeds mixed with a large proportion of broken pieces of the capsule and a few entire fruits. The latter is mitre-shaped, about three-tenths of an inch long, and two-tenths broad, laterally compressed; sides furrowed; surface polished, of a chestnut colour; capsule two-celled, two-seeded; seeds heart-shaped, flat, covered with long coarse hairs; when soaked in water the hairs disintegrate and produce a large quantity of viscid mucilage.

Microscopic Structure.—Each hair is made up of several columnar cells, each of which contains a spiral fibre, which upon the solution of the cell wall uncoils and imparts an unusual stringiness to the mucilage.

Commerce.—Utinjan is imported into Bombay by way of the Red Sea. Value Re. 1¼ per pound.

LEONOTIS NEPETÆFOLIA, *Br.* LABIATÆ. HEJURCHEI (Beng.), MATIJER, MATISÚL (Bomb.).

This is a large and conspicuous annual, common in the neighbourhood of villages. It is easily recognized by its globular, spinous heads of orange-coloured flowers. Roxburgh gives the following description of the plant:—"Stem annual, straight, four-sided, simple, from 4—6 feet high. Leaves opposite, spreading, petioled, cordate, serrate, pointed, downy, from 4—8 inches long and 2—3 broad. Floral leaves lanceolate, depending. Petioles channelled, winged with the decurrent leaf; verticels globular, 2—3 or 4, towards the apex of the plant about 5 inches asunder. Involucres many, subulate. Flowers numerous, of a deep rich orange colour. Calyx 10-striated, 8-toothed; corolla under lip very short, 3-toothed, at all times of a dirty withered colour.

The ashes of the flower heads mixed with curds are applied in Bombay to ringworm and other itchy diseases of the skin.

(*To be continued.*)

ALEURONE.

Aleurone has recently become the object of a certain amount of interest, and was not long since the subject of a question at one of the University examinations. Nothing, however, has yet been published respecting it in this Journal, and very little in this country. The following notes, compiled from various works, have been supplied by Mr. Marshall Leigh:—

Aleurone grains were discovered by Hartig in 1855; their importance, however, was not generally acknowledged until Dr. Pfeffer published his researches in 1872 (*Jahrb. f. wiss. Bot.* 1872). These researches are still the standard work in Germany, and contain a larger amount of reliable information than any other.

The reservoirs of ripe seeds, the endosperm and cotyledons, always contain aleurone together with starch and oily matter. If the seeds contain much starch, as in the chestnut, the aleurone grains occupy the interstices and consist of minute granules; in oily seeds, however, the granules are found in the place of starch.

Their formation commences when the seeds have attained their last condition of ripeness and the funiculus become sapless; the seed loses water by evaporation, the mucilaginous mass in its interior gradually becoming firmer, and the grains of aleurone separate from the turbid matrix.

The origin of the grains is therefore simply a dissociation which arises from loss of water; on germination, the cells absorb moisture and the aleurone grain again unites with the matrix.

The matrix surrounding the grain may be considered as the protoplasmic mass of the cell, in which water is replaced, on drying, by oil or starch.

The use of aleurone is to act as a reservoir of protein, in the same way as starch and oil globules are reservoirs of hydrocarbons, the protein being the source from which the protoplasm of the young plant is formed upon germination.

Occasionally the grains are seen to have a crystalline appearance due to their enclosing crystals of oxalate of calcium, more frequently however they contain non-crystalline and clustered granules of a double phosphate of calcium and magnesium mechanically enveloped during the contraction of the proteine.

Aleurone grains are absolutely insoluble in alcohol, ether, benzol or chloroform; they are mostly soluble in water and can by that means be separated from the enclosed crystals or globoids.

Their chemical composition has recently been made the subject of observation by several chemists. In 1872,* Ritthausen exhausted the seeds by alkaline solutions and demonstrated the presence of vegetable caseins, such as legumin and conglutin.

In 1877,† Weyl published some observations which tended to show that the proteids existed as globulins and that the caseins extracted by Ritthausen were the products of alteration caused by his alkaline solutions.

Mr. Sidney Vines‡ has lately contributed an article to the Royal Society which in many respects confirms Weyl's observations.

An extract of the seeds of blue lupin (*Lupinus*

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* 'Die Eiweiss Korper der Getreidearten,' 1872.

† 'Zeitschr. fur Physiol. Chemie,' 1877.

‡ 'Proc. Roy. Society,' December 19, 1878.

varius) in common salt was found to contain two proteids belonging to the group of globulins and hitherto known to occur only in animals: myosin, a constituent of dead muscle, and vitellin, a constituent of the yolk of egg; these two substances, vegetable myosin and vegetable vitellin, were found to have exactly similar reactions to the animal substances of the same name.

An aqueous extract of the seeds contained another proteid having all the properties of peptone and agreeing very nearly with the α peptone of Meissner, or hemialbumose of Kuhne,* an easily decomposable peptone formed by the action of gastric juice on proteids.

ALKALOIDS OF THE BERBERIDACEÆ.†

BY ALBERT B. PRESCOTT, M.D.,

Professor of Organic and Applied Chemistry and Pharmacy, University of Michigan.

The discovery of an alkaloid in any plant is undoubtedly a fact of the first importance, both as concerning the strictly chemical interest of the plant and as bearing upon its medical application. But, of course, the fact that a plant contains or does not contain one or more alkaloids, is not in itself a decisive fact in materia medica. Over a hundred alkaloids have been definitely distinguished in the vegetable kingdom, and it is probable that a greater number remain undiscovered. Possessing a class of substances in class character chemically distinct, and comprising articles of such intense power and diversified influence upon the human organism as strychnia, quinia, atropia, aconitina, morphia, etc., the medical world must look with the liveliest interest upon the finding of new alkaloids in well known medicinal plants. But the medical world would not, and should not, venture to trust upon the lines of analogy beyond the support of facts. Alkaloids, like all other agents, must be put directly to the proof, as to their physiological power and therapeutic value. Testimonies of trial—a fair trial in a fair field—are wanted. Certain alkaloids have but a third-rate medicinal consequence, as the narcotina of opium, the brucia of nux vomica and the ergotina of ergot. Alkaloids are not the only substances known to stand distinctly as the active principles of plants. The resins of podophyllum, for instance, are stable, easily separated, and represent almost the entire medicinal power of the crude drug in a very concentrated form. It has stood in the books since 1863, though now disproved, that the podophyllum root contained an alkaloid, berberina, but the question of the use of this alkaloid has been wholly overshadowed by the greater potency of the resins. Finally, it must not be forgotten that a larger number of medicinal plants contain a group of therapeutic agents, presented by nature in most useful proportions, so that if these several bodies could be separated and safely preserved by chemical skill we could do no better than to put them together again in the original proportions for administration. The greater number of vegetable drugs are best kept intact, with only such rejection of inert matters and concentration of medicinal virtues as the fluid extract, when skilfully and faithfully made, best provides. Nevertheless, an alkaloid of any decided mechanical power, capable of production in purity, is always an article of importance.

At this time four at least of the medicinal plants of the barberry family have been found to contain alkaloids, as follows:—

Berberis vulgaris. Common barberry; root, bark. Berberina (Buchner, 1835); oxycanthia (Polex, 1836).

Berberis aquifolium. Pacific coast. Root. Berberina (Neppach, 1878); mahonia* (Jungk, Detroit, 1879).

Berberis aristata; B. asiatica: B. lyceum. Indian barberry bark. Berberina (Solly, 1843; Stewart, 1866).

Jeffersonia diphylla. Twinleaf. Rhizome. Berberina and a white alkaloid (Mayer, 1865).

Berberina, the alkaloid named from the berberideæ, is probably more widely distributed than any other alkaloid known. It is found in five botanical families, or as Husemann classifies, in seven families, as follows:—

Of the Berberidaceæ, in *Berberis vulgaris*, *B. aquifolium*, the Indian species of *Berberis*, and *Jeffersonia diphylla.* Also, according to Husemann, in *Caulophyllum thalictroides*, or blue cohosh.

Of the Ranunculaceæ, in *Hydrastis Canadensis*, with two other alkaloids; in *Coptis trifoliata*, goldthread, with another alkaloid; in *Coptis teeta*, India, 8½ per cent. berberina; and in *Xanthorriza apifolia*, or yellow root.

Of the Menispermaceæ, in Calumba root, *Cocculus palmatus*, along with columbin and columbic acid; in *Menispermum Canadense*, Canadian moonseed; and in *Coscinium fenestratum*, or Ceylon calumba wood.

Of the Anonaceæ, in *Cœlocline polycarpa.*

Of the Rutaceæ, in *Xanthoxylum clava-Herculis*, the Hercules club, of West Indies.

Also, according to Perrins, in the St. John's root, of Rio Grande, and the pachinello tree, of New Grenada.

In many instances berberina is accompanied by a colourless alkaloid in the same plant. In calumba root the alkaloid is believed to be formed, along with the calumbic acid, from colombin, a neutral body.

The English chemist, Perrins, in 1862, after a full report upon the chemistry of berberina, a report which was the first and is still the fullest given in Europe, thus remarks upon the value of this alkaloid (*Journ. Chem. Soc.*, xv., 456): "Though it has long been used as a fine yellow dye, more especially for animal tissues, its chief claims to usefulness do not reside in its application to the economic arts. . . . The polished Greeks the semi-barbarous nations of Hindostan and China, the North American Indians and the natives of tropical Africa have been all impressed with the medicinal value of berberina."†

THE MIGRATION OF PLANTS FROM EUROPE TO AMERICA, WITH AN ATTEMPT TO EXPLAIN CERTAIN PHENOMENA CONNECTED THEREWITH.‡

BY PROF. E. W. CLAYPOLE, B.A., B.SC. (LONDON), OF ANTIOCH COLLEGE, OHIO.

Underneath the great wave of human emigration from the so-called Old to the so-called New World, underneath the noisy busy surface tide that has swept westward from the shores of Europe to these of America during the last two hundred years, there has existed another and a less conspicuous wave, another and a less prominent tide of

* 'Verhandl. d. Nat. Med. Vereins zu Heidelberg,' 1876.

† From *New Preparations* for September, 1879.

* Dr. Jungk and *New Preparations* are to be congratulated upon the identification of this alkaloid, with ultimate analysis, determination of formula and analytical reactions, as given in the August number of that Journal. Further report promised, with investigation of physiological effect, etc.

† It is unfortunate that the hydrochlorate of berberina, a beautiful bright yellow salt, should have so often gone under the name of *hydrastia*, the cognomen of the more abundant of the two colourless alkaloids in hydrastis. In an examination of "hydrastin," of commerce, Mr. Beach, in 1875, working under the observation of the writer, found in six samples, respectively, 1·7, 17·4, 6·7, 5·1, 6·8, and 0·0 per cent. of hydrastia alkaloid; and found, respectively, 35·1, 21·9, 6·9, 28·0, 36·0, and 100 per cent. of berberina hydrochlorate.

‡ Paper read before the Montreal Horticultural Society, 1877.

emigration. Westward in its direction, like the former, it has silently accomplished results that seldom strike the superficial eye, but yet are scarcely less in magnitude than those which have followed the advent of the white man to the shores of America.

I allude to that slow and noiseless immigration of European plants which has been going on for many years, and which probably commenced when the first European vessel touched our shores. Side by side with the displacement of the red man by the white man has gone on the displacement of the red man's vegetable companions by plants which accompanied the white man from his trans-Atlantic home. Not more completely have the children of the Pilgrim Fathers made themselves at home on the banks of the Charles and the Neponset, not more completely have the successors of Champlain and Jacques Cartier established themselves along the St. Lawrence, not more completely have the descendants of the aristocratic colonists of Maryland and Virginia appropriated the shores of the Chesapeake, than have the homely weeds of England and France made themselves at home in the New World; established themselves on its soil, appropriated its fields, its gardens and its waysides. Nor have the older States alone been seized by these European invaders. The stream has flowed beyond them, and as no village or hamlet in the West is without its population of European descent, so too it is never without its plant population of European weeds. To the American, born and reared among them, these things have none of the significance which they possess to him who comes across the Atlantic, conversant with the flora of Europe, and anticipating a complete change of plant life as well as of place and scene after voyaging 3000 miles. And yet I scarcely know which strikes the thoughtful stranger most, the resemblance or the difference between the Old which he has left or the New to which he has come. Differences of course, there are, many and great, but in the face of the fact that the new country with its millions of inhabitants is using the same language and laws and customs as the old country he has so lately left, they are less striking. The same is true of the American flora. The writer will never forget the impression made on his own mind when soon after landing in America he set to work upon the botany of his new home. The summer, with its floral treasures, had gone by and the brilliant New England foliage told that winter was rapidly approaching. In the woods and shrubberies the falling leaves revealed new types of tree-life mingled with old forms well known in England. But on the ground, in the fields, along the waysides and fences were many well-known plants. Old acquaintances, friends and foes both, which he had years before learned to know—sometimes to cherish and often to uproot—when a boy in the old country. So far was the flora from being totally new that sometimes he was puzzled to know whether, on a given space, there were more strange or familiar forms around him. This result was quite unexpected and opened before him a new and very interesting field of observation and investigation, which has continued ever since to occupy at intervals his attention. The fact here mentioned—this migration of European plants into America—became all the more striking when, after a longer residence in this country, and a further study of its flora, he looked back to his earlier botanical studies in Europe and observed that this vegetable migration is almost entirely in one direction. In the midst of this rich flora, aliens by origin, but naturalized by the letters patent of time, he looked back to his old home and tried, but almost in vain, to recall American forms of plant life naturalized there. Scarcely a solitary specimen could be found to which the Old World, always chary of conferring its citizenship upon foreigners, could be said to have given the rights to home. Whence comes this striking difference? Why is the Western World so hospitable and the Eastern so inhospitable to vegetable strangers? Is it that these Western strangers do not claim naturalization? Do they feel their inability to make way against the crowded life of the East, and therefore fail in the intenser struggle for existence which marks newer and more highly developed Europe? The full answer to this question is at present impossible, and the writer desires this paper to be considered merely suggestive. Facts must be gathered before conclusions can be drawn. The field is so vast and the need of patient and continuous observation so great that many years may pass ere a solution of the problem can be reached. "The harvest is plenteous but the labourers are few."

A few illustrations will show the kind of facts to which this paper is intended to call attention, and the writer's purpose will be fully served if its perusal should incite any who are familiar with European botany to note the occurrence of European species in different localities, and especially if it should lead any to inquire as to the cause which prevents the naturalization of others that can only be raised here under cultivation.

The careful observer will notice foreign plants in all stages of naturalization. Some are at present only cultivated in fields or gardens, others have escaped from the domain of the plough and the spade, and are maintaining a precarious existence among conditions not altogether congenial, and are liable to extermination at any time, by an unfavourable season. Others have a stronger hold and occupy the fence corner or the wayside, while a number, bolder and hardier, have emerged from these sheltering nooks, and have begun an independent career among the indigenous vegetation, hoping, often in vain, to hold their own against the aborigines of the land. Not a few, more hardy still, or more adaptable in their nature, have altogether cut themselves loose from the cultivated field and the domain of man, have ventured out into open conflict with the denizens of the soil, and emerged victorious from the struggle. By crowding upon them, by stifling them, by appropriating their food, they have succeeded in ousting their antagonists, the rightful heirs, as by similar practices the white man has ousted the red man from his ancestral land, and both now occupy the country often to the exclusion of all save the hardiest of the native tribes.

For example, the Scarlet Poppy (*Papaver dubium*), a weed so common in England that many a wheat field appears one sheet of glowing red when it is in full flower, must have come over to America many times in seed wheat, and is occasionally met with here in the fields, especially in Wisconsin and other North-Western States. Yet outside of these, it has never to our knowledge succeeded in propagating itself. It is quite scarce in America. The Giant Elecampane (*Inula helenium*), the Horseheal and Scabwort of the leech, so renowned among the old herbalists as a remedy in complaints of the chest, is but scantily diffused. The writer has met with it in the East near Boston and in the Island of Montreal, and it is abundant in the West in some parts of Ohio and Indiana.

The English Groundsel (*Senecio vulgaris*), a favourite with the keepers of canary birds, but by no means in equal liking of the English gardener, has failed to establish itself in America. A few specimens may occasionally be met with near gardens, but it shows here none of that reproductive power that makes it in England one of the earliest weeds in the spring, and the latest in the fall.

The Salsify, or Vegetable Oyster (*Tragopogon porrifolius*), a native of the Mediterranean region, but established in a few places in the south of England, whence it was probably imported, is most likely of late introduction, and still on trial, not having found a place in Professor Gray's 'Manual of the American Flora.' The writer has only found it once near St. Catharine's, in Ontario, in considerable quantities, flowering and apparently bringing its seed to perfection.

The Henbane, a dangerous narcotic (*Hyoscyamus niger*), is sparingly diffused in some places. It may be found in tolerable abundance on Fletcher's Field, near Montreal showing the same predilection as in England for dunghills and heaps of old bricks and mortar.

The Thorn Apple (*Datura stramonium*), a native of Asia and Europe, where it extends as far north as Sweden, is scantily met with in England, having escaped from gardens, where it prefers similar spots to those chosen by the Henbane. But it has been introduced into this country where, under a new name, "Jamestown (Jimson) Weed," it is only too well known. The American name seems to indicate that it was introduced or first noticed as a nuisance in the neighbourhood of Jamestown, Virginia.

The Common Hemp (*Cannabis sativa*), so valuable for its fibre, a native of the Caucasus and of the mountains of Northern India, only known in Western Europe in cultivation, and doubtless early brought here for economic purposes, has run completely wild, and may now be found in waste land near human dwellings, from the streets of Montreal and Boston to the west of Ohio, and probably farther still.

The Grape Hyacinth (*Muscari botryoides*), and the Star of Bethlehem (*Ornithogalum umbellatum*), both common English garden flowers, may be occasionally found in the vicinity of Montreal, as if longing, yet fearing, to strike for freedom from the control of man in their new country.

The Corn Cockle (*Lychnis githago*), so mischievous in English wheat fields, is tolerably common here in similar places, but has not succeeded in establishing itself outside of the protection of man. The same may, in the northern districts, be said of the common Red Clover (*Trifolium pratense*). In spite of its deep tap root and rank growth, it is unable to bear the cold, and an occasional severe winter will exterminate it if unprotected even in cultivated fields. Its near relative, however, the White Clover (*Trifolium repens*) was introduced in early days, and called by the Indians, "White Man's Foot." Longfellow sings in the story of Hiawatha:—

> "Wheresoe'er they tread, beneath them
> Springs a flower unknown among us—
> Springs the White Man's Foot in blossom."

This is much more hardy and seldom yields except to the severest frosts. It overruns field and wayside, fence-corner and common, holding its own against even the aborigines, and strangling them out by its tangled perennial roots. Early in the spring it secures such headway that larger and coarser plants are compelled to give way. Its flowers afford the honey bee so rich a harvest that its seeds are surely fertilized, and this double method of reproduction by root and by seed gives it such an advantage in the struggle for existence that it has spread rapidly over the country, and many an American common is as white with its flowers as is an English lawn with daisies. It is worthy of notice that similar results have attended the introduction of this plant into New Zealand. There also it has run wild, and is said to be pushing out some of the native species, among others the hard and stiff New Zealand flax (*Phormium tenax*), which is said to be unable to hold its ground against the strangling roots of the White Clover.

The English Buttercup (*Ranunculus acris*), beloved of English children and poets, especially of the school of Wordsworth, has overrun the north-east, and the writer has met with it even in the Canadian backwoods, where only a trail through the bush existed, carried doubtless in the hay taken thither to feed the horses and oxen of the lumbermen when driving logs in a Canadian winter.

The Barberry (*Berberis vulgaris*), with its graceful drooping stems and pendant racemes of bright yellow flowers and scarlet fruit, followed the pilgrims to Plymouth Rock, and like them has struck its roots deep in the bleak hills of New England, until now it is far more common in the neighbourhood of Boston than in any part of England with which the writer is acquainted.

Every one who has owned or worked a garden in America has made the acquaintance of the ubiquitous Purslane (*Portulaca oleracea*), so fondly mentioned by the author of 'My Summer in a Garden' as "pusley," one of his pets which stuck to him so closely that he could not get rid of it. This, the only *valuable* (start not, American gardener, it is even so) plant of its order, is cultivated as a salad and pot-herb; but, transplanted into our soil and under our skies, it has squatted on the land until nothing save constant watchfulness and hoe can prevent its complete monopoly of the garden. It occupies here the place of the sow-thistle in England. Both break off at the surface of the ground as soon as an attempt is made to pull them up, and when the gardener's back is turned both send out a new crop of leaves, flowers and seed, to punish him for his assault. The writer would like to suggest to the Horticultural Society of Montreal the desirability of offering a prize for the best illustrated essay on the means of turning this European immigrant to account in the Canadian and American kitchens. Possibly the surest way of getting rid of it would be to make it useful. Useful plants are seldom so abundant as to be a nuisance.

The Common Water Cress (*Nasturtium vulgare*)—when, how, and by whom introduced we know not—is now so abundant in some places that one is almost tempted to look upon it as a native. Many of the streams of New York and of South-Western Ohio are as thickly set with it as are any of the water-courses in old England.

The Common Parsnip (*Pastinaca sativa*) has run wild in America in fence-corners and along railway banks near Montreal and other places.

The Hemlock (*Conium maculatum*), of Socratic infamy, has taken possession of certain spots, as it does in Europe. The writer has seen acres of it along the banks of the White River at Richmond, in Indiana.

The Ox-Eye Daisy, or White Weed of New York (*Chrysanthemum leucanthemum*), has crossed the Atlantic with hay-seed and so completely monopolized many of the meadows in the Eastern States that they more resemble snowfields than hayfields when the plant is in blossom. It is slowly spreading west and south, and last summer the writer found it in Ohio close to the State line of Indiana, appearing in full vigour and of large size.

The Tansy (*Tanacetum vulgare*), valued by herbalists as a tonic, is not uncommon. The crimped variety (*crispum*) grows near Montreal.

The Chicory (*Cichorium intybus*), with its stiff stem and lovely but evanescent azure blue flowers, wild in England and well known to manufacturers of coffee (the genuine article!) is now one of the wild flowers of the Island of Montreal.

The Great Mullein, or Flannel plant (*Verbascum thapsus*), common in waste ground in Europe and Asia, is more common here than in England in similar situations, but never so far as the writer is aware on ground that is truly wild.

The Yellow Toadflax, or "butter and eggs" (*Linaria vulgaris*), has been introduced with crops, and now shows its two-tinted blossoms in gardens and on waysides, and once in is with difficulty eradicated.

The Catmint or Catnip (*Nepeta cataria*), a native of England and southern Europe, is now as common in America. The Burdock (*Arctium lappa*) is another importation from the Old World, "who left his country for his country's good," and has proved like many others who did the same no blessing to his adopted land. Moreover, he has left so many of his kith and kin behind him that his absence is not noticed. Every boy knows the hooked burs or seed vessels of this plant, which cling so closely to the clothes of men, the fleeces of sheep, and the manes of horses that its rapid extension is inevitable.

The Great Celandine (*Chelidonium majus*), with its bright yellow flowers and orange juice, may be found on the eastern seaboard and near dwellings in the inland States.

The Shepherd's Purse (*Capsella bursa-pastoris*), a common weed in England, is common in Canada and the States.

The Bladder Campion (*Silene inflata*) spreads its white petals by the roadside, while its little congener, the Mouse Ear (*Cerastium vulgatum*), grows ensconced, as in Europe, in gardens and in fields.

Our list is long enough, but a few remain too common to be completely omitted. Every street and road in many parts of the country is covered with a soft summer-green carpet of the little insignificant Knot-grass (*Polygonum aviculare*). It forms a substitute for grass where grass cannot find a foothold and keeps its ground in defiance of dust and traffic and heat.

Not a few of the European grasses, too, imported for meadows, have escaped from cultivation and succeeded in establishing themselves more or less firmly as occupants of the soil. The little Annual Meadow Grass (*Poa annua*), the Timothy (*Phleum pratense*), the Fox-tail (*Alopecurus pratensis*), the Redtop (*Agrostis vulgaris*), the White Bent (*Agrostis alba*) have become perfectly wild in different places. The Cocksfoot (*Dactylis glomerata*), the Couch or Quick grass (*Triticum repens*) have been less successful. The former apparently dislikes the hot sun of America, though it does well in the shade. The so-called Blue Grass, more properly the June Grass (*Poa pratensis*), of the famous Kentucky pastures, has almost monopolized the ground in many places, and the Chess or Cheat (*Bromus secalinus*) constantly cheats the American farmer into a more than Darwinian belief in the transformation of species, not, by the way, upward, but downward. The Purple Finger Grass (*Panicum sanguineum*), an immigrant from Southern Europe, found but not native in England, may be gathered by the wayside in the Eastern and Midland States. Finally, in some parts of the country the hay betrays to the European by its scent the presence of the Sweet Spring Grass (*Anthoxanthum odoratum*), so well known as giving much of the finest of the fragrance to an English hayfield.

In thus noting instances of vegetable immigration from Europe to America, another side of the question must not be overlooked. Many common English plants have totally failed to secure a foothold here. The seed of the English Daisy must have come over in almost every case of grass-seed that has been imported; yet it has not become naturalized in America. The only instance with which the writer is acquainted of its lasting for several years in a lawn, as in England, occurred in the immediate vicinity of Montreal, and was communicated to him by a friend in that city. It would therefore appear that the heat of summer rather than the cold of winter is the barrier to the establishment in the New World of the "wee modest crimson-tipped flower," so familiar to every British eye. Equally "conspicuous by their absence" are the Primrose and the Cowslip, the flowers of childhood in the old country. Many other instances of this kind might be adduced, but the converse side of the problem now claims attention.

(*To be continued.*)

FRAXINUS CULTIVATION AND MANNA PRODUCTION.*

BY J. JANSSEN, FLORENCE.

The planting of Fraxinus trees in Italy yields pecuniarily a good return without any great trouble or cost being incurred. The best trees for planting are *Fraxinus Ornus*, L., and *F. excelsior*, L. The former species has been artificially introduced into Sicily and Calabria, though both species occur there growing wild.

When the tree has attained an age of eight to ten years it is used in the production of manna. For this purpose a horizontal incision is made in the bark with a sharp garden knife, equal to about one-fifth of the entire breadth. In doing this the following points are observed. In the first year the incisions are made upon the side of the tree towards which it inclines (the Fraxinus scarcely ever grows straight) and they always progress from below upwards. The first incision is made at the base of the tree, and then one incision over another at intervals of one centimetre until the ramification of the branches is reached. The incisions are then made on the opposite side, commencing at the base of the tree as before. From the beginning of July to the end of September an incision is made daily in each tree.

The manna is collected during nine years, when the tree becomes exhausted and incapable of production. For this reason during the ninth year incisions are made simultaneously on both sides of the tree in order to use it up completely. The tree is now cut down, leaving only a single shoot, which at the end of four or five years is capable of production.

The juice which flows only from the incisions is at first brownish and has a bitterish taste; but after some hours in contact with air it becomes solid, whitish and sweet, forming long pipes or small stalactites. But frequently the juice is very fluid and it then runs down, forming a kind of long plaster that adheres to the bark, whilst a portion drops to the ground where it is collected upon leaves of *Ficus Indica*.

The manna is collected once in the week and only in fine weather; if rain falls the gathering is hastened. Rain and dew interfere with the profits. A man provided with two vessels goes round to the trees, collects the pipes and scrapes off the smooth mass lying on the surface, putting each sort into a different vessel, as in commerce they have a very different value. The first sort is the "manna canellata," the second "manna in sorta." After the collection both sorts are spread out in the sun to dry a little and then sent into commerce.

The gross returns from a hectare of land is on the average 830·35 Italian francs, viz., manna canellata 6 kilos at 22·10 = 132·60; manna in sorta, 94 kilos at 7·50 = 705; wood cut down, 12·75. Total 850·35 francs.

* *Pharmaceutische Zeitung*, Oct. 15. From the 'Agricoltina meridionale.'

PREPARATION OF PERFECTLY PURE HYPOPHOSPHITE OF SODA.*

BY M. BOYMOND.

It has long been known that the preparation of hypophosphite of soda by the action of phosphorus on a solution of soda is not a practical process. This finds a ready explanation in the property possessed by the hypophosphites of oxidizing rapidly in alkaline solutions in proportion as the base is energetic and the solutions concentrated. It consequently happens that in heating phosphorus in a strong solution of potash or soda, much phosphite is formed, and in boiling hypophosphites in such solutions they are converted, with disengagement of hydrogen, into phosphites and phosphates. Besides the formation of considerable a quantity of phosphite, this process presents the inconvenience that the phosphite and phosphate formed, as well as the alkali in excess, are dissolved, and are very difficult to eliminate.

As to the preparation of the hypophosphites by means of a milk of lime, although that base presents important advantages over soda,—as the quantities of phosphite and phosphate formed are less considerable and the elimination of these salts and the lime in excess is more easy,—this process does not yield a perfectly pure product, the proportion of phosphite and phosphate present amount sometimes to as much as 5 per cent. Hypophosphite of soda prepared with such a salt of lime could not be pure. Besides, even when the hypophosphite of lime is perfectly pure, the evaporation in a water-bath of an alcoholic solution of pure sodic hypophosphite is sufficient to give rise to an appreciable quantity of phosphite.

* *Répertoire de Pharmacie*, vol. vii., p. 328, from the *Schweizerische Wochenschrift f. Pharmacie*, vol. xvii., p. 92.

The author has obtained this salt entirely pure by employing, in the place of hypophosphite of lime, a clear solution of hypophosphite of baryta, in the following manner:—

25 grams of commercial hypophosphite of soda, containing phosphite, and 1 gram of hypophosphite of baryta (sufficient to precipitate all the phosphorous and phosphoric acid contaminating the product) were mixed and water added so that the volume of the whole solution did not exceed 50 c.c. Some time afterwards, without filtration, nearly 200 c.c. of absolute alcohol were added, the mixture was allowed to stand, and then filtered. In this way all the phosphoric acid was precipitated, as well as nearly all the excess of baryta in the state of hypophosphite. To the clear filtered liquid was added, in small quantities, sufficient solution of sulphate of soda to precipitate the baryta still dissolved; then about 100 c.c. of absolute alcohol was added and the liquid allowed to stand. The clear liquid obtained by filtration and decantation was afterwards mixed in a larger vessel with about 500 c.c. of absolute alcohol, and as much absolute ether as was required to agitate the mixture strongly, when all the hypophosphite separated. The salt was collected and deprived of the last traces of alcohol and ether by passing over it a current of dry air.

The ethereo-alcoholic liquid, after the separation of the salt, was completely neutral. The hypophosphite, crystallized in small needles, dissolved perfectly in water and in alcohol, and the solution was not rendered turbid by the addition of baryta or sulphate of soda. Once only it contained a trace of sulphuric acid, consequent upon the employment of a slight excess of sulphate of soda.

ERYTHROXYLON COCA.*

BY D. F. SHULL, PH.G.

The leaves of this plant, which grows wild in South America, and belongs to the natural order Erythroxylaceæ, possess peculiar stimulating properties, which properties have been of late the subject of considerable investigation.

Specimens of the leaves which I obtained were of an oval-oblong pointed shape, resembling the leaves of tea, about one inch in breadth and from one and a half to two inches in length; with an entire margin, short, delicate footstalks, with a small vein in each side of the mid-rib, running from the base to the apex. The leaves when of good quality are of a light green colour, with an aromatic odour similar to tea.

The leaves when chewed have a slightly astringent and aromatic taste, producing smarting and a feeling of numbness to the tongue. The smarting and feeling of numbness produced are due to the alkaloid cocaina. The alkaloid, when taken in small doses, produces the same effect, except in a more marked degree. I also found that those specimens of the leaves which did not possess this property were entirely devoid of any medicinal effect, which goes to prove that the alkaloid must be the active principle.

There is much variance in the quality of the leaves. Some specimens obtained, which were of a light brown colour, I found to be entirely worthless. A good quality of leaves can be readily recognized by their taste and colour.

The alkaloid cocaina I obtained by exhausting the leaves with alcohol, precipitating the colouring matter with lime, filtering, evaporating to a small bulk, adding water and evaporating until all the alcohol was driven off, adding carbonate of potassa, filtering, saturating with carbonate of potassa, and dissolving out the alkaloid with ether, then decolorizing with charcoal, and allowing the menstruum to evaporate and the alkaloid to crystallize. Cocaina forms small, colourless prismatic crystals, inodorous, with bitter taste, producing smarting and a sensation of numbness to the tongue. In small doses it has strong stimulating properties; it produces a feeling of intoxication. I also obtained the alkaloid from a decoction by treating with lime, evaporating to small bulk, saturating with carbonate of potassa and dissolving out with ether.

Cocaina is soluble in alcohol, ether, chloroform and water. I found the active principle not to be a glucoside by boiling it with dilute sulphuric acid and applying Trommer's test for glucose.

I obtained, associated with cocaina, an uncrystallizable principle of a light brown colour, strong odour, sharp burning taste, with an alkaline reaction, soluble in alcohol, ether, chloroform and water.

The other constituents which I found were gum, tannin, wax and resin.

I prepared an extract by exhausting the powdered leaves with alcohol and evaporating at a temperature of 160° F. to the proper consistency. The preparation was of a green colour and of a resinous appearance, with the characteristic odour and taste of the leaves. When exposed to the air it does not harden, but absorbs moisture and becomes quite liquid. This makes it inconvenient for forming into pills, as they become quite soft in a few days. From one hundred parts of the leaves I obtained fourteen of extract.

A fluid extract was prepared by exhausting two ounces of the powdered leaves with alcohol, reserving the first ounce and a half and evaporating the remainder to half an ounce, and mixing this with the first. This preparation was of a light green colour, with the odour and taste of the leaves, and seems to be permanent.

An infusion was made by macerating two ounces of the powdered leaves in a pint of boiling water for four hours and straining with pressure. This preparation was of a light brown colour, with an aromatic and astringent taste similar to green tea.

Experiments were made with these three preparations by taking doses of a known quantity of leaves and doses of the preparations representing the same amount of the drug and noting the effect of each on the pulse. I found that all three produced the full stimulating effect of the leaves on the heart's action. Of these three preparations I think the fluid extract would be preferable, as it is not so liable to be affected by age as the others.

In a few experiments made as to the therapeutic effects of coca, I found that in doses of from 30 to 60 grains it produces a gently excitant effect, with an indisposition to sleep, in this respect resembling tea and coffee, but having a more decided action on the heart, increasing its contractions and giving elasticity to its action. It also possesses a peculiar stimulating power over the digestive organs, giving almost immediate relief to that feeling of depression after eating caused by indigestion. Taken in larger doses of from two to three drachms it excites the whole system, causing the face to flush and imparting increased vigour to the muscles as well as to the intellect, with an indescribable feeling of satisfaction.

I took note of the stimulating power on the heart's action of a good quality of coca in doses of thirty grains each, on four young men at the same time, by noting the pulse of each before taking and again twenty minutes after taking, with the result of an increase of the pulse in the first from 90 to 110, in the second from 76 to 86, in the third from 66 to 82, and in the fourth from 92 to 125, making the average increase of the pulse $19\frac{3}{4}$.

Many contradictory statements have been made by those who have studied coca as to its stimulating properties. I think this is largely due to the difference in the quality of the leaves used. Some extraordinary stories are told by travellers in South America of the endurance of hard labour, famine and loss of sleep, afforded to the natives by the use of coca. They are probably in most cases exaggerated, although there can be no doubt that the fresh leaves used by them are more active than those we obtain.

* From the *Druggists' Circular and Chemical Gazette*, October, 1879.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 22, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

ADULTERATION OF CREAM OF TARTAR.

THE adulteration of "cream of tartar" still continues to be a source of vexation, and from inquiries we have made, there seems to be good reason for apprehending that many persons who use this article for various purposes, as well as those who supply them with it, may find themselves unexpectedly involved in difficulty, arising from the presence of sulphate of baryta in the "cream of tartar" they are using or selling. For this reason, we think it will not be out of place to again warn members of the trade against the danger attending the sale of "cream of tartar," unless they satisfy themselves that the article is free from adulteration or impurity.

Some two years ago, the presence of sulphate of baryta in "cream of tartar" was noticed by Mr. KINNINMONT and other of our correspondents, and the examination of a number of samples all purporting to be obtained from the same source showed that those samples all contained sulphate of baryta. But notwithstanding the circumstance that the samples represented the same original bulk of ground "cream of tartar," the percentage amount of sulphate of baryta was, strange to say, very different in the several samples; in some it exceeded 3 per cent., and in others it did not exceed ½ per cent.

This strange variation in the amount of impurity seemed at first sight unaccountable, and it was only by the examination of the crystals from which the powder had been obtained that a clue was found to the explanation of the fact. When a quantity of these crystals were placed in a large bottle and shaken about, so as to detach any dust adhering to the lumps of crystals, and then this dust was separated from the crystals by sifting, the analysis of the dust showed that the percentage of sulphate of baryta in it was six times as great as in the powder obtained by grinding the original crystals.

Moreover, upon microscopic examination of that portion of the separated dust which could not be dissolved by boiling water, it turned out that it consisted of small particles of "heavy spar," the form in which sulphate of baryta occurs naturally as a mineral. Hence it became evident that the presence of baryta in the "cream of tartar" was not due to any introduction of impurity in the course of its manufacture. The sulphate of baryta was not, in fact, an ingredient of the "cream of tartar" crystals, but was merely mixed mechanically with them.

From a chemical point of view it seems highly improbable that sulphate of baryta should be introduced into "cream of tartar" as a consequence of the presence of some baryta compound in the material called yeso, or Spanish earth, which is used for plastering wine, for the insoluble nature of the sulphate of baryta is alone sufficient to justify the opposite conclusion. We do not therefore, on these grounds, share the opinion expressed by Professor REDWOOD and Mr. FLETCHER, and in the case we have above referred to there was no inducement to regard the presence of sulphate of baryta as being thus explicable, for in addition to the fact that the substance was only an admixture, it was in the state of coarsely ground "heavy spar."

Further examination of other samples of "cream of tartar" within the last few weeks has shown that sulphate of baryta is frequently present in this article and invariably in the state of "heavy spar," and it has been possible to account for the circumstance that in the ground "cream of tartar" the percentage amount is so variable even when the powder represents the same parcel of crystals. Bearing in mind that in a cask of "cream of tartar" the crystals of bitartrate of potash are mixed with the particles of "heavy spar," and having regard also to the great difference in density of these two substances, it is obviously natural that the heavy particles should shake down towards the bottom of the cask and thus become unevenly distributed. A sample of the crystals taken from such a cask with every intention of fairness might give results on analysis indicating the entire absence of baryta, and yet analysis of the powdered "cream of tartar" obtained by grinding the contents of the cask would show that sulphate of baryta was present in it, and the question, How did it get there? would arise, possibly to the inconvenience of the grinder or of the retailer, as in the late case of Mr. BOYCE.

Moreover, the amount of sulphate of baryta in the powder obtained from different parts of the contents of a cask of "cream of tartar" crystals may vary in consequence of the unequal distribution of the "heavy spar," so much that in one part it may be so small as to appear inconsistent with the probability of adulteration having been practised, and in this way further difficulties may be created, leading to the conclusion that sulphate of baryta, even in the form of "heavy spar," may be derived from the stones used in grinding, as suggested by Mr. TANNER some weeks ago. Very little consideration of the matter, however, will suffice to show that there is no real foundation for the idea that this can be the source of the contamination. The weight of "cream of tartar," ground by one pair of stones will sometimes amount to fifteen or twenty tons in a month, and if only 1 per cent. of sulphate of baryta was introduced into the powder by the abrasion of the stones, they would very soon cease to exist as stones, since they do not weigh more than five or six hundredweight each. On the contrary, the fact is that these stones wear down very little and last a very long time.

But there is another point of evidence, especially conclusive in regard to the origin of the sulphate of baryta in "cream of tartar" and explanatory of the varying proportion, and this is the fact that by shaking a cask of "cream of tartar" crystals in such a manner as to make all the dust settle down to the bottom, almost all the sulphate of baryta will be found in this dust—in one instance that lately came within our knowledge the amount was no less than 45 per cent.

There is, therefore, reason to believe that the adulteration of "cream of tartar" with "heavy spar" is systematically practised and that it is probably carried out by throwing a handful of the coarse powder here and there into the casks while they are being packed. By the base ingenuity thus exercised it becomes possible for the seller at some stage of the commercial history of the article, either to sell below the market rate, and thus to put honest dealers at a disadvantage, or to obtain an extra profit when selling at the market rate. In the manufacture of tartaric acid the presence of such an adulterating material as "heavy spar" may well escape detection, and in the use of "cream of tartar" for various other purposes it may happen that the presence of 2 to 6 per cent. of sulphate of baryta may pass unnoticed until some one of the commodities into which "cream of tartar" enters falls into the hands of a public analyst, and either the seller or the manufacturer comes to grief on a change of adulterating his wares.

Considering the possible damage that may arise from this vicious practice, as well as the actual fraud that is perpetrated, we have thought it desirable to place the facts of the case before our readers and by thus making them known we trust that an end may be put to this instance of adulteration.

THE PROPERTY IN A PRESCRIPTION.

Referring to the remarks made recently upon this subject by Mr. Kinninmont, President of the Glasgow Chemists' Association (see before, p. 394), the *Medical Press and Circular* has this week some outspoken words not quite in accord with opinions that have been uttered by some medical men. Admitting that occasionally the repetition of prescriptions works disadvantageously, and that in some cases a high-class pharmacist might very properly refuse to continue an endless repetition of doses, the editor declines to "encourage for a moment the "theory that the right to that repetition is possessed "by anyone but the patient." The writer concludes by saying, "We fail to understand upon what prin-"ciple a patient who has paid his fee for advice and "a recipe for medicine should be obliged to seek "leave from either doctor or dispenser to make "unlimited use of the recipe which he has thus "purchased, and however justifiable it might be for "the dispenser to retain the original prescription for "his own safety, we certainly think he is bound in "equity to send to his patient, with the medicine, a "true copy, so that the patient may please himself "as to when and where he will have a repetition of "it compounded."

THE OOTACAMUND QUINOLOGIST.

In a recent number of the *Madras Mail* it is stated that Mr. Broughton, who formerly held the post of quinologist in connection with the Government plantations of cinchona in the Neilgherries, is at the present time in Colombo. It may be in the recollection of some of our readers that about four years since Mr. Broughton left his place of residence in India somewhat unexpectedly, and that, with the exception of some mysterious rumours, nothing was known as to where he had gone. A correspondent of the *Daily News*, referring to the statement in the *Madras Mail*, remarks that "it is "little to the credit of the Madras Government that "the fate of an officer high in their service should "be involved in such mystery."

BRITISH MEDICAL ASSOCIATION GRANTS.

We understand that the sum of £282 5*s*. has been voted by the British Medical Association in the shape of grants in aid of scientific investigation connected with physiology and other subjects bearing upon the practice of medicine. Amongst these subjects we may mention "Anæsthetics" as having been entrusted to Dr. McKendrick, of Glasgow University, the "Relation between Bacteria and Surgical Diseases" to be investigated by Dr. Ogston, and the "Physiological Action of Alcohol with Especial Reference to the Mode of its Elimination," which is to be continued by Dr. Crocker.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association will be held on Thursday next, the 27th inst., at 17, Bloomsbury Square, when Mr. E. M. Holmes, F.L.S., will read a paper on "Study."

CHEMISTS' ASSISTANTS' ASSOCIATION.

On Wednesday next, November 26, at the rooms of the above Association, 32a, George Street, Hanover Square, a paper will be read by Mr. A. P. Luff, F.C.S., on "Water Analysis." Chair to be taken at 9 p.m.

In addition to the pharmacists mentioned last week as having received municipal honours, Mr. John Babtie, Pharmaceutical Chemist, has been elected Provost of Dumbarton.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH.

The opening meeting of the twenty-sixth session took place on Tuesday, November 11, Mr. J. B. Stephenson, President of the Branch, in the chair.

The minutes of former meeting were read and confirmed.

The Honorary Secretary announced the following donations:—

To the Library:—'Manual of Materia Medica,' Craig, 4th ed., from Dr. Wm. Craig; *Canadian Pharmaceutical Journal*, 5 numbers, from the Ontario College of Pharmacy; *The Pharmacist and Chemist*, 5 numbers, from the Chicago College of Pharmacy; *Journal of the Chemical Society*, 6 numbers, Redwood on Electricity as a Source of Light; Programme of the City and Guilds of London Institute; Technological Examinations for 1880, from Mr. Mackay.

To the Museum:—Collection of dried specimens of indigenous Medical Plants, from the Society in London, *per* Mr. Holmes.

The President's Address.

Gentlemen,—On several occasions during my protracted tenure of office, I have been led to offer a few remarks on some considerations arising from a view of the complex character of our business as being at once a *profession* and a *trade*, and I have thought the subject one of such interest to us all, and so suitable for an address on the opening of our scientific session, that I have ventured to reproduce it this evening. My previous remarks were of a fragmentary nature, and had reference to varying occasions, and I have therefore endeavoured now to treat the subject more as a whole, and to enlarge somewhat both its scope and comprehensiveness. Still, I fear, I shall be open to the charge of reiteration, and I must just ask the indulgence of those brethren who have already listened to the expression of the same ideas, and probably even the same words.

I shall assume that our business may be legitimately classed as a *profession*—that at least to some extent, and in some of its details, it partakes of that character. I think the day is gone past when we are to be regarded as mere hewers of wood and drawers of water, and that now, pharmacy constitutes one of the recognized provinces of the medical field, which not only can be cultivated better, but cannot be efficiently cultivated at all, except by those whose exclusive business it is. We have, indeed, occasionally complaints, and quite recently in high quarters, of the non-recognition of the true position and character of pharmacy and the pharmacist by the medical profession and the public. I am bound to say that as far as my experience goes these complaints are groundless. I have almost invariably found a ready recognition of our claims by both the one and the other, or at least a readiness to admit them when the state of the case was explained. But my object this evening is not at all affected by the recognition or non-recognition of our professional claims by any outside our own body. It has to do exclusively with the realizing and carrying out the idea by ourselves, which it is much to be desired were done more consistently and thoroughly; but of this more by-and-by. Well, but on the other hand, there can be no doubt ours is a *trade* as well as a profession,—subject to commercial conditions like any other trade. We have indeed high authorities remarking on this as an anomalous state of things, and recording their aspirations for the time when pharmacy shall be freed from commercial associations entirely, and assume its proper position as a pure profession. I have no such views to advocate to-night. Whether such a state of matters is attainable or probable, it is not for me to say. As matters stand at present, I cannot see that such a consummation is either practicable or desirable, and my own inclination is to accept the present situation loyally. I wish to magnify our *profession* as much as I can, but am by no means disposed to minimize the *trade*. It is as honourable in itself as any other trade, and in sooth, I think very few of us could afford to let it go. And there is, to my mind, nothing to hinder the prosecution of it honestly and efficiently, while maintaining the professional idea in its integrity. But then if the higher character is realized and the principle of it cherished, it ought to have an effect on all our business actings, and it is the gist of my address this evening to try to show how legitimately and inevitably such an effect will follow—for it has long been my firm persuasion that the surest means of advancing true pharmacy is to cultivate this higher view of our business.

The pharmacist must be a man possessed of a good general, as well as of a special technical knowledge, both of which are tested by examinations of fair comprehensiveness and stringency. He is a man on terms of confidence with his clients, of the same kind, and only less in degree, with the medical practitioner, and in the details of his calling he is constantly invested with a responsibility, which although often ignored, it is not easy to over-estimate. These and like considerations, duly pondered, are fitted to evoke, in every properly constituted mind, a legitimate pride in belonging to his guild —an "*esprit de corps*," in fact—which will not remain inoperative, but will prompt the possessor to a careful and jealous guarding against anything compromising either it or himself. And, as in other cases, a high sense of honour and the aspirations after a lofty ideal will dignify any course of action, however humble, so here a sense of what our profession requires of us will lighten the drudgeries and ennoble the commonplaces of our business. Nor is the effect of this professional idea which I am commending, restricted by any mean. to the region of sentiment. On the contrary, as I have hinted, it is capable of being applied constantly in the active duties of our calling, and I believe, it will be found a most practical and operative principle. It will suggest the solution of many a difficulty —it will adjust our relations to one another and to the public generally, and it will keep us right with regard to many practices, where there is considerable temptation to go wrong. Let me endeavour to illustrate this in a few instances.

Consider first, for a few moments, the pecuniary remuneration of our business, and the first thing that occurs is this—if our transactions are of a professional character the payment of them ought to be on the basis of a professional fee. No doubt this is recognized in our tariff of charges for prescriptions; but is the idea properly realized? Is there a distinct estimation made of the knowledge, skill and responsibility which come into play with reference to the purity and the potency of every drug we handle? or are these not all thrown in as a mere makeweight to the cost of the ingredients, just exactly reversing what ought to be done? At any rate, I do not believe that dispensing is a paying business. I do not doubt that this statement will meet with an incredulous reception; but I would suggest a ready method of putting it to the proof. Our dispensing operations are so mixed up with other business, such as patents, perfumery, aerated waters, etc., that the returns of the former are overlaid and lost sight of; but let them be carefully eliminated, and see how matters stand; or, let anyone arrange for himself, say half a day's work of pure dispensing—let there be a fair assortment—mixtures, pills, powders, ointments, suppositories to make, a plaster to spread, an infusion to prepare, and let him have to prepare, copy prescription, finish off, and send out, and then see how much he gets for his half-day's work by the tariff of our own price list, and estimate from that if he could make his living as a simple dispenser. I am confident the conclusion will be that he could not. Well only think of a member of another profession—say a doctor or a lawyer—who had as many clients as occupied all his time, and yet could not make a living out of it. It is not my object in what I am saying to advocate raising prices. I think my brethren on the Price Committee will bear me out when I say that my action has been (somewhat illogically) in the other direction; but I venture to predict that if my proposition be true, viz., that dispensing *per se* is not remunerative, then, in the event of the public insisting on depriving us of our profits on such articles as they can get at stores, etc., this will inevitably happen—they will have to pay for their medicine at a very different rate from what they have been accustomed to. We must all have met with cases of complaint by parties who have become accidentally aware of the inexpensive composition of some preparation they have had, and for which they have been charged, as they call it, an exorbitant, or extortionate, price, and I have known medical men, who surely should have known better, indulge in the same tone. And there is another class of cases where parties want, say one dozen powders in bulk, for themselves to divide, or the solid ingredients of a mixture that they may add the water themselves. These are very unpleasant cases, and I am afraid I cannot suggest any consideration that will suffice to get the better of such knowing ones; but the only course open to us in such circumstances, is the firm maintenance and the respectful assertion of our professional standing, both as a rule of action to ourselves and a vindication of it to others.

Again, there is the old question, but one of the last importance, our relation to the medical profession, with the grievance of *medical dispensing* on the one side, and *counter prescribing* on the other. As to the former, we in Edinburgh have no experience of it, but we know how in many places in Scotland, and still more in England, it is still maintained with the greatest tenacity, and it presents to the mind one of the dreariest prospects of pharmacy. One peculiarly objectionable form of it is the case where open shop is kept with the doctor's name over the door. Surely our Pharmacy Bill might be adapted to meet such a case as this. But it is the other grievance that falls within the scope of my subject. Now, there is a certain *counter prescribing* which I hold to be indispensable in the carrying on of our business, and which I would rather describe as *recommending our goods*, and to be able to do so implies a knowledge of their nature and uses, and is of the essence of a pharmacist's qualifications. So that, if this were the extent of the grievance, I should feel it unnecessary to say anything on the subject. But I am bound to admit that I believe prescribing of a most objectionable character prevails to a great extent, and it is therefore necessary to apply the professional standard to it. Now, as a general rule, the higher view a man takes of his own profession the less likely will he be to encroach on that of another. The pharmacist feels that he has his own field, worthy of, and demanding all his exertions, and that he has neither the right nor the qualification to occupy the field of the practitioner. His professional instincts will impel him to take up this position at once. He would rather be a good pharmacist than an unqualified medical man—a quack in fact—and various considerations will confirm him in the conclusion. Respect for his clients will influence him, and respect for the medical practitioner will come into play, as well as respect for his own profession and himself, and the result will be that in maintaining his self-respect, he will acquire that of the others. I do not say that medical dispensing will cease all at once on this happening; but surely there is more likelihood of it ceasing when the doctor comes to look on the pharmacist not as an antagonist, but as a co-operator, and to be entirely freed from all suspicion of him as a rival—and just as surely will this result never be attained by the assertion of rights and qualifications on our part, which do not belong to us, and which can only embitter and exasperate the whole question.

There is another department of our business upon which I should much like to see the influence of this professional spirit, which I am commending, brought to bear. I allude to patent and proprietary medicines, and with them I include specialities and novelties of various kinds—preparations sometimes of articles of the Pharmacopœia, but purporting to have an excellence peculiar to themselves—a daily increasing tribe, and I bracket them all together "Quackery." I shall be sorry to give offence or to do injustice to any article of real merit—and some such do unquestionably exist in this class; but my apology is just that I find them in bad company, and I cannot draw any distinction. These productions are all characterized by their wonderful properties in curing disease—diseases of the most formidable character, and generally indeed of the most widely differing character—in proof of which we have the *ipse dixit* of the authors, given for the most part in such high-flown and bombastical language that the wonder is it does not defeat the object in view, accompanied by testimonials of the most wonderful kind, from all classes, but chiefly clergymen; and both mixed up with a jargon of a quasi-scientific or offensively pious—I should rather say profane—description. And all this is poured forth on the world by means of advertisements in newspapers and magazines, bills, pamphlets, almanacs, etc., etc., constituting in fact a literature *sui generis*. The other characteristic of the whole tribe is the secret of their composition or mode of preparation—which is known only to the author—a fact, the importance of which the public is carefully instructed in and warned as to the fatal consequences of neglecting. Surely, gentlemen, it might be thought that a different standard from the professional might suffice for passing condemnation on this whole system, and that all these pretensions and secrecies are not more incompatible with true science than with the simplest dictates of morality or even decency. And indeed before saying anything of the *professional*, I have one or two remarks on some other aspects of the case. And *first* I would require the authors of every one of these articles to declare on oath the composition of it. This appears a simple provision, but I would anticipate much good from the working of it. From what I have seen in the case of several much vaunted preparations, I am sure that the wonderful secret would turn out to be of such a common-place character as to necessitate the calling in some other agency to account for the effects. We would be shut up to find this in Faith, and the inference would at once follow if Faith can work such wonders with such rubbishy materials, what will it not perform if allied with a rational treatment. This consideration applies to the public interest, but there is another strictly related to our own. It appears to me that this class of business is so much on the increase as to threaten to effect a change in the character of our business, so that from being compounders of medicines we shall become in great measure merely the salesmen of the preparations of others. This may appear from a simple commercial point of view no great evil, because—as we all know—the public—strangely enough—will give without grudging *shillings* for these articles, when they grudge *pence* for our own preparations, or for medical prescriptions. I am not at all sure, however, that our pecuniary interests will not suffer, and that disastrously, in the long run; but apart from that, I must protest for myself and for my brethren upon whose qualifications as compounders of medicine our Boards of Examiners have set their *imprimatur* against the degradation which is inflicted on us, and the slur cast upon us in the eyes of the world, by any body of persons and for any reasons whatever. Let we take a leaf out of these gentlemen's books. Well do they know the prestige of our profession in the estimation of the public, and how necessary our agency is for the introduction of their productions, although, when once established, general merchants or stores may safely be trusted to sell them; let us utilize this prestige in the opposite direction, for the purpose of discouraging and discrediting the whole system. Then lastly, on this head—I feel it almost unnecessary to make any remark on the professional attitude we ought to assume towards this question. Only one word. We see the credulity of the public—even of the educated part of it—on this matter, and we recognize a reason for it in their ignorance on the special subject, and often perhaps in the unsettledness of mind that goes along with illness, and we even see medical men often lend their sanction to this system, and especially to that section of it which I have alluded to as *specialities*. But then, *doctors* are not *pharmacists*. We claim that part of the field as ours, and to us therefore falls the duty of forming an opinion on the subject, and if we find the system opposed to the whole scope and genius of true pharmacy, which I think there can be no intelligent doubt that we shall, then is there not a call upon us as the accredited exponents of pharmacy to denounce this as a counterfeit system, and, in as far as we can, to stand between the public and the medical practitioners on the one hand, and these helots of our own profession on the other?

In conclusion, you ask me whether these are not fancy pictures I have been drawing, and whether this professional spirit, or at least the practical carrying of it into business, is not entirely a myth; whether in fact the end of our business is not after all to make money. I admit in sober sadness that there is not much evidence around us of the prevalence of the professional element, while there is abundance of that of the money making. Herein indeed, lie the occasion and the apology for my enlarging on the subject. Mammon, gentlemen, is an exacting master. According to the sacred dictum, no man can serve two masters when Mammon is one of them, so that if a man allows it to master him, there can be no scope for the higher and nobler allegiance. Yet there may be much more of the professional spirit in full and active operation than what meets the eye, for like other noble principles it often leads a hidden life, and it never courts publicity. I said "*may be*," but I confidently cherish, and we must all cherish, the hope and belief that there *really is*, for on it depends the future of pharmacy. Without this it were but the body without the soul; and who of us can be so distrustful and so disloyal as to doubt that there is a bright and a glorious future for our as yet infant organization? And, gentlemen, if I have awakened or strengthened in any of you the conviction or the faith that this principle may and ought thoroughly to pervade our profession, my object has been abundantly accomplished, for I shall feel assured that thereby I have done something towards helping on this better state of things which is yet in store for us.

Mr. Wm. Gilmour then read communications on (1) Gregory's Powder, (2) Proof Spirit, and (3) Physic Balls and Mass.

Note on Gregory's Powder.

BY W. GILMOUR.

Some time ago my attention was called to the fact that complaints were frequent regarding Gregory's Powder, these complaints generally being to the effect that it was next to impossible to get it to mix with water. Shortly before this there had been some change, I was aware, in the density of the magnesia used in making the Gregory (Pattison's), and the blame was therefore at once connected with this. Further investigation, however, proved this not to be the case, but directly attached the cause of complaint with the use of one of Baker's sieves, which had about this time been introduced to the trade. Baker's sieve, as probably everyone knows, is constructed with a metal agitator working backwards and forwards above but in close contact with a concave sieve. Sieve No. 5, recommended for Gregory and similar powders, has 2500 holes to the square inch, and this is as near as possible of a fineness with the muslin sieve which we had been in the habit of passing the powder through. It was, therefore, I was convinced, nothing connected with the fineness or coarseness of sieve used which accounted for the peculiar change which had taken place in the powder. I should state here that the plan pursued in making the Gregory was the same in both cases. Operating on a pound of material the ingredients were first mixed in a large mortar, then transferred to the sieves, in the one case a Baker and in the other a fine muslin through which the powder was pressed by means of a brush, and afterwards again transferred to the mortar and lightly mixed and finally bottled. Prepared in this way, the powder in the one case mixed readily with water, in the other it was, as already stated, next to impossible to mix it. Even when it was placed in a bottle and thoroughly shaken with water the mass of the powder floated to the surface in the froth, and only by repeated shaking and after the lapse of considerable time did it assume the dark brown, homogeneous appearance produced in the other powder by a single shake under the same conditions. The peculiar way in which the powder floated in little balls on the surface of the water and resisted its penetrating action, together with its general behaviour, forced the impression on my mind at an early stage of the investigation that some electric action had been set up in the powder in passing through the sieve. I soon, however, set aside this idea, principally because I felt persuaded that any electric action which might have been set up in the powder had ample time to exhaust itself in the exposure of the second mixing which the powder received in the mortar after having passed through the sieve. To make quite certain, however, I attached a delicate electroscope both to the sieve and the powder whilst in operation, but as I quite expected with entirely negative results, and I therefore had to cast about for another and more probable explanation of the phenomenon. In thinking the matter over two theories presented themselves for consideration. First, that the powders were not sufficiently mixed with the Baker sieve, and in consequence the rhubarb floating about in little masses, prevented the powder being taken up by the water. To favour this theory there was the well-known fact that rhubarb, especially when in little granulated masses, is much more difficult to mix with water than magnesia, and the further fact that on mixing the powder with water the little of the powder that was taken up did not colour to the dark brown which rhubarb always assumes when acted upon by water. The other theory was that the powder passing through the Baker sieve was less acted upon by the atmosphere, there being a much smaller surface of the powder exposed to its action and the process also being more quickly finished. We all know how quickly Gregory is acted upon by the air, and the natural inference was that the density of a powder thus acted upon would be greater, and that consequently it would be much more easily mixed with water. In support of this theory of the miscibility of the one and not of the other, there was the fact that the powder passing through the Baker sieve was undoubtedly the lighter in colour of the two, showing apparently that it had been less acted upon than the other by the atmosphere. I may state at once that both of these theories were most thoroughly knocked upon the head when upon further experiment I discovered that *the powder which had passed through a Baker sieve did not afterwards regain its property of miscibility by passing it through the muslin sieve also.* It could not, therefore, be from want of exposure to the atmosphere or from want of the powders being thoroughly mixed that it exhibited this peculiar property, for here we had the Gregory, so to speak, doubly exposed and doubly sifted, and still it had not regained the power of mixing with water to any extent.

Examined with an ordinary pocket lens no difference could be detected between the powders, and even with a low power the microscope revealed little to account for the change. It was only under a higher power and after sundry experiments I concluded I had arrived at a probable solution of the problem. Baker's sieve, it will be kept in mind, consists of a brass sieve and a metal mixer. Both of these present hard, unyielding surfaces to the powder passing through. The mixer, it will further be noticed, is simply an arrangement of wires (four or five), separated from each other by intervals, and passing closely over the face of the sieve. These wires are, comparatively speaking, small, and therefore they pass through the powders without, to any extent, mixing them. At the same time, they pass so close to the surface of the sieve as to force through whatever they come into contact with, and there is in consequence more a process of granulation than of mixing set up and continually going on, which, to a great extent, might account for the phenomenon in Gregory's Powder under consideration. Along with this, however, and to my mind a more important element in its production, is the heat generated by friction from the mixer passing so closely and quickly over the surface of the sieve. I am not prepared to say how far this heat consolidates the little granulated masses, but that it has some very decided effect may be proved by a very simple experiment. If a small quantity of the powder, for example, be exposed to a gentle heat, its repellant action to water is encreased, but if on the other hand, it be exposed for a short time to the action of the atmosphere it loses it entirely. Either the heat dries the powder, or it consolidates the particles, the result in either case being the same.

Since writing the foregoing, the subject has grown somewhat on my hands. I did not expect to find, as I now do, that the phenomenon described had been for the last two years the subject of such general observation and complaint, far less was I prepared to find such a diversity of opinion as to its cause. It appears that this non-miscibility of Gregory with water may exist, although no Baker's sieve has been used in its preparation; and, on the other hand, it has been known not to exist where the Baker's sieve has alone been used. Having investigated the subject entirely in connection with the Baker's sieve, to the use of which this peculiar property of Gregory was in my own case undoubtedly traced, and on abandoning the use of which it as undoubtedly ceased to exist, I might well be content to leave it there without endeavouring also to reconcile conflicting opinions. It seems to me, however, that the subject is of sufficient importance to justify better treatment than this would indicate, and moreover I cannot but think that many of the opinions expressed are perfectly reconcilable, not only with the solution of the question given in the preceding paper, but reconcilable also to a great extent with each other. Some, for example, blame the magnesia and change the kind which they have been using, and find the evil complained of ceases. Others again blame the rhubarb and change if for another, and likewise some also blame the ginger, and so on. I am thoroughly convinced the true explanation of the phenomenon is to be found in the magnesia being more or less hydrated. If the magnesia as well as the other powders be (comparatively speaking) in a dry condition, circumstances will then be favourable to produce a Gregory non-miscible. On the other hand should the same magnesia be used with a rhubarb or a ginger (comparatively speaking) in a moist condition, the magnesia would absorb the moisture, and the Gregory would be converted into a miscible. In proof of this, if the magnesia from which a non-miscible Gregory has been made be exposed for a time to the atmosphere, it will be found to have changed into a miscible on being made into Gregory. In the same way if a non-miscible Gregory be exposed for a time to the atmosphere it changes into a miscible, and on the other hand one perfectly miscible may to a certain extent be changed to a non-miscible by exposure for a time to a gentle heat, but in this case its non-miscibility will neither be so aggravated nor so aggravating as a powder which has passed through a Baker sieve.

The note on Gregory's Powder gave rise to considerable discussion, in which Messrs. Heron, Noble, Young, Symington, Napier and the President took part. Several of them had experienced the same difficulty as Mr. Gilmour, and had overcome it by different means. In connection with this preparation a very interesting document was submitted to the meeting, by Mr. Mackay, containing some prescriptions in the handwriting of the late Dr. Gregory, and among these was the recipe for Gregory's Powder, in the same proportions as it now stands in the British Pharmacopœia. The date on the prescription is December 22, 1816, and it is signed J. G.

Note on Physic Balls and Mass.

BY W. GILMOUR.

I do not know if my experience as an apprentice was a common one, but I can well recall after the lapse of all these years (not a few now) the feeling of aversion which I soon entertained to all veterinary medicines and to horse balls in particular. One of my earliest experiences was gained from an endeavour to make a good mass with olive oil. I was directed to melt the aloes in a large iron crucible over the fire, next to add a certain quantity of oil, and then stir till cold. If any of my young friends have a forenoon to spare, and want a little diversion, and do not mind wasting a little aloes, they may try this formula. The plan generally followed, however, was powdered aloes and soft soap a sufficiency. This at least made a mass, and what did it matter, although, to use the expression of an ancient farrier who patronized the establishment, they became through course of time "as hard as *chucky stones*." They were made to sell, and sell they did. Times have changed, and doubtless we change with them, and what suited the taste and fancy and wants of twenty of thirty years ago will not suit those, I need scarcely say, of the present day. Thoughts such as these were called up recently, when on turning over the pages of an old number of the *Pharmaceutical Journal* (December 22, 1877), I came upon an article on "Physic Balls and Mass." The paper was certainly in the direction of elegant veterinary pharmacy, but, unfortunately, what was new in the paper was not of much use to the general reader, and what might have been of use was not new. The somewhat elaborate, not to say expensive, paraphernalia therein referred to, placed it, I think, entirely beyond the scope of the great majority of its readers, whose aim, I take it, is not so much to supply so many gross on the shortest possible notice, as to meet the limited, but daily, wants of their own immediate sphere. For more than ten years I have used nothing but glycerine in the making of physic mass, and while in my earlier experiments I endeavoured to formulate the amount of glycerine necessary to make a proper mass, I soon gave up the hope of doing so, being persuaded that it was next to impossible. A change in the quantity of aloes operated upon, even although a corresponding proportion of glycerine was employed, a change in the temperature, a more or less lengthened exposure of the mass to heat in preparation, and probably many other causes also, modified the results obtained.

The plan I now adopt is to break up the aloes into small pieces, pour over it a little glycerine (about an ounce to each pound of aloes) to make it work freely, and when the aloes is melted, pour it on to a slab well smeared with glycerine, with which the aloes is worked up into a proper consistence. A good mass may in this way be obtained at any time, under any circumstances, with the use of a minimum of glycerine. The pan which I use for melting the aloes is one of my own devising, made of ordinary tin ware, and fitted up on the glue-pot principle—one pan fitting into another. When the balls are weighed they are first wrapped into waxed paper and then into ordinary counter paper, after which they are placed in their proper divisions *end up*. In this way I have a ball, I think, as near perfection as possible, and I never have any trouble from their falling or getting soft.

Mr. Gilmour afterward brought before the meeting the following—

Memorandum with Reference to the Weights and Measures Act, 1878 (41 & 42 Vict., c. 49).

It will be remembered that by a recent Order in Council the various weights, such for example as the 4 grain, the ½ drachm, the 2 scruple, etc., which were excluded in the original Act, have been legalized, together with the symbols ℈j, ʒj, and the only point now necessary to be observed is that these weights, together with every other, must be properly stamped.

I am not aware, however, of ever having seen a proper explanation of the order relating to apothecaries' measures, and therefore the following short account may not be uninteresting. It need only be further premised that the various points noted are now law, although it is not at all probable that the inspector will enforce it for some time to come. The first point to be noted is that every measure must be graduated into its own denomination—that is to say a measure glass graduated into ounces must not contain drachms, or one graduated into drachms must not contain minims and *vice versâ*. Each glass must either be all ounces, or drachms, or minims.

The second point is that each graduation must be distinctly marked on each measure glass. In the case of ounces each graduation must be distinctly marked with the number of ounces, but an intermediate half-ounce is also allowed to be graduated, although not marked half-ounce; the same applies to the drachms, but in the case of the minim measure each tenth minim only requires to be marked, and the law apparently admits of any number of intermediate graduations unmarked.

The next point is that no symbols are allowed, and all measure glasses must therefore be marked fl. oz., fl. dram., min., and each glass must also have marked upon it, t = 62° Fah.

The largest measure glass provided for is 40 ozs., but any smaller number may be legal, such for example as a 20 ozs., 10 ozs., 5 ozs., 4 ozs., down to ½ oz. In the same way the drachms and minims, I presume, may be legal up to or down to any reasonable number, but the exact limits I for the moment forget.

The last point to be observed is that the same rule applies as with the weights, viz., that wherever a measure glass is stamped or engraved it is legal in every other place if the stamp be the Government stamp of a crown, and V.R. The Order in Council provides for no distinctive mark in the case of the measure glass, and therefore the presumption is that it will be the same with the weights, but it expressly provides for or allows the engraving of the mark. It will be kept in mind that it is as much illegal to have a measure glass not engraved or stamped, as it is to have one incorrect in measure, or not conforming to the other requirements of the Act.

Some discussion ensued with regard to the glass measures and considerable difference of opinion was expressed as to the precise scope of the different provisions.

Mr. Mackay mentioned that last month when he was in London, this subject had been fully discussed and it had not then been definitely arranged, although a specimen of the proposed marked measure had been submitted, but not officially. From the remark made by the President of the Society in Bloomsbury Square, at the last meeting, it was evident that the Government was now about to take action in the matter, and he thought it probable, that, without much further delay, specific instructions would be issued and ample time given to chemists to get a series of the new measures for general use. In the meantime Mr. Mackay suggested that further inquiry might be made of the inspector of the Edinburgh district, and the meeting thereafter appointed the President, Messrs. Gilmour and Mackay for that purpose.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

Wednesday, November 5, 1879.

Present — Charles R. C. Tichborne, LL.D., Ph.D., President; Dr. A. Smith, Vice-President; Sir George Owens, M.D., Messrs. Brunker, Goodwin, Hayes, Hodgson, Oldham, Payne (Belfast), Pring (Belfast), Simpson.

The minutes of the meeting held on October 1 were read and signed.

The letter from Mr. Robert Barklie, F.C.S., read at last meeting, was now considered.

Proposed by Mr. Payne, seconded by Mr. Pring, and resolved—

"That the School of Chemistry in connection with the Working Men's Institute, Belfast, be one of the schools from which this Society will accept certificates of Practical Chemistry, provided Mr. Barklie conforms to the regulations of this Council."

Read letter from Messrs. T. Devlin, Sons and Co., Belfast, respecting the loss, by fire, of Mr. Frederick Devlin's certificate as pharmaceutical chemist.

Proposed by Mr. Hodgson, seconded by Mr. Pring, and resolved—

"To acknowledge the letter from Messrs. T. Devlin, Sons and Co., and to state that Mr. Frederick Devlin has passed his examination as a pharmaceutical chemist, and that a certificate was issued to that effect on 4th April, 1877."

Read a letter from Mr. James Acheson, Pharmaceutical Chemist, of Ballymena, making inquiries relative to the certificate for compounding presented by one of the candidates at the last pharmaceutical examination.

The Registrar to inform him that the Council are of opinion that Mr. Fennell is not authorized to answer private inquiries.

The letters from Mr. William Dowling, of Killarney, and Mr. William Prott, of Belfast, which were read at last meeting, were now considered in connection with the the notice of motion given by Mr. Holmes.

Mr. Holmes being absent, his motion by his request was proposed by Mr. Payne as follows:—

"That the Preliminary, Entrance, or Matriculation examinations of the following bodies be accepted by the Pharmaceutical Society of Ireland, in lieu of the Preliminary examination as at present required, viz.: Trinity College, the Queen's Colleges, the College of Surgeons, and the Apothecaries' Hall of Ireland. Candidate to pay entrance fee as heretofore."

The motion was not seconded, and was, by permission withdrawn.

Proposed by Mr. Brunker, and seconded by Dr. A. Smith—

"That the Preliminary or Matriculation examination of the College of Surgeons, or such other examination as is accepted by the General Medical Council as equivalent to it, and the Preliminary examination of the Pharmaceutical Society of Great Britain, be accepted instead of the Preliminary examination of this Society; such examination to be passed at least two years before the candidate presents himself for the licence of this Society. The usual fee of two guineas to be paid."

The following amendment was proposed by Mr. Payne, and seconded by Mr. Pring:—

"That the Preliminary examination of the Pharmaceutical Society of Great Britain be omitted, until the Council of that Society be asked if they will accept the certificates of candidates who have passed the Preliminary examination of the Irish Pharmaceutical Society, in lieu of their own Preliminary."

This amendment was lost, on a division, and the original motion (Mr. Brunker's) was then put and carried.

Mr. Dowling and Mr. Prott to be informed that the Preliminary examination passed by them shall be accepted in accordance with the foregoing resolution.

The Reports of the Examinations held in October were laid on the table.

At the Pharmaceutical examination held on October 1st, five candidates presented themselves, of whom the following three passed:—

David Baxter ....Ballymoney.
Patrick John Joseph English ...Mullingar.
Andrew McIlwaine ...33, High Street, Belfast.

At the Preliminary examinations held on October 6th and 7th, twenty candidates presented themselves, of whom eighteen passed.

Proposed by Mr. Brunker, seconded by Mr. Hayes, and resolved—

"That Regulation III. FINANCE (page 61 of Calendar), relating to members, read as follows:—'The annual subscription of elected members of the Society shall be one guinea, payable in advance on 1st October in each year, or a life composition of ten guineas.'"

Proposed by Mr. Brunker, seconded by Mr. Payne, and resolved—

"That the Chief Secretary for Ireland be requested to receive a deputation, who shall be empowered to explain the views of the Council with reference to the proposed amendments in the Pharmacy Act, and the working of the Poisons Act generally in Ireland."

The following to form the deputation, viz., the President, the Vice-President, Mr. Payne, Mr. W. Hayes, Mr. Brunker, Dr. Collins and Mr. Oldham.

Proposed by Mr. Oldham, and seconded by Mr. Hayes—

"That a circular be addressed to all licentiates who are not members, inviting them to join the Society."

Mr. Oldham read the draft of a circular prepared by him, setting forth the advantages to licentiates of becoming members of the Society. Some slight alterations were made in it, and it was then resolved—

"That the circular as thus amended be adopted and printed, and that a copy be sent to each licentiate of the Society."

Some bills were ordered for payment, and the Council then rose.

Provincial Transactions.

LEEDS CHEMISTS' ASSOCIATION.

The second meeting of the session was held in the library, Church Institute, on Wednesday, November 12, the President, Mr. Councillor Stead, in the chair.

The minutes of the former meeting having been read and confirmed, Mr. J. Slater was elected a member and Messrs. G. F. Bacon, F. Cooper, F. A. Graham, William Wallace and Henry Thorpe were elected associates.

Mr. James Abbott gave a lecture on Ergot, in which he illustrated upon the black board the various stages of the development of this fungus, and explained its action upon the involuntary muscles of the capillaries whereby hæmorrhage was checked. He was of opinion that the oil present in the ergotized grain was inert and that a fresh aqueous infusion answered all the purposes required. In order to keep the ergot free from parasites, it was best to powder it as soon as received, add a little water and then dry at a temperature not exceeding 212° F., constantly stirring so as to granulate the powder, in which condition it would keep well for two or three years though it was advisable to replenish the stock with new annually.

Mr. S. Taylor proposed a vote of thanks to Mr. Abbott for the very interesting and instructive lecture, regretting that there was not a better attendance of associates, for whose especial interest these monthly meetings were held.

Mr. E. Yewdall seconded the motion and thought it was very necessary there should be experiments instituted with various solvents in order to obtain a preparation which would give uniform results; although the subject had received a fair share of attention there was yet a difference of opinion, shown by the various preparations in the market, in some of which the oil was retained, giving a very unsightly preparation, whilst others prepared with water gave unsatisfactory results.

The President supported the motion and stated that a freshly prepared decoction in which the smallest possible quantity of water was used had been found to give the best results in a large obstetrical practice extending over a period of more than twenty-five years.

The motion was carried.

GRIMSBY CHEMISTS' ASSOCIATION.

A meeting of this newly-formed Association was held on November 12, at Druig's Hotel. There was a very fair attendance of chemists belonging to Grimsby and district. The business transacted was mostly of a preliminary or introductory character. The chief objects of the institution are to establish a uniform scale of prices in retail business as well as charges for prescriptions, etc., and to protect trade interests generally. An inaugural dinner was spoken of, to come off about the middle of January next, so as to supplement Christmas festivities. This proposition was heartily supported by all present, and the meeting then broke up. Good wholesome kindly feelings was manifest throughout.

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

The first meeting of this Association was held on Thursday, November 13, 1879, when the President, Professor Attfield, occupied the chair.

The Secretary reported that during the last session the number of members had been ninety-one, and that the number of meetings had been seventeen.

A list of seventeen papers read at these meetings was read.

A Committee had been appointed to report on recent advances in pharmacy and allied branches to the Association, and reports had been presented on subjects in Chemical Physics, Inorganic Chemistry, Organic Chemistry, Analytical Chemistry, Botany, Materia Medica and Pharmacy.

The subjects of these papers and reports have already appeared in this Journal.

The Secretary then read the report of the Committee appointed at the Annual Meeting, for the obtaining of pharmaceutical papers of a practical character, which was adopted unanimously.

The election of officers was then proceeded with, Messrs. Drew and Jackson having been appointed as a Committee to examine the voting papers. For Vice-Presidents, Mr. H. Allen, Mr. R. H. Parker; for Committee, Mr. W. Elborne, Mr. A. F. Dimmock, Mr. J. Thomas, Mr. J. B. Taylor; for Secretary and Treasurer, Mr. W. R. Dunstan, 17, Bloomsbury Square, W.C.

The President then delivered his annual address as follows:—

THE PRESIDENT'S ADDRESS.

After addressing some words of welcome to old members, new members and prospective members, Professor Attfield reminded those who had recently joined the Association, that their aim should be threefold, namely, to get knowledge because they desired to pass the examinations; to get knowledge irrespective of that desire; and to become useful, active members of the Students' Association. To the extent to which they attained those objects would they afterwards become successful pharmacists and possibly leaders in pharmacy. Pharmaceutical education was technical and general. That which related to dispensing and the preparation of galenicals was technical; that which related to chemistry, physics and botany, was, for them, general. Materia medica was partly general, partly technical. The man who wished to become solely a chemist, or botanist, or physicist, must not only acquaint himself with the fundamental truths and principles, and analogies of chemistry, botany or physics, but must have a technical knowledge of the respective subjects. The pharmaceutical student, however, studying those sciences because they formed the basis of the practice of pharmacy, only went so far into them as to learn the general working of their laws, went far enough to enable him to take a broader view of his calling than he would otherwise possess, went far enough to enable him to anticipate as well as supply the demands of the public, went far enough to enable him to extend as well as occupy the area of his avocation. When properly taught and properly learned, they enlarged and improved the powers of the student's mind, not only as a man, but very specially as a pharmacist. The Pharmaceutical Society had for nearly forty years been directly and indirectly maintaining and encouraging courses of general education in these subjects at Bloomsbury and in connection with the provincial pharmaceutical associations, and had instituted examinations with the same objects. In the legal profession the subjects which occupied a similar position in general legal education as distinguished from technical legal education were, he was assured, Roman law, jurisprudence, and international law. In the medical profession the subjects of *general* medical education were much the same as their own. The efforts of the Pharmaceutical Society in promoting general pharmaceutical education were thwarted to the extent that students through too rapidly learning these subjects very rapidly forget them, possessing them indeed only long enough to enable them to pass an examination. There was, he feared, in pharmacy just now a tendency to depend too much on rapid teaching and too little on deliberate learning. He implored students to get knowledge not only on account of, but irrespective of their desire to pass the examinations. Their technical pharmaceutical knowledge would be kept bright by daily use in business, it was their general pharmaceutical knowledge which was liable to rust, and which therefore needed their utmost care as to its being of the right kind and of a lasting kind. He trusted too that those whom he addressed would also have the honourable ambition to some day become leaders in pharmacy and leaders in local efforts to promote the good of those around them. To that end he commended to their notice the machinery of the Students' Association and of similar associations. There was no better way of fitting themselves for such public, pharmaceutical, or other work than by compiling papers on chemical, physical, botanical, mechanical, or more specially pharmaceutical or galenical subjects, and reading them before their assembled fellow-students of the current or past sessions.

Mr. Branson proposed, and Mr. Gutheridge seconded, a vote of thanks to the President for his able address and for the interest which he takes in the welfare of the Association, which was carried unanimously.

A vote of thanks was then proposed by Mr. Taylor to the retiring officers, which was carried *nem. con.*

Mr. Hutchinson and Mr. Dunstan having responded to this vote, the meeting adjourned.

Parliamentary and Law Proceedings.

Is Nitrate of Potash a Poison?

At the Liskeard County Court, on Monday, before the judge (Mr. Montague Bere, Q.C.), an action was brought by Richard Young, chemist and druggist, of Liskeard, against Daniel Bray, farmer, of Alternun, to recover the sum of £2 2*s*., the cost of an analysis supplied defendant. Mr. Borlase Childs appeared for plaintiff, and Mr. Collings, of Bodmin, defended. According to Mr. Childs' statement, the defendant went to his client in September, last year, and complained that certain of his cattle had died, and he was unable to account for their death. Defendant said that he had been giving the cattle some "drenches," and the plaintiff said that they must have contained poisonous matter. Mr. Young told the defendant to send him one of the drenches, and he would have it analysed. This defendant did, and he expressed his intention of bringing an action against the person who supplied the drenches if they were found to contain poison. The plaintiff forwarded a sample to Messrs. Allen and Hanburys, Lombard Street, London, and on September 27, he received the following from them:—"The sample consists of nitrate of potash with a small admixture of some species of starch. It is entirely free from the poisonous matter, and from prussic acid, and carbolic acid. The poisons, if any are present, must therefore be sought by a complete poison analysis. The starch could only be identified by an expensive, and perhaps useless, search." Mr. Young then informed the defendant that the drenches contained nitrate of potash, and that if he wanted the analysis he would have to pay £2 2*s*. He agreed to take it upon the terms named, and defendant was entered as a debtor to plaintiff, but for some reason or other defendant thought fit not to pay the sum. The action was accordingly brought to recover the sum paid for the analysis.

Plaintiff was called, and said he was led to believe that there was poison in the drenches from the description of the death of the animals given by defendant. Witness told him that if the analysis did not prove there was poison he would pay for the analysis himself. He had paid the fees for the analysis, which stated that there was nitrate of potash in the drenches.

His Honour: What did you pay for the analysis?

Witness: The charge was £2 2*s*., but I got a discount of 20 per cent. allowed.

His Honour: So you paid £1 14*s*. for it?

Witness: Yes.

His Honour: The analysis produced is no analysis at all. It does not state the quantity of poisonous matter in it, and to say that a certain mixture contained two items without mentioning the quantities was not a complete analysis, and if you paid £2 2*s*. for that you are a very unwise man.

Witness: But it proves that there was poison in the sample.

His Honour: But nitrate of potash used in certain quantities is not poison, and you told the defendant that you would take the risk of the analysis as to its containing poisonous matter.

Witness: There was a large quantity of nitrate of potash contained in the drenches. I understood this to be the case from the analyst.

His Honour: Well, he does not state in the document what the amount was.

Witness: I understood that it contained more than 80 per cent. of poison.

Mr. Collings contended that the analysis spoke for itself. They did not require to go any further into the case.

His Honour reminded Mr. Young that the analysis did not even state that nitrate of potash was a poison.

Mr. Childs: But it is a fact that it is a poison.

His Honour: The document does not show that the poisonous matter was there in such a quantity as to cause death.

Mr. Childs reminded his honour that the only question was whether his client was entitled to the sum he paid for the analysis.

His Honour gave a verdict for defendant.—*Western Daily Mercury.*

Action for Protection of Trade Mark.

In the Supreme Court of Judicature, before Lords Justices James, Baggallay and Thesiger, on Monday, November 17, an appeal from the decision of Vice-Chancellor Malins in the case of Dence *v.* Mason, was heard.

The action was brought by Thomas Dence and John James Mason, carrying on business as provision dealers in Little Stanhope Street, Mayfair, under the title of Brand and Co., to restrain the defendant, Frank Mason, from selling any essence of beef, concentrated beef-tea, meat lozenges, or other meat essences in tins, or otherwise having thereon labels or wrappers in imitation of the labels or wrappers used by the plaintiffs, and from using the name of Brand, either alone or in combination with Mason or any other name, in the manufacture of these articles in such manner as to represent or lead to the belief that the articles made by the defendant had been manufactured by the plaintiffs. The plaintiffs' firm was established about forty-five years ago, when the business was conducted by Mr. Henderson William Brand, and was, about the year 1835, acquired by Mr. Withall, who, on September 29, 1875, sold the same to the plaintiff, Thomas Dence, for the sum of £5000. The business had always been carried on under the name of Brand and Co. The plaintiff, John Mason, was for fifteen years employed as the manager of the business; and the defendant, who is his brother, was for about fourteen years prior to March, 1874, when he left the plaintiffs' service, employed as an assistant in the business. After leaving the firm he entered into partnership with a grocer in Sloane Street, named Brand, and commenced the sale of essence of beef and other articles of a similar nature under the style of Brand and Mason. This he was constrained by a consent order from doing, and he then called the firm Mason and Brand till the partnership was dissolved at the end of 1874. After that he continued the use of the word Brand in one form or another upon his labels, and this action was commenced in December, 1876. In February, 1878, the Vice-Chancellor granted a perpetual injunction against the defendant, with costs. Afterwards the defendant became a bankrupt. He appealed from the judgment, but the trustee in his bankruptcy was not made a party.

Mr. Solomon was for the appellant; Mr. Glasse, Q.C., Mr. Bristowe, Q.C., and Mr. Freeman were for the plaintiff.

Their Lordships had at first some doubt whether the defendant was entitled to appeal, but they ultimately decided that he could appeal from the injunction, which was a personal order against him, notwithstanding the bankruptcy, though he had no interest in the order as to costs, his estate being now vested in the trustee. But on the merits their Lordships agreed with the Vice-Chancellor and affirmed his order with this exception, that they thought it went too far in restraining the defendant from using the names of Mason and Brand, and that it ought to be qualified by inserting a proviso that the injunction was not to restrain the defendant from using the names of Mason and Brand *bonâ fide*, if and when there should be a real partnership properly designated by that name. But this alteration was not to affect the costs of the appeal, which must be paid by the defendant.—*Times.*

Obituary.

Notice has been received of the death of the following:—

On the 26th of October, 1879, Mr. James Barnes, Pharmaceutical Chemist, Fishergate, Preston. Mr. Barnes was a Local Secretary of the Pharmaceutical Society, of which he was also one of the Founders, having joined it in 1841.

On the 1st of November, 1879, Mr. James Pasmore, Pharmaceutical Chemist, King's Road, Chelsea. Aged 65 years. Mr. Pasmore had been a Member of the Pharmaceutical Society since 1842.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[345]. In reply to Mr. Fox, with regard to the proper mode of dispensing this injection, I may say that the presence or absence of a precipitate in certain patent medicines of comparable composition does not justify us in assuming that it is right to imitate the plan there adopted. I very much question whether "Injectio Brou" and similar remedial preparations have their efficacy increased by the insoluble lead salt; but if Mr. Fox can point out any book on therapeutics that recommends sulphate of lead for its "soothing properties," or, indeed, for any medicinal purpose, I shall be glad to see it. He will consult the standard works of Pereira, Christison, Neligan, Royle, Waring, or Adolphe Wahltuch, without avail. It is not even included in the 'Pharmacopée Universelle.'

I may repeat that I have known prescribers ordering such a lotion who were quite unaware of the chemical incompatibility, and others who meant the precipitate to be filtered out. Such a mixture is often used as a collyrium, and a muddy sediment diffused through the liquid would not be very nice for such a delicate and sensitive organ as the eye.

The writer of "The Month," while allowing that it is unusual to filter, directs that a "Shake the bottle" label should not be put on, and further adds "the deposit is not considered an essential part of the remedy or one that possesses any value. The dispenser, therefore, has nothing to justify him in ordering the bottle to be shaken." The last quotation is sound sense, but coupled with the first allusion seems to indicate a degree of uncertainty if not an evasive reply. If lead sulphate be useless, why retain it, especially when many patients have acquired the habit of shaking up the sedimentary deposits in their medicaments before administration? Thus all the precautions of the dispenser would be rendered useless.

J. B. L. Mackay.

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[365]. It was no doubt a slip of *Lavandula's* to mention "Potass. Bicarb." as a constituent of this ointment—but his suggestion to use double quantity of the potash salt is not a good one.

I differ from *Pot. Carbon.* in the opinion that a creamy ointment cannot be produced with fresh official ingredients. Doubtless, however, much depends on manipulation and the amount of exposure to air. Omitting the water in the iodide of potassium ointment, and using lard free from moisture, would retard the decomposition, but sooner or later the chemical change is inevitable—hence the prescriber should be informed of the results and questioned as to his intentions.

J. B. L. Mackay.

*** *Lavandula* writes to say that "Potass. Bicarb." was a mistake for "Potass. Carb."

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[370]. Rub the two extracts with a few drops of boiling water to a smooth paste, then mix them thoroughly with the lard and a smooth ointment will be the result. This is similar to No. 359.

Lavandula.

[370]. J. Y. should rub the extracts in a mortar with a little hot water, warming the mortar at the same time will diminish the labour. When smooth and soft add the adeps and thus a good ointment may be turned out.

J. M.

[370b]. Rub down both the extracts to a smooth paste with a little hot water, then mix thoroughly with the prepared lard.

J. B. L. Mackay.

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[371]. P. T. W. will find by using the proper acid. carbolic. crystal., that no excipient is necessary, as a good enough mass can be had from the ingredients in the prescription, mixing first the powders, adding the acid last.

J. M.

[371]. In reply to P. T. W., I beg to state that if P. T. W. will try spts. rect. as an excipient for his pill mass, he will (I think) find it answer admirably. By virtue of its solvent power, it will to an extent operate on the guaiacum resin, so that a large quantity of ferri arsen. or other dry powder may be added at leisure.

H. R. L.

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[372]. This might be dispensed in the following manner. Weigh the proper quantity of phosphorus, say gr. j. Melt with, say gr. x. each, bals. tolu. and cera flav. under water, using a small dish half full of warm water, mix well under water. When cold take $\frac{3}{5}$ part for 30 pills and mix with the quinine and iron, making it into a mass with s. v. r. These pills should also be coated.

J. M.

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[374]. Dilute the liq. potassæ with a fluid ounce of water, pour into the right sized bottle and add all at once the cod-liver oil, shake vigorously, and gradually add the remainder of the water, shaking well on each addition.

J. B. L. Mackay.

[374.] The quantity of liq. potassæ ordered in this prescription is insufficient to saponify the oil, therefore a little more must be used, and the water to be added gradually, shaking after each addition.

Lavandula.

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[375]. I had the enclosed sent me to dispense to-day, it was neatly printed on pink paper. Can any correspondent inform me how to do it?—

Dermaline.

℞	Acidi Malachiti	♏v.
	Acidi Acetici.	♏x.
	Tinct. Amyrru.,	
	Balsam. Nervini	āā ♏xx.

According to the directions it is intended for removing corns, etc.

Is the third intended for tr. myrrhæ, and is not nervine balsam a solid ointment?

L. J. Latham.

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[376]. I enclose copy of recipe that came into my hands yesterday, can any of your readers kindly tell me what should be given?—

℞	Ol. Origani	5 drops.
	Ol. Apii.	½ ounce.
	Ol. Carui.	5 drops.
	Com. Ex. Valeriat.	30 drops.
	Com. Ex. Sesquianha Rad.	j dram.

Sp. Rect. to make an ounce.

Robert Rogers.

Notes and Queries.

[634]. COLOURING FOR WAX.—*Epsilon* will find that colouring the turpentine with anchusa is a very good plan, viz:—

℞	Rad. Anchusæ	ℨij.
	Spt. Terebinth.	℥xvj.

Macerate two or three days with occasional agitation and filter through tow.

Then melt your wax in the coloured turpentine.

C. H. Bradshaw.

[634]. Digest in a warm place a small quantity of alkanet root, with the turpentine and wax, until sufficiently coloured. I have no doubt but that this will answer *Epsilon's* purpose.

Lavandula.

[634]. Immersion of fragments of alkanet root (enclosed in a muslin bag) into the melted wax will impart beautiful red more or less deep according to requirements.

J. B. L. Mackay.

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[635]. SALICYLIC MOUTH WASH.—Would any reader oblige with a good formula for "Salicylic tooth and mouth wash"?

Jacque.

[636]. DR. STARTIN'S POMADE.—Will one of your readers oblige me with the formula of "Dr. Startin's Pomade?" It is used for scurf, etc.

W. Richards.

[637]. CROTON CHLORAL.—Will some correspondent kindly oblige by giving a method of determining the purity or otherwise of croton chloral.

Quidnunc.

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[638]. CLEANING OF PAINTINGS.—Will any of your readers kindly furnish me with the method of cleaning oil paintings with peroxide of hydrogen, its application, and the manner in which it acts?

H. W.

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[639]. PRINCE'S BALSAM.—Can any of your readers inform me, if there is any authority for a preparation called "Prince's Balsam?"

H. A. Howe..

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Sale of Drugs in Doctors' Shops in Glasgow.

Sir,—Being in Glasgow for a few days lately, I was surprised at the comparatively small number of qualified chemists carrying on business in that greatest of Scotland's commercial cities. I was told by an authority that there were nearly one hundred "doctors' shops" on the south side of the river. Curious to know how they conducted business in those shops I called at one in Crown Street and demanded 15 grains of Dover's powder. I was served by a girl apparently about sixteen years of age, and who appeared to have charge of the dispensing department. She did not appear very familiar with the apothecaries' weights, but at last succeeded in getting 13 grains into the scale pan. The powder appeared dark in colour and not like the genuine article, but as the girl did not appear to possess much pharmaceutical knowledge, I paid the moderate charge of 1½d. and departed. On arriving at my lodgings and examining the powder, I found that it had little taste and no smell, and although I did not get it analysed, I am sure that it did not contain the proper proportion of either opium or potass. sulph. On going back to the shop, and asking the doctor if the article was the pulv. ipecac. co., B.P., he very coolly told me that no druggist could sell me Dover's powder without a prescription, at the same time refusing to give me back what I had purchased of the girl. I observed that some of his other medicines appeared to be much of the same character as the pulv. Doveri, but of course unless analysed according to Act 38 and 39 Vict., cap. 63, no penalty could be imposed. What, with your kind permission, I want to ask your correspondents, is—

1. Is it lawful for a doctor to keep a girl not qualified, for the purpose of dispensing medicines?

2. Is it lawful for a doctor, such as the above, to keep an open shop for the purpose of retailing and dispensing medicines?

3. As I see a great many grocers selling citrate of magnesia; and ironmongers and others selling poisonous sheep dips. Is this lawful?

If some of your numerous correspondents will kindly supply the information required, they will greatly oblige.

GEO. CORMACK.

DRUGGISTS' SUNDAY WORK.

Sir,—I was very pleased to see in a recent Journal the letter of Mr. Long on the above subject, and I, as an advocate for early closing, fully endorse his remarks, and I really do think that the late hours and constant confinement of many of our brethren are most undoubtedly the sole cause of them "departing this life" much earlier than they otherwise would if they would only give themselves more liberty for recreation, etc. It is indeed very painful to see in the obituary of our Journal the comparatively young ages at which chemists succumb. I have now closed (in conjunction with my neighbour) at 8 p.m. for over three years, and I find that it does not interfere with business in the least, it works very well, and may, I think, be extended to other chemists in the neighbourhood if they would only unite. I am sorry to say that my brethren within ten or fifteen minutes' walk of me keep their shops wide open every night until 10.30 or 11 p.m. and I feel certain that the amount of business they do as a rule after 8 or 9 o'clock cannot pay for gas. Besides they are daily injuring their bodily health and I should not be surprised to find their names down in the obituary at any time. They are not even content with the late hours on week days, but must open on Sundays from 5 or 6 in the evening till 10.30 or 11, which to my mind is very bad taste, and it takes the respectability of the establishment off at once. I do not deny for one minute but that it is necessary to be on the premises at certain hours to supply the "needful," but to invite a Sunday trade by the lighting of the lamp and opening the shop is altogether quite uncalled for. I never show a light in the evening of Sunday (or any Bank-holiday), excepting I should be engaged in dispensing, but the gas is turned out directly.

FREDERICK D. HEATH.

30, *Highbury Park, N.*

Sir,—Now that Mr. Nicol's health question has been duly discussed in the Journal, would you kindly allow me to ask what a chemist's shop is open on Sunday for? Whether is it for the sale of medicines and medicines only, or perfumes, confectioneries, soda water, tobacco, cigars, etc.? I always had an impression it was for the former, but have met with several, who say, that you cannot well refuse to supply anything that may be asked for, while the shop is open. Is this right? Perhaps some of your readers will oblige with their opinion of druggists' Sunday duties.

JEK.

EXTRACT OF MALT.

Sir,—As an illustration of adage "There is nothing new under the sun," I send the formula copied from an old book, viz., 'Pharmacopœia Bateana,' date 1693. At the present time when ext. of malt, either alone or in combination, seems so popular, it is interesting to find that it was prescribed for the same class of diseases at that remote period as it is now.

Extm. Maltæ Compositum.

℞ Leaves of Coltsfoot,	
Spotted Lungwort . . . . . . :	℥vj.
Liquorice	℥viij.
Raisins, stoned	℔ij.
Strongest Ale, not hopt, of a due age .	Gall. vj.

Boyl to the consumption of gall. iv., then express strongly and evaporate to the consistency of honey. Dose: ʒij twice or thrice a day, against the phthisick or consumption of the lungs, etc.

C. S. MILLER.

R. H. L.—Recipes for materials for stopping teeth will be found in vol. vii., p. 706.

G. D. R.—The *Chemical News* is published weekly, and the office is in Boy Court, Ludgate Hill. The *Analyst* is a monthly journal, and is published by Baillière, Tindall and Cox, King William Street, W.C. Application as to terms of subscription should be made at the respective publishing offices.

R. Modlen.—The botanical origin of Damiana was first determined by Mr. E. M. Holmes, and published in this Journal, vol. vi. (1876), p. 581. See also other notices of the drug in the same volume, pp. 24 and 423 (figure).

"*Surrey.*"—(1) The pod has been received and will receive attention. (2) The fee, which is for registration, must be paid, if a certificate of another examining body be accepted, and the person, after registration, stands in exactly the same position as to the Bell Scholarship, and in every other respect, as if he had passed the Society's examination.

"*Pil. Rhei Co.*"—It would be against the rules of this Journal to invite an expression of opinion upon the merits of a particular apparatus. The recipe you require would probably be supplied by the manufacturer.

Hampton.—A good transparent cement may be made by warming best transparent gelatine, cut small, with a little acetic acid until liquefied. Other recipes have been given in back numbers of this Journal.

H. Eeles.—We can only refer you to the numerous advertisements in another part of this Journal.

"*Pickering.*"—The definition is to be found in most modern works on English grammar.

K. K.—(1) See the note on "Green Extract Suppositories," vol. ix., p. 949. (2) See the remarks on ext. taraxaci liq., Dispensing Memorandum No. 10, vol. viii., 145.

"*Inquirer.*"—See remarks on Dispensing Memorandum No. 259, vol. ix., p. 797.

C. Swinn and *Chemist and Dentist.*—We are obliged for your letters, and think that the use of the alternative terms in the Act was intended to indicate, as the words of the section purport, that the exemption provided by the sixth section had reference to all persons who were at the passing of the Act *bonâ fide* engaged in the practice of performing operations upon the teeth. We think the most ordinary common-sense view of the case, as well as the terms of the Act itself, are alike sufficient to justify this view should the position of pharmaceutical dentists ever be disputed.

A. Billington.—Your inquiry should be addressed to a rabbit fancier, or to the editor of the *Field* or of *Land and Water*.

D. K. Whitlock.—The communication of which you speak as having been forwarded has not been received.

Scrutator.—The precipitate is probably hydrobromate. A paper upon an analogous case is to be found in the *Pharm. Journal* for July 30, 1870, p. 96.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Stocks, Haydon, Toomey, Sumner, Harrington, Stott, Thompson, Liebig and Co., Inquirer, One who would try to be even with them, Noris, H. R. L., A. P. S.

"THE MONTH."

The sudden accession of severe weather has stripped the gardens and hedges of the last lingering traces of flowers. Mulberry trees that on the 13th instant were covered with leaves, at 10 o'clock the next morning had shed every leaf, and from the fine bracing weather of autumn we are suddenly landed, as it were, in the middle of December or January. The Gardens at Kew, except in the hothouse, hardly show a flower anywhere. A solitary hellebore in blossom and a single Boraginaceous plant were the only ones that were noticed in the Herbaceous Ground on a recent visit.

In the Economic House at Kew there are at present in blossom the Assam tea plant, the staminate plant of the papaw tree, the ground nut (*Arachis hypogœa*), *Petiveria alliacea*, and the sour varieties of the tobacco plant. The boldo tree is in bud, and will probably be in flower in another week.

At Mr. Bull's nursery at Chelsea, during the early part of this month, *Gentiana Kurroo*, an Indian medicinal plant, was in blossom. The root of this plant appears to have been frequently confounded with that of *Picrorrhiza Kurroa*, a Scrophulariaceous plant, which is also intensely bitter.

In *Flora*, Dr. Otto Kuntze has a long paper on "The Relationship of Seaweeds and Flowering Plants." He would trace the derivation of the Angiosperms from the Carposporous algæ, and the Gymnosperms from the Oosporeæ.

At a recent meeting of the Royal Horticultural Society, Professor Henslow exhibited a curious specimen of *Begonia*, in which the connectives of the anther were developed as stigmas. Dr. Berggren has stated his opinion that the further plants are found from the centre where they are most abundant and luxuriant, the greater is their tendency to produce male plants, or male inflorescence, while, in their native home, the tendency is rather to produce the female plant. It would be interesting to know whether an improvement in the circumstances of the plant led to this curious phenomenon noticed in the Begonia.

At a recent meeting of the Linnean Society, Professor Henslow read a paper on the origin of the scorpioid cyme, which he considers to belong to the indefinite or centripetal system. He points out that the flower sometimes found in the fork of the two branches of the inflorescence in *Myosotis* is not the terminal bud of the primary axis, but belongs to one or other branch of the inflorescence, and owes its position to the adhesion between the terminal and the highest axillary raceme. He considers that this form of inflorescence owes its origin to a new principle of phyllotaxis, by which opposite decussate leaves are resolved into alternate, the ordinary spiral line *oscillating* through three-fourths of a circle, so that if a line be drawn from flower to bract it will represent the scorpioid cyme (or rather raceme) of the *Boraginaceæ*.

The well-known fungologist, the Rev. M. J. Berkeley, has recently met with a specimen of *Polyporus varius*, bearing asci, containing spores, on the pores beneath the pileus. A similar occurrence on the hymenium of *Agaricus melleus* was described by De Barry some years ago. If this be not a parasitical growth, but a natural, though rarely seen development in the hymenomycetous fungi, it will open a new field of observation, and probably modify to a certain extent the views held concerning the reproductive organs of this group of fungi. A drawing of asci and spores may be seen in the *Gardeners' Chronicle* for Nov. 15.

A writer in the same journal makes some curious remarks with regard to cowbane, *Cicuta virosa*, which are worthy of attention. He states that it is certainly eaten by cattle wherever they can get at it. He has frequently examined the sides of those pits where it grows abundantly and where it is regularly cropped as far as a cow can reach, and he can find no sign of its being dropped after it is bitten. He has never been able on inquiry to hear of any suspicious death or illness of cattle in the neighbourhood where it grows. He has also seen *Œnanthe crocata* quite cropped down, while *Œnanthe Phellandrium* is never touched by the cows. Unfortunately the address of the writer is not given, but even supposing it to be in the North of England or Scotland, it is interesting to know that *Cicuta virosa* and *Œnanthe crocata* do not prove poisonous to cattle in some localities, since the latter is known to be remarkably fatal to human beings. The effect of eating the plants upon the milk of the cow is one that needs inquiry.

Those who have visited the hothouse containing succulent plants at Kew must have noticed a peculiar feature in the spines of many of the cacti, viz. that the tips are frequently dark coloured. In that very valuable work, 'Notes of a Naturalist on the "Challenger,"' the use of this discoloration is pointed out in a very interesting manner. The author believes it to be intended to protect the plants from being devoured by animals, for he has observed that on attempting to touch the end of one of the spines it is almost impossible to do so without getting pricked, owing to the illusion produced by the dark tips of the spines causing a miscalculation of distance. Animals in this way probably get severely pricked and learn to avoid the plant. The black tips being almost invisible as viewed at many angles, the spines look as if they terminated where the white portions of the spines end and consequently the hand is advanced as if the prickles began there and is pricked suddenly by the unseen black tips. This feature, however, is not present in several species of *Opuntia*.

Some time ago attention was called in these columns to the discovery of the largest aroid known, *Conophallus titanum*, by Dr. Beccari, and now there is announced the discovery of the smallest in the world. It is called *Microcasia pygmæa* and inhabits moist rocks, etc., in Borneo. The whole plant is not more than one inch high and has fleshy lanceolate obovate leaves, with rose coloured spathes just appearing above them. The spathe is deciduous, separating above the base, and has a cup-like appearance.

Most of those who use the microscope are familiar with the beautiful little object called *Volvox globator*, one of the fresh water algæ, and know how difficult it is to keep in a healthy state. Mr. N. E. Brown, of Kew, has found that if it be kept out of doors in a bottle or vessel exposed to the drip from a roof, it keeps in good health and multiplies freely. Mr. Bolton, of Birmingham, has recently sent out specimens of this beautiful little plant in a very rare state, namely with antheridia, which are readily distinguished by their orange colour.

Several changes have recently been made in colonial botanical gardens. Dr. Trimen, senior assistant in the Botanical Department of the British Museum, and well known, not only for his disinterested labours as one of the editors of the *Journal* *of Botany*, but also in connection with Professor Bentley as one of the editors of the very valuable and well known work on 'Medicinal Plants,' has been appointed director of the Botanical Gardens of Ceylon. Fortunately he has been able to complete 'Medicinal Plants' before leaving. It would have been a matter of regret had it been necessary to leave this work unfinished, as it will undoubtedly be the standard work on the subject for many years to come. The Government may be congratulated on their choice of one who is not only an able botanist but who is peculiarly fitted by his special knowledge of and interest in medicinal plants for the duties which will be incumbent on him in an island where cinchona, cinnamon and other plantations of great value and extent form important branches of industry. The invariable kindness and courtesy experienced at his hands by all inquirers, and the readiness with which he at all times frequently spends both considerable trouble and time in helping amateur botanists to determine knotty botanical points, indicate that his Directorate will be a highly gratifying one to all who are concerned in it.

Mr. H. Marshall Ward, scholar of Christ's College, Cambridge, who read a valuable paper on the development of the Embryo in Phanerogams at the Linnean Society last week, goes out with Dr. Trimen as cryptogamist, for two years, to investigate the coffee leaf disease in Ceylon.

Mr. D. Morris, B.A., former assistant director of the Botanical Garden at Ceylon, is appointed to be director of the Botanical Department, Jamaica, and other changes in the superintendence of the botanical gardens at Jamaica, Demerara and Trinidad have also taken place.

The *Gardeners' Chronicle* states that the fruit of the *Ptelea trifoliata*, or wafer ash (so-called from the resemblance of its fruits to a wafer in shape and thinness), has been tried in France as a substitute for hops in beer. The quality and flavour are reported equal to the best Strassburg beer. The tree is called the hop tree in the United States, on account of the fruit having the odour of the hop. The bark of the tree is used in medicine in the United States in cases where a soothing tonic is required to relieve debility after fevers or gastro-intestinal irritation, and can be taken where other tonics are rejected. As the fruits probably contain the same alkaloid, berberine, which is found in the bark, beer made from the *Ptelea* fruits may be expected to prove quite a semi-medicinal drink, and will possibly be free from the slightly narcotic influence of the hop. Without going to America, there is an extremely common plant in this country having not merely the odour of the hop in a powerful degree, but also its bitterness, viz., *Teucrium Scorodonia*, which would prove an excellent substitute for hops when such is required. It also possesses the advantage of having been proved to be very useful in the relief of pyrosis, or water-brash, and as a stomachic tonic.

According to a paragraph quoted in the *Pharm. Zeitung f. Russland* (Oct. 1, p. 591) the juice of a South American species of *Ocimum—O. basilicum*—known in Brazil under the name of "albahaca," is a valuable anthelmintic. It is said to rapidly cause the removal of the worm in any stage of its development, whilst if no worm be present it simply exercises an aperient and antiseptic action. Fifty grams of the juice are administered, followed about two hours afterwards by a dose of castor oil.

In a St. Petersburg weekly medical journal (quoted *Pharm. Zeit. f. Russl.*, Oct. 15, p. 623), P. Filatow reports that in the provincial hospital of Ssaransk, during the last three years, an infusion of sunflower (*Helianthus annuus*) has been used in numerous cases of intermittent fever and in most of them with results as certain and satisfactory as those following the use of quinine. The "infusion" used was prepared by digesting sunflower stalks, cut into small pieces, during three or four days in eight parts of ordinary brandy; it is described as being then of the colour of sherry and tasting of sunflower. The dose for adults was a tablespoonful three times a day, and the action is said to have been equally favourable whether administered before or during the paroxysm of fever. In fresh cases of fever the cure was completed in from one to three days, but in more confirmed ones the use of the infusion required to be continued during a week or longer.

In the *Deutsch. med. Woch.*, No. 34, Dr. Auerbach, of Berlin, recommends the use of balsam of Peru for pruritus as well as for itch, having found its use attended with the greatest success.

Dr. E. U. Kerr, in the *British Medical Journal* of November 1, reports a new and important use for nitrite of amyl. He has found its inhalation in doses of 5 minims to cause even severe *post partum* hæmorrhage to cease.

A specimen of "saffron" is described M. Boutet in the *Répertoire de Pharmacie* (vii., 469), which requires almost a stretch of courtesy to accord to it the term adulterated. It was found to contain only 25 per cent. of true saffron, the other 75 per cent. being made up of sulphate of lime (25 per cent.), glucose (20 per cent.), colouring matter, water, and the stalks and radicles of a dicotyledonous plant. Another commercial specimen of saffron, which recently came into the hands of Herr Martenson, of Dorpat, for examination, was found by him (*Pharm. Zeit. f. Russl.*, Oct. 15), to contain 39 per cent. of calcium carbonate (the total ash in a genuine specimen being about 6 per cent.), some foreign colouring matter, and saccharine matter, probably honey. Although similar adulteration of saffron has been long ago recognized and pointed out, the practice appears still to possess considerable vitality.

The same Russian journal also mentions (*Pharm. Zeit. f. Russl.*, Oct. 1) a spurious "essential oil of bitter almonds" which has occurred in the market for some years, but the origin of which is not known, it not being the volatile oil of cherry-laurel, peach kernels or apricot kernels. It differs from the true essential oil of almonds in its specific gravity being only 1·029 to 1·030; that of the true oil, according to 'Pharmacographia,' varying between 1·061 and 1·065, or when purified, according to Umney, 1·049. The spurious oil has also a less agreeable and more acrid smell. Boyveau indicates as a means of distinguishing between these oils their behaviour towards concentrated sulphuric acid. With an equal volume of the true oil the mixture acquires a beautiful red colour that becomes gradually darker, but the liquid remains thin and clear. The essential oils from peach and apricot kernels also turn red at first, but become dark red more rapidly; the mixtures also become thick, but remain clear. Cherry-laurel oil behaves similarly, but becomes immediately very dark red. The mixture of the spurious oil with sulphuric acid also becomes red, but afterwards brown, and then thick and turbid, and after one day forms a stiff brownish mass.

At the drug sales in London this month, an unusually large quantity of Siam benzoin in the tear was offered, also a small quantity of Sumatra benzoin in the tear, a form in which it rarely occurs. In this state it differs from the Siam in having a paler colour and more dusty surface, and has not the peculiar vanilla odour of the Siam benzoin. Balsam of tolu also appeared in quantity. Among those of less common occurrence were noticed kamala, condurango bark, myrtle wax, German chamomile, Para tonquin beans, Ceylon cardamoms and araroba. Among spurious drugs offered were jaborandi, consisting of leaves of a species of pepper, false buchu (*Empleurum serrulatum*) and horse-cassia pods (*Cassia grandis*).

In Messrs. Gehe's 'September Report,' it is stated that owing to the Zulu war the supply of Cape aloes had stopped during the preceeding six months.

Calabar beans are stated also to have been scarce. Several packages of these beans have, however, been offered for sale during the last few drug sales in London, and some of them of good quality.

In South Italy the olive trees have suffered much from drought and not even a moderate supply of oil is reported, so that an advance in the price of olive oil also may be expected.

Owing to the great demand for artificial benzoic acid its value has increased 10 per cent. in spite of the establishment of new factories. It is now prepared both in France and Germany, not only, as formerly, from the urine of herbivorous animals, but also from the toluol of coal tar. This has a much less penetrating peculiar odour than that made from urine, but does not yield such fine crystals.

Messrs. Gehe's agent in Shanghai reports concerning rhubarb that the Shansi root is scarce, since from its low price the natives of the Shansi mountains have found it unprofitable to collect it. This is probably due to some extent to the fact that it is mostly of inferior quality and dried with less care, apparently in ovens, in which case it soon rots in the centre or is attacked by insects.

The district of Tanyue in the province of Sze-chuen yields a good and cheap rhubarb. "This variety is in much demand in London where it is called high dried Shanghai rhubarb." It is easily distinguished from the more woody and fibrous Emow-Wo brand, which is collected in the Kwanyue district of Sze-chuen, by the wartlike points on the upper surface, and by its hard bony exterior. The stock of the Shansi rhubarb in Shanghai is said to be about two hundred chests, and that of Sze-chuen rhubarb from six hundred to seven hundred chests.

According to Dr. Septimus Piesse, in a letter to the *Times*, the produce of the lavender and peppermint farms at Mitcham, Merton and Carshalton, in Surrey, and at Hitchin, in Hertfordshire, has fallen this year 40 per cent. below a seven years' average, and since August, 1876, the crops have suffered from want of sunlight and temperature. A rise in the price of the oils of these plants may therefore be expected.

It is interesting to notice that after a general acceptance during several years of Mantegazzi's theory as to the beneficial influence of odoriferous plants upon the atmosphere, because of the formation of ozone induced by the oxidation of their essential oils, a continental chemist has just been publishing his reasons for believing that the hitherto belauded ozone may exercise an injurious and even poisonous effect when breathed. Whilst doctors are thus disagreeing, Mr. Rimmel steps forward with Christmas novelties in the shape of "ozonized" lavender water, eau de cologne and florida water, the special merits of which, it is claimed, lie in their power to evolve ozone. How the ozonization is accomplished does not appear, but his "aromatic ozonizer," another device by which the same effect is produced, was shown in the Paris exhibition, and was understood to be a fine sawdust saturated with oil of eucalyptus.

Attention is being called by our contemporary, *Iron*, to the value of the gum euphorbium for coating iron exposed to the action of sea water. It not only, by its poisonous properties, prevents the adhesion of marine animals, but it also keeps the iron from rusting.

The possibility of utilizing the banana fruit in the production of alcohol has been under the consideration of the Academy of Sciences more than once recently. M. Buignet has found, that during the whole growth of this fruit the saccharine matter is constituted entirely of cane sugar, but the proportion varies considerably. From some results of analysis published by M. Correnwinder it appears that a sound ripe banana fruit contains as much as 22 per cent. of its weight of sugar, 16 per cent. being crystallizable and the remainder uncrystallizable. In the mature sugar cane the proportion of cane sugar present is, according to Payen, 18 per cent. After the banana has become quite ripe there is a rapid diminution in the proportion of crystallizable sugar and an increase in the proportion of inverted sugar, but not to the same extent. An over ripe fruit, the flesh of which had become very mellow, contained only 2·84 per cent. of crystallizable and 11·84 per cent. of uncrystallizable sugar, being a total of 14·68 per cent. or two thirds of the original quantity.

In a communication to the Berlin Chemical Society (*Berichte*, Nov. 10, p. 2059), G. Bruylants describes a method of preparing hydriodic and hydrobromic acids, based upon the property possessed by the halogens of combining at ordinary temperatures with certain organic substances, and under the influence of heat separating again in the form of hydriodic or hydrobromic acid. The organic body preferred by Bruylants belongs to the class of terpenes, it being the essential oil obtained by the distillation of balsam of copaiba and dried over chloride of calcium. This is said to be capable of converting three times its weight of iodine or bromine into the corresponding hydrogen acid. About 60 grams of oil are put into a tubulated retort of 500 c.c. capacity, combined with an inverted condenser, which on the opposite side is connected by a bent tube with a gas drying tower, having a loose plug of asbestos in its lower part and a delivery tube above. The oil is slightly warmed and 20 grams of iodine are gradually dissolved in it; the temperature is then allowed to rise. An abundant and regular evolution of gas soon takes place, and when this ceases the retort is allowed to cool a little and then more iodine is added, the operation being repeated with increasing quantities of iodine until about 150 grams have been used. The acid obtained about equals in weight the iodine used. In preparing hydrobromic acid by this method the quantities of bromine added are about the same, but the bromine is allowed to fall upon the oil slowly, drop by drop, and the gas is passed through two or three drying towers. The greater part of the oil becomes solid during the operation, and a smaller portion is converted into cymol and perhaps dicymol.

The solubility of morphia in chloroform has been variously stated by different authors. Professor v. d. Burg (*Pharm. Zeitung*, Nov. 8, p. 696) has tried to settle the doubt by operating with freshly precipitated morphia and chloroform washed four times with its own volume of water and then distilled over calcium chloride. The morphia was finely powdered, submitted for several hours to an increasing temperature and then repeatedly shaken up with the chloroform, the liquid being afterwards rapidly filtered and 10 c.c. of it evaporated in a porcelain capsule. In pure chloroform morphia was found to be nearly insoluble, only one milligram of residue being left from the 10 c.c. But the solubility rapidly increases with the presence of alcohol; chloroform containing 1 per cent. of alcohol leaving a residue of 5 milligrams from 10 c.c.; with 5 per cent. of alcohol, 45 milligrams; and with 10 per cent., 90 milligrams. Morphia containing narcotine, which is soluble in chloroform, would give a larger residue when pure chloroform is used, and its presence might be detected in this way

The intrusion of sensationalism into that part of the domain of scientific investigation which has reference specially to the nature of the elements appears to be very persistent. Dr. Endemann, wishing to bring before the American Chemical Society the subject of the alleged dissociation of the elements at high temperatures, applied to Professor Victor Meyer as to the nature of some results recently alleged to have been obtained by him, the report of which has raised considerable expectation in the scientific world. In his reply the professor declares that the communications in the English journals concerning his investigations which report the separation of oxygen from chlorine have been published without his knowledge and against his wishes, and that they are entirely incorrect in essential particulars. It will not be unreasonable to expect that by the time the next "Month" is due there will be some explanation to report.

The onerous task undertaken by the New York College of Pharmacy in order to ward off from the pharmacists of the State of New York the inconveniences of an Act for the compulsory verification of weights and measures (see before, p. 168) has hardly yet received the recognition it deserves. Eight weeks after the sending out of the circular recently quoted in this Journal only eight pharmacists had (according to *New Remedies*) sent in their weights for verification, and only forty-nine new sets of correct weights had been sold to twenty-seven buyers, three of whom resided outside the State. Yet it appears to be acknowledged that such an Act would have had some *raison d'être* in the "bad character of the weights used in some establishments." A gentle fillip has been administered to the sluggards by the Medical Society of New York, which has passed a resolution advising its members to patronize, so far as may be consistent, only those apothecaries who use weights certified by the College of Pharmacy to be correct.

November is the month in which even the most laggard societies show signs of getting to work, and as a result of the meetings which are now getting into full swing there will no doubt be soon an abundance of more or less scientific papers on topics in every department of science. Next Monday the annual distribution of medals by the Royal Society takes place. The Copley medal goes to Professor Clausius, of Bonn, for his researches on Heat; the Davy medal to M. Boisbaudran, for his discovery of Gallium; a Royal medal to Mr. W. H. Perkin, for his researches in organic chemistry; and another Royal medal to Professor A. C. Ramsay, for his work in geology and physicial geography. At the Royal Institution the Christmas lectures to juvenile audiences are this year to be delivered by Professor Tyndall, the subject being Air and Water.

Pharmacopœia literature is just now assuming considerable prominence in various parts of world. In the United States, many eminent pharmacists are working hard to secure all possible perfection in the next edition of their text-book. In Germany, a committee appointed by the Deutsche Apotheker-Verein, and presided over by Dr. C. Brunnengraber, of Rostock, has just issued a long and elaborate report upon the form it is advisable that the next pharmacopœia of that country should take. In Norway a new edition of the Pharmacopœia has just been published, and in Russia a new edition is to be put into the hands of the printer this month and is expected to come into force in March or April of next year.

In the presence of a difficulty with regard to a prescription, whether that difficulty arises from an "unusual dose," incompatibility of ingredients, or any one of many other causes, the dispenser would often gladly avail himself of a communication with the writer, and in justice to the persons involved, the writer, the dispenser, and the patient, such an opportunity should be afforded him.

In every dispensing establishment, instances of this kind must occasionally occur, and it will have been observed how frequently in these columns the remark has been made, that the "the writer of the prescription should be referred to." This wholesome advice is very easily given, but in practice, having in view the present method of writing prescriptions, very difficult for the dispenser to follow; the prescription is usually written on a sheet of note paper which may have been picked up at the house of the patient, and it may or may not have even the patient's address on it; sometimes an old envelope does this duty. But the sole clue to the prescriber are the initials, generally illegibly written at the bottom of the prescription, and from long continued use this signature may have assumed the form of a hieroglyphic, the mystical characters of which it is composed having no relation to the combined letters of their prototype.

As a result of this, the dispenser, unless he is familiar with the writing, tries in vain to decipher the writer, and the only alternatives which present themselves to him are, to use his own judgment, or to apply to the patient for the writer's address. The former of these, in the case of an unusual dose, throws on the dispenser a grave responsibility; the latter involves a modified explanation, which very rarely satisfies the patient.

The remedy for this state of things is very simple; it is for those who write prescriptions to make a practice of writing them on paper bearing their address, not only when being consulted at home, but also when visiting their patients. It is true that this would involve the carrying of a small case of their own paper to the houses of their patients, but simply one adapted to a side pocket, and such as are now commonly made use of for letters.

It may be said that this course would not be considered professional, that it would savour of advertisement; but the necessity for some such course is apparent, and it is only necessary that the subject should receive the attention of those in the profession above suspicion, to be followed by others and to become a general and accepted practice. A directory could then be referred to, and the writer, if necessary, communicated with. This common sense course of procedure, if generally adopted by the medical profession, would prove a boon to dispensers, and relieve them of responsibilities which form no part of their legitimate business, and to which, with their consequences, they should not be subjected.

The ointment, No. 365, directly on being mixed evolves ammonia with the formation of mercuric iodide; this gives it a reddish-yellow colour. The decomposition has been fully explained by "Pot. Carb.," p. 398. "Unguentum" does not state whether the "creamy" applies to colour or consistence, or both.

No. 366. The acid. carbolic. should be dissolved in the ol. olivæ, and the extract of opium made smooth by the addition of a little water and with the aid of heat; sufficient water should be added, so that when the bottle is shaken the ext. opii may be diffused through the oil, but not more than is necessary for that purpose. The remarks of "Lavandula" on this prescription, p. 377, may be referred to.

Mr. Thursfield has already replied to "Sub Umbra Floresco," No. 367, with regard to the pitch pill. The pitch selected should be firm enough, so that the pills made of it retain their shape; then the manipulation referred to by Mr. Thursfield may be adopted with advantage.

The prescription No. 368 should be dispensed with tr. zingib, B.P.; its strength does not usually vary materially in any two establishments. The result must necessarily be a milky mixture, and the milkiness would to some extent depend on the strength of the sp. am. arom. and sp. æth. nit. used, but more so on the variety of ginger employed in making the tincture. The Pharmacopœia directs the tincture to be made from the "dried rhizome of *Zingiber officinalis*, from plants cultivated in the West Indies, India and other countries." So long as ginger is the product of *Zingiber officinalis*, there is considerable latitude allowed as to the country from which it is obtained. From a paper by Mr. Thresh, read at the British Pharmaceutical Conference in Sheffield, and the discussion to which it gave rise, it will be seen that the African ginger, with more resin and less starch, must yield a tincture differing in its milky character when mixed with water from that yielded by Jamaica ginger. As a commentary on this, "Leo" is referred to some remarks on tinct. sumbul. obtained from various sources, and the discussion which followed the reading of the paper, showing the different results obtained when such a tincture was combined with the other ingredients of which the mixture was composed (*Pharm. Journ.*, Nov. 8, p. 373).

In No. 369, Mr. Bessant has met with a mixture containing a larger amount of camphor than is usually prescribed, but, nevertheless, quite within the B.P. indicated dose—1 to 10 grs. In accordance with "faithful dispensing" this difficulty may be easily and satisfactorily overcome, and the "reins of conscience" by no means relaxed. The camphor should be put into a mortar with the spirit of nitre, and a small addition of rectified spirit, but only sufficient to dissolve the camphor, and then ℥ss mucilage gradually added, and with trituration till smooth. The camphor, on the gradual addition of the other ingredients, remains suspended, so that each measured dose of ℥j shall contain 5 grs. camphor. Mr. Bessant's attention is directed to remarks in "The Month," January 28, 1879, p. 1058, No. 308, and previously, on the method of suspending camphor when prescribed in mixtures.

In mixtures like that of No. 370, each ingredient should be mixed with separate proportions of the vehicle. The remarks of "Lavandula," p. 378, convey all that need be said on the subject, and his observation that the mixture should not be filtered may be emphasized.

The manipulation of ointments containing extracts, as No. 370, has been on several occasions explained. J. Y. is therefore referred to the remarks in the last "Month," p. 326, No. 359. Several correspondents also have in last week's Journal replied to this question, suggesting the same manipulation.

The pills, No. 371, do not require an excipient; they should be made with the carbolic acid in crystals. If the mass become too soft for pills, more especially as these pills are to be silvered, $\frac{1}{2}$ grain of pulv. tragacanth. added to each pill will give them the requisite firmness, and if allowed to stand a short time they may be satisfactorily silvered.

The phosphorus pills, No. 372, may be made in the following manner:—The ferri redact. and quinæ sulph. should be combined with glycerine and tragacanth into a firm and suitable pill mass. The phosphorus then should be dissolved in a few drops of bisulphide of carbon, to which a drop or two of chloroform should be added, the vapour of the chloroform preventing the oxidation of the phosphorus during the manipulation. As soon as the phosphorus is dissolved, the pill mass of ferri redact. and quinæ, previously prepared, should be added, the whole combined and divided into thirty pills.

The manipulation of phosphorus in a pill mass has on several occasions previously been referred to, and bisulphide of carbon recommended as a solvent.

M. P. S., in No. 373, requires the strength and also the quantity usually injected, of solution of daturin. Daturin is generally considered as being chemically identical with atropin, and may be administered hypodermically in the same dose. The strength of a solution of sulphate of atropia for hypodermic injection is 1 to 2 per cent., and the dose from two to five minims, equivalent to from one-fiftieth to one-twentieth grain.

The emulsion, No. 374, should be made by adding the liq. potassæ to the water previously to the addition of the cod liver oil. Little need be added to the method given by J. B. L. Mackay, p. 419. It may, however, be stated that a successful result must necessarily in great measure depend upon the liq. potass. being of full strength; a deficiency in this respect may account for the separation mentioned by T. B. L. as having occurred in every sample that he had experimented on. The B.P. says that the fluid ounce of liq. potassæ should contain 27 grs. of hydrate of potash.

The prescriptions Nos. 375 and 376 resemble those obscure combinations which can be prepared satisfactorily only under the directions of the writers; they seem typical of those valuable recipes sent in return for a certain amount in postage stamps.

GLYCERITUM FERRI SUBSULPHATIS.*

BY I. E. SAYRE, PH.G.

A liquid preparation of Monsel's salt, free from acid or irritating properties, bearing a definite and easily recollected ratio of strength to the salt in question, with a basis of glycerin or some other liquid as capable of permeating tissue, is one of the pharmaceutical wants of the present time. These combinations have grown greatly in favour of late years in the treatment of various kinds of mucous discharges and chronic ulcerated surfaces where a powerful astringent effect is required; they are highly commended by some in the treatment of diphtheria. In vaginal, rectal and local hemorrhages they are believed to have advantages over the officinal solution in forming less hard and irritating clots when applied to such delicate parts. Such preparations cannot be compounded extemporaneously from the subsulphate of iron, in a form which is desirable for the physician or creditable to the pharmacist. The argument then is greatly in favour of the adoption of a standard preparation which would do with justice.

The commercial persulphate (so called) is found in the shops in a yellow pulverulent mass, or in powder. It is very slowly and imperfectly soluble in water or glycerin —it probably contains oxysulphate. Several samples of the salt have been tried, and they all proved incompletely soluble in water or glycerin, either cold or boiling. The perfectly soluble and deliquescent Monsel's salt can be produced by evaporating the officinal solution at a moderate temperature upon porcelain or glass plates; but this is an unstable salt and very inconvenient to handle, its proneness to change suggests the idea of making it at once into a glycerite of definite strength, so that it may be at once ready for use, or can be made so by simple dilution.

A glycerite containing fifty per cent., by weight, of the salt furnishes perhaps the most convenient form, and, furthermore, one which possesses qualities which render such a standard of strength most desirable.

The process adopted for its manufacture consists in first preparing a solution of the subsulphate, following the directions of the U. S. Pharmacopœia for the solution; this is evaporated in a tared capsule at a moderate temperature until a thick viscid liquid is obtained; this is then diluted with a sufficient quantity of glycerin to produce a solution of the above percentage. In order to use this process the quantity of dry subsulphate of iron in the officinal solution must be known. By careful experiment it has been found to contain 47 per cent. The use of weight instead of measure, in the formula, is suggested by the writer as being easier and apt to secure more accurate manipulation.

The following process is recommended, the finished glycerite measuring about twelve fluidounces, the quantity directed by the U. S. Pharmacopœia for the solution:—

Take of liquor ferri subsulphatis 6·127 grains, evaporate to 3·963 grains, continue the heat and add glycerin sufficient to make the weight 5·760 grains.

This furnishes the easily recollected percentage of dry salt, half its weight being Monsel's salt, each fluid drachm representing about 50 grains of subsulphate of iron—in exact figures 51·08 grains.

It can readily be diluted to any extent without destroying its transparency, either by water or glycerin, and in this respect furnishes a much superior article for compounding than the dry salt of commerce. Its viscidity renders it of that plastic character so very advantageous where the application is intended to remain upon the surface of the affected part and in addition to the styptic effect of the iron salt, the glycerin exercises its emollient properties in many ways and particularly in preventing the formation of the irritating clots and crusts peculiar to the salt itself or its solution.

* From the *American Journal of Pharmacy*, November, 1879.

ELIXIR GLYCYRRHIZÆ COMPOSITUM.*

The following formula has been calculated on the basis of various formulæ heretofore proposed, substituting parts by weights for definite weight and measure. A convenient quantity of the elixir, on a small scale, will be obtained by substituting for part the quantity "10 grains." The resulting product will then measure about 1 pint.

Take of

Licorice root, cut and bruised, ninety parts.	90
Sugar, two hundred parts	200
Water, a sufficient quantity	q.s.

Digest the licorice root with

Water, six hundred parts	600

for an hour on a water-bath, then heat to boiling, boil for about fifteen minutes, and then strain with strong expression. Pass through the strainer enough water to make the decoction weigh seven hundred parts . . 700

Then take of

Star-anise, in No. 40 powder, six parts . .	6
Cinnamon, in No. 40 powder, five parts . .	5
Coriander, in No. 40 powder, four parts . .	4
Caraway, in No. 40 powder, two parts . .	2
Nutmeg, in No. 40 powder, one part . . .	1
Alcohol, 93 per cent., a sufficient quantity	q.s.
Water, a sufficient quantity	q.s.

Mix the powders, pack them firmly in a conical percolator, then pour upon them about one-half of a mixture of

Alcohol, seventy parts	70
Water, forty parts	40

When the percolate begins to drop, close the orifice with a cork, and set the percolator aside in a warm place for four days. Then allow the percolation to proceed, pouring gradually more of the menstruum on top, until the percolate weighs one hundred parts 100

Add this percolate to the strained decoction of the licorice, let the mixture stand twenty-four hours, filter and add the sugar. Dissolve the latter by agitation, then filter again, and wash the filter with enough of a mixture of alcohol, seven parts, and water, four parts, until the whole filtrate weighs one thousand parts . . 1000

SOME OF THE CONSTITUENTS OF PHYTOLACCA DECANDRA.†

BY A. C. EHRHARD.

Powdered poke-root was percolated with three successive portions of ether, and the percolate evaporated spontaneously to dryness. The greater portion of this ethereal extract was dissolved in alcohol and had an *acid* reaction. From a part of this, by means of alcoholic and aqueous reagents, the following results were obtained. With alcoholic solution of potassa, a precipitate soluble in excess; with solution of lime, a precipitate insoluble in excess; with aqueous solution of platinic chloride, a whitish crystalline precipitate. No precipitates were

* From *New Remedies*, October, 1879.

† From *New Remedies*, September, 1879. Abstract of a thesis presented to the College of Pharmacy of the City of New York, in 1875.

Poke-root was partially analysed in 1843 by E. Donelly (*Amer. Journ. Pharm.*, Oct., 1843, p. 165). Nothing of special interest, besides the usual constituents of plants, was found in it. No chemical examination has since been published on any part of the plant, unless we may reckon here Reichel's (1836) analysis of another species of *Phytolacca*, which established the presence in the root of *Ph. drastica*, Poppig, of about 6·6 per cent. of calcium malate. Baillon (*Compt. Rend.*, 80 (1875), p. 426) has published some interesting observations on the behaviour of the colouring matter.—ED. N. R.

obtained with silver nitrates, potassium iodide, or other reagents. A portion of the alcoholic solution was then treated with acetate of lead, a precipitate obtained and filtered. The excess of lead in the filtrate was removed in the usual manner by hydrosulphuric acid, and on evaporating the final filtrate, the residue was dissolved with the aid of a drop of dilute hydrochloric acid. Platinic chloride produced with this a precipitate, which turned out to contain *potassa*. The lead precipitate was freed from lead by hydrosulphuric acid, and the final filtrate was found to contain *calcium* and *sulphuric acid*.

The remainder of the alcoholic solution was evaporated to dryness on the water-bath, the residue dissolved in ether and shaken with a mixture of acetic acid and water (1:10), which produced a flocculent precipitate, which dissolved in concentrated sulphuric acid with an olive-green colour changing to purple on applying heat. The acid aqueous, separated from the ethereal solution, was evaporated to dryness to expel the acetic acid, and the residue examined for alkaloids, with a negative result. Although iodine with potassium iodide produced a light-coloured precipitate, and ammonia a flocculent precipitate, solution of nutgalls only caused a slight turbidity, and platinic chloride gave no precipitate.

The ethereal solution, after a partial precipitation by acidulated water, was evaporated spontaneously to dryness, yielding a light-brown *fat* or *wax*, part of which was saponified with potassa, leaving a slight residue soluble in dilute nitric acid, but too small for further examination. The soap solution was a clear light-brown liquid.

After treating the original ethereal extract with alcohol, the greater portion of the residue left after the evaporation of the latter was redissolved in ether, when a white crystalline substance was left, which was apparently very difficultly soluble in this menstruum. This was dissolved in boiling alcohol and found to be a *crystallizable acid resin*, insoluble in water, and soluble in ammonia; on evaporating the ammoniacal solution, ammonia was lost, and the acid resin separated. Sulphuric acid dissolves this with an olive-green colour, changing to purple on heating, and to red on adding nitric acid. Reducing agents turn the sulphuric acid solution a dirty purplish colour.

The same lot of poke-root, which had thus been exhausted with ether, was then percolated with alcohol, the percolate concentrated (*a*) and set aside. A crop of crystals was thus produced, which were dissolved in water, decolorized with bone-black, and the solution evaporated, when colourless crystals were obtained. They dissolved slowly in strong sulphuric acid, yielding a colourless solution. The aqueous solution of the crystals was found to yield no precipitate with potassium iodo-hydrargyrate, potassium iodo-iodide, picric acid, barium chloride, ammonium carbonate, lime-water, and acetate of lead. Heated in a dry test-tube, they frothed, emitting a peculiar odour, then charred, and by increase of heat became colourless. The crystals were found to be potassa combined with a *peculiar organic acid*. By further concentration (*b*) of the alcoholic percolate, another crop of crystals was obtained, different from the preceding, and neutral. Some of these were dissolved in water, decolorized by animal charcoal, and the solution concentrated. An uncrystallizable substance of a sweet taste remained behind, which gave, with Fehling's test, a brick-red precipitate. The pure crystals, when boiled about ten minutes with a little dilute sulphuric acid, gave the same reaction. The remaining crystals were dissolved in water, the impurities precipitated by acetate of lead, and the solution, after removal of the lead, concentrated, when almost pure *cane sugar* was obtained. The whole remaining alcoholic percolate was then concentrated (*c*) on the sand-bath, until all the alcohol was expelled, water added, and the mixture filtered to separate *the resin*. Part of the filtrate was tested with the following reagents with the results stated: phosphomolybdic acid, a light gelatinous precipitate; tannic acid, light flocculent precipitate; potassium iodo-iodide, light-coloured precipitate; potassium iodo-hydrargyrate, a very light-coloured precipitate; sodium tungstate and mercuric chloride, a white precipitate. The remainder of the filtrate was precipitated by acetate of lead, and after removal of the excess of lead by hydrosulphuric acid and evaporating, the residue was dissolved in water. This aqueous solution gave no precipitate with ammonia, but gave light-coloured precipitates with picric acid, potassium iodo-iodide, tannic acid, sodium tungstate and phosphomolybdic acid. The larger bulk of the solution was precipitated with potassium iodo-hydrargyrate, producing a flocculent precipitate, which on the addition of an excess changed to a tough resinous mass. This was dissolved by moderately dilute hydrochloric acid, water added, and decomposed by sulphuretted hydrogen. The solution was freed from the excess of hydrochloric and sulphydric acids by evaporation to dryness, and the residue again dissolved in water. Potassium iodo-hydrargyrate produced in the solution a precipitate, which dissolved on the application of heat and separated again on cooling.*

THE CONSTITUTION AND PROPERTIES OF DIALYSED IRON.†

BY M. PERSONNE.

The ferruginous liquor designated under the name of dialysed iron is not a true aqueous solution of sesquioxide of iron; it is nothing but a pseudo solution of modified sesquioxide of iron, which differs from the ordinary oxide in being insoluble in acids and its specific heat being less.

This particular state of sesquioxide of iron has been long known; it was discovered in the chemical laboratory of Pelouze more than twenty-five year since by Pean de Saint-Gilles, who obtained it by the action of heat upon the acetate of sesquioxide of iron. M. Béchamp obtained it afterwards by the action of heat upon nitrate of iron. From that time all the physical and chemical properties of modified sesquioxide of iron have been perfectly known, and in consequence of its weak taste it has been recommended as a ferruginous medicine.

Subsequently, Graham demonstrated in his work upon dialysis that the modified sesquioxide of iron was a colloid body, that is to say could not form a true solution, its apparent or pseudo solution not possessing the property of traversing an organic membrane. The preparation of this oxide of iron was then effected by submitting to dialysis a solution of perchloride of iron in which a great excess of sesquioxide of iron had been dissolved. The hydrochloric acid and the salts of the solution diffuse through the membrane of the dialyser and there remains upon this membrane or septum a more or less concentrated liquor, which is nothing but the pseudo solution of sesquioxide of iron containing some perchloride of iron which constitutes the dialysed iron of commerce.

This very process of preparation proves that dialysed iron cannot pass through the membranes in the same manner as crystalloids. It contains perchloride of iron and even sulphate of sesquioxide in variable quantities. If, for example, the commercial product announced as the purest be taken, analysis indicates that it contains—

Perchloride of Iron	6·75
Persulphate of Iron	0·76
	7·51

Or $7\frac{1}{2}$ per cent. of foreign bodies. It is therefore very far from being of the purity announced.

* The author's manuscript omits to state what conclusion he arrives at from the facts stated. The behaviour of the substance contained in the watery solution obtained by adding water to the concentrated alcoholic percolate appears to point to the existence of an alkaloid soluble in water.—Ed. N. R.

† Communicated to the French Academy of Medicine (*Journal de Pharmacie et de Chimie* for October, p. 332).

As to the properties of this dialysed iron, they are the following: it is precipitated by the more powerful acids, whether employed concentrated or diluted with water. Saline solutions, such as marine salt, for instance, also precipitate it. Its insolubility in the gastric juice is complete; this I have verified with gastric juice obtained by Dr. Bochefontaine. Some was injected into the stomach of a dog in full digestion; the stomach having been opened two hours afterwards the oxide of iron was found adhering in flocculent condition to portions of undigested food and it was impossible to detect a trace in solution in the acid liquids of the stomach or upon the whole surface of the digestive canal.

These experiments are completely in accord with the chemical properties of this modified oxide and go to confirm its insolubility. Being insoluble it cannot be absorbed, in virtue of the old and universally true principle *corpora non agunt nisi soluta*. Insolubility therefore implies inactivity.

This inactivity has long been recognized. In fact at time of the discovery of the modified oxide of iron it was recommended as a therapeutic agent, the more convenient from its being devoid of the inky taste of salt of iron. But notwithstanding this it was quickly abandoned. Why did it not succeed at that time and succeed now, the compound being the same? Misleading advertisement everywhere and under every form can alone explain it.

DENOMINATION, SHAPE, AND MATERIAL OF LOCAL STANDARDS OF APOTHECARIES' WEIGHTS AND MEASURES.*

APOTHECARIES' WEIGHTS.

1. *Denomination.*

1. Local standards of apothecaries' weights should have their denominations, or abbreviations thereof, engraved or stamped on them as follows:—

Denomination.	Abbreviation.	Denomination.	Abbreviation.
10 ounces, apothecaries' weight.	10 oz. tr.	2 scruples, apothecaries' weight.	℈ij
8 ounces, apothecaries' weight.	8 „	1½ scruples, apothecaries' weight.	ʒss
6 ounces, apothecaries' weight.	6 „	or half a drachm, apothecaries' weight.	ʒss
4 ounces, apothecaries' weight.	4 „	1 scruple, apothecaries' weight.	℈j
2 ounces, apothecaries' weight.	2 „	½ scruple, apothecaries' weight.	℈ss
1 ounce, apothecaries' weight.	1 „	6 grains, apothecaries' weight.	6 gr.
		5 grains, apothecaries' weight.	5 „
4 drachms, apothecaries' weight. or half an ounce, apothecaries' weight.	ʒiv ½ oz. tr.	4 grains, apothecaries' weight.	4 „
		3 grains, apothecaries' weight.	3 „
2 drachms, apothecaries' weight.	ʒij	2 grains, apothecaries' weight.	2 „
1 drachm, apothecaries' weight.	ʒj	1 grain, apothecaries' weight.	1 „
		½ grain, apothecaries' weight.	½ „

As it may not be practicable to engrave or stamp the denomination on small weights below the scruple, the abbreviation of the legal denomination of each small weight should be marked inside the box in which the weights are placed.

2. The actual weights in grains (of which the imperial pound contains 7000 grains) of apothecaries' weights are as follows:—the apothecaries' ounce and the troy ounce being of the same weight.

Denomination.	Weight in Grains.	Denomination.	Weight in Grains.
Ounces:—		Scruples:—	
10 oz. tr.	4800 gr.	2	40 gr.
8 „	3840 „	1½ or ʒss	30 „
6 „	2880 „	1	20 „
4 „	1920 „	½	10 „
2 „	960 „		
1 „	480 „	Grains:—	
		6	6 „
		5	5 „
Drachms:—		4	4 „
ʒiv or ½ oz. tr.	240 „	3	3 „
		2	2 „
ʒij	120 „	1	1 „
ʒj	60 „	½	0·5 gr.

3. It has been suggested that the amounts of errors to be allowed on local standards of apothecaries' weight should be as follows:—

Denomination.	Amount of error to be tolerated in excess. No error in deficiency allowed.	Denomination.	Amount of error to be tolerated in excess. No error in deficiency allowed.
Ounces:—		Scruples:—	
10, 8, 6, 4	0·1 grain.	2, 1½, 1, ½	0·03 gr.
2			
Drachms:—		6 grs., 5 „, 4 „, 3 „, 2 „, 1 gr.	0·02 „
1, 4, 2, 1	0·05 „		
		½ „	0·01 „

4. The form of these local standard weights from 8 ounces to 1 ounce should be cylindrical with a small knob as in fig. 16. From 4 drachms to ½ scruple either cylindrical (fig. 16) or flat shape (fig. 17). From 6 grains to ½ grain either wire shape (fig. 18) or flat shape (fig 17).

Fig 16. 8 oz. . 1 oz. tr.
4 dr. . ½ sc.

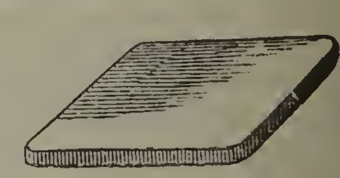


Fig. 17. 4 dr. . ½ sc.

Fig. 18. 6 gr. . . ½ gr.

* Reprint of copy of Instructions issued from the Standards Office of the Board of Trade.

5. These local standards weights are to be made of bronze, gun metal, or hard brass. Below ½ scruple they should be made of platinum or aluminium.

APOTHECARIES' MEASURES, OR MEASURES TO BE USED IN THE SALE OF DRUGS.

6. The denomination of every measure, or an abbreviation thereof, should be engraved on the measure.

Denomination.	Abbreviation.
40 fluid ounces to half a fluid ounce	40 fl. oz. to ½ fl. oz.
16 fluid drachms to half a fluid drachm	16 fl. dr. to ½ fl. dr.
60 minims to 1 minim	60 min. to 1 min.

Each measure is also to have engraved on it "$t=62°$ Faht.'

7. At the temperature of 62° F. (the barometer being at 30 inches) the weights of the contents in distilled water of the several apothecaries' measures are as follows.

8. It has been suggested to allow on local standards the several amounts of error or remedy defined in the third column of the table.

Denominations.	Weight of water contained in the Measure. $t=62°$ F. $b=30$ in.	Amount of error to be tolerated in excess or in deficiency.
	Grains.	Grains Weight of Water.
Fluid ounces:—		
40 fl. oz.	17500·0 gr.	8 gr.
39 „	17062·5	
38 „	16625·0	
37 „	16187·5	
36 „	15750·0	
35 „	15312·5	
34 „	14875·0	
33 „	14437·5	
32 „	14000·0	
31 „	13562·5	
30 „	13125·0	
29 „	12687·5	
28 „	12250·0	
27 „	11812·5	
26 „	11375·0	
25 „	10937·5	
24 „	10500·0	
23 „	10062·5	
22 „	9625·0	
21 „	9187·5	
20 „	8750·0	6 gr.
19 „	8312·5	
18 „	7875·0	
17 „	7437·5	
16 „	7000·0	
15 „	6562·5	
14 „	6125·0	
13 „	5687·5	
12 „	5250·0	
11 „	4812·5	
10 „	4375·0	
9 „	3937·5	
8 „	3500·0	
7 „	3062·5	
6 „	2625·0	
5 „	2187·5	4 gr.
4 „	1750·0	
3 „	1312·5	

Denominations.	Weight of water contained in the Measure. $t=62°$ F. $b=30$ in.	Amount of error to be tolerated in excess or in deficiency.
	Grains.	Grains Weight of Water.
Fluid ounces:—		
2 fl. oz.	875·0 gr.	
1 „	437·5	
½ „	218·75	2 gr.
Fluid drachms:—		
16 fl. dr.	875·00 gr.	4 gr
15 „	820·31	
14 „	765·63	
13 „	710·94	
12 „	656·25	
11 „	601·56	
10 „	546·88	
9 „	492·19	
8 „	437·50	
7 „	382·81	
6 „	328·13	
5 „	273·44	
4 „	218·75	2 gr.
3 „	164·06	
2 „	109·38	
1 „	54·6875	
½ „	27·34	
Minims:—		
60 min.	54·69 gr.	
59 „	53·78	
58 „	52·86	
57 „	51·95	
56 „	51·04	
55 „	50·13	
54 „	49·22	
53 „	48·31	
52 „	47·40	
51 „	46·48	
50 „	45·57	
49 „	44·66	
48 „	43·75	
47 „	42·84	
46 „	41·93	
45 „	41·02	
44 „	40·10	
43 „	39·19	
42 „	38·28	
41 „	37·37	
40 „	36·46	
39 „	35·55	
38 „	34·64	
37 „	33·72	
36 „	32·81	
35 „	31·90	
34 „	30·99	
33 „	30·08	
32 „	29·17	
31 „	28·26	
30 „	27·34	No appreciable error allowed below 30 minims.
29 „	26·43	
28 „	25·52	
27 „	24·61	
26 „	23·70	
25 „	22·79	
24 „	21·88	
23 „	20·97	
22 „	20·05	
21 „	19·14	
20 „	18·23	
19 „	17·32	
18 „	16·41	
17 „	15·49	
16 „	14·58	

Denomination.	Weight of water contained in the Measure. $t=62°$ F. $b=30$ in.	Amount of error to be tolerated in excess or in deficiency.
Minims—*cont.*	Grains.	
15 min.	13·67 r.	
14 „	12·76	
13 „	11·85	
12 „	10·94	
11 „	10·03	
10 „	9·11	
9 „	8·20	
8 „	7·29	
7 „	6·38	
6 „	5·47	
5 „	4·56	
4 „	3·65	
3 „	2·73	
2 „	1·82	
1 „	0·911458	

9. The following are the Board of Trade standards:—

Thirteen standards made of gun metal, cylindrical shape (see Fig. 20), each containing one quantity or measure as follows:—

40 fluid ounces (or a quart).
20 „ (or a pint).
10 „ (or half-a-pint).
5 „ (or a gill).
4 „
3 „
2 „
1 „
½ „
4 fluid drachms.
3 „
2 „
1 fluid drachm or 60 minims.

Five standards made of glass, pipette form graduated (see Figs. 21, 22) each standard containing several measures, as follows:—

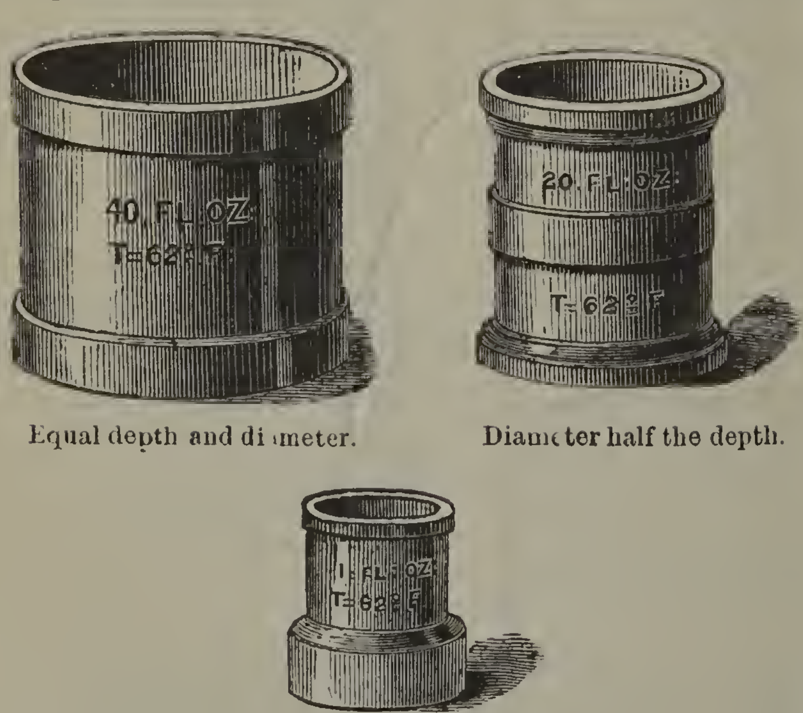
1 pipette, 40 to 10 fluid ounces. Each ounce being numbered.

1 pipette, 10 to 1 fluid ounce. Each ounce being numbered.

1 pipette, 16 to 8 drachms. Each drachm being numbered.

1 pipette, 8 drachms to ½ drachm. Each drachm being numbered.

1 pipette, 60 minims to 1 minim. Each tenth minim being numbered.



Equal depth and diameter. Diameter half the depth.

On ivory stand.

Fig. 19. Gun-metal measures.

10. Apothecaries' measures, as already explained, may be made of gun-metal or of glass. If made of gun-metal they are to be of the usual cylindrical shapes of measures of capacity. See paragraph 9.

If made of glass local standards are either to be pipette, flask or beaker shape, marked as explained in paragraph 9. See Figs. 20, 21, and 22.

Fig. 20.

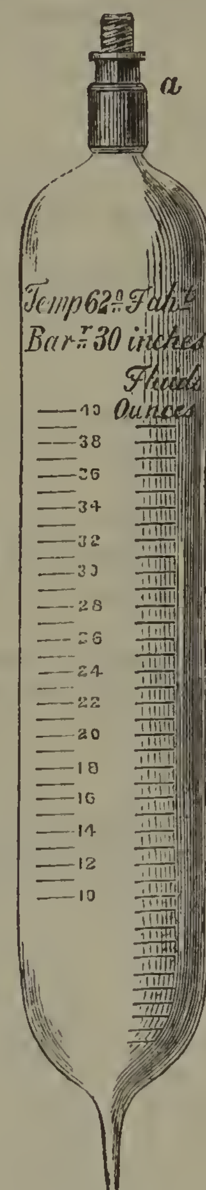


Fig. 21.

Fig. 22.

[*In the original drawing of Fig. 21 each graduation is numbered, but in the above reduced engraving the alternate figures have been omitted.*]

With these pipettes the inspectors may find it necessary to use a filling apparatus similar to that used at the Standards Office. When this apparatus is used the brass fittings shown at *a*, Figs. 21 and 22 are required.

11. Apothecaries' weights or measures should be placed in a mahogany box having a lock and key. On the outside of the box there should be a brass plate bearing the following inscription:—Apothecaries' Weights. Local Standards. Of [*Insert name of County or Town*].

12. It is for the local authorities to decide whether they require any standards of apothecaries' weights and measures.

Many inspectors of weights and measures are already provided with some of the principal apothecaries' measures; as 40 fluid ounces (or a quart), 20 fluid ounces (or a pint), 10 fluid ounces (or half a pint), 5 fluid ounces (or a gill). Local standards of the several apothecaries' measures, or measures to be used in the sale of drugs, as set forth in the second schedule of the Weights and Measures Act, 1878, have also been already verified for local authorities, viz.:—

Fluid ounces	4, 3, 2, 1.
Fluid drachms	4, 3, 2, 1.
Minims . . .	30, 20, 10, 5, 4, 3, 2, 1.

Board of Trade, Standards Office,
October, 1879.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 29, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

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APOTHECARIES' WEIGHTS AND MEASURES.

ON the previous pages will be found the text of the memorandum relating to the standards of apothecaries' weights and measures mentioned by the President at the last meeting of Council.* It enumerates the several denominations of standards authorized by the Board of Trade for the purpose of being used by inspectors of weights and measures under the new Act as local standards for the verification or inspection of the apothecaries' weights and measures used in trade. It further indicates the corresponding abbreviations which are to be stamped or engraved on the respective standards, as well as the actual weight in grains of each weight and the number of grains of water at 62° F. contained in each of the measures. The shape of the local standards and the materials of which they are to be made are specified, and the amounts of error to be allowed in the several local standards of apothecaries' weights and measures are also stated.

From the concluding paragraph of this document it will be seen that in some instances there is nothing to prevent the work of inspection being commenced at once, or as soon as the local authorities may direct, and as this is a point of some importance to bear in mind, we think it desirable again to urge our readers to take every means of learning what is being done in regard to inspection of apothecaries' weights and measures by the local authorities in their respective districts. In speaking upon this subject at the evening meeting of the North British Branch of the Society, Mr. GILMOUR suggested that it was improbable the inspectors would proceed to carry the new law into force "for some time to come;" but we are disposed to think that in taking this view he was misled, and should rather advise chemists and druggists throughout the country to communicate at once with the local authorities of their district, with the object of obtaining information as to the steps to be taken in the inspection of apothecaries' weights and measures and the facilities to be afforded for their verification when the Act comes into operation on the 1st of January next. This could be done either through the medium of the local secretaries of the Society or by the secretaries of provincial associations, and it would, at least, remove any ground for commencing the work of inspection in such a way as to cause inconvenience.

* See also *Pharm. Journ., ante*, p. 390.

In some other particulars Mr. GILMOUR's statements as to the provisions of the new Act respecting apothecaries' weights and measures were not altogether correct and their inaccuracy appears to have arisen from the want of due distinction between the provisions as to local standards and those applying to the actual weights and measures used in trade. Thus for instance, the point that every measure must be graduated into its own denomination—that each glass must be either all ounces, drachms or minims—does not apply to trade measures, but only to the local standards by which such measures are to be verified. It would indeed, be a most arbitrary requirement to compel dispensers to use a special drachm measure for measuring 3 or 6 drachms when an ounce measure graduated into drachms would answer the purpose perfectly well.

We are quite at a loss to imagine on what authority it is stated by Mr. GILMOUR that no symbols are to be used on graduated glass measures and that each glass measure is to have marked upon it "t=62° F." These again are provisions that relate only to the local standards and not at all to the measures actually in use. As to the stamping or engraving of weights and measures with the Government stamp of a crown and the letters V.R., which Mr. GILMOUR describes as being requisite, we equally fail to discover any authority for this statement, either in the memorandum lately issued by the Standards Office, or in the Act itself. On the contrary, section 43 of the Act distinctly states that the stamp of verification with which lawful weights and measures are to be stamped by the inspector of a particular district is to be "some name, number, or mark" that will distinguish that district. It is for the local authorities to decide also what they will stamp and what they will not stamp, and they will have to exercise their discretion as to where the impracticability of stamping with the abbreviated denomination, or the mark of verification, obtains on account of the small size of the weight or measure. In fact, all the proceedings to be taken under the new Act for the local verification and inspection of weights and measures are to be taken by the local authorities of counties and boroughs, independently of the Government, and it is only in regard to verification and custody of standards that the Act confers any powers or duties upon the Board of Trade.

Again, therefore, we would remind our readers that it will be unwise to wait until the time when it may be supposed the Government will take action in the matter and issue specific instructions that will enable chemists and druggists to provide themselves with proper weights and measures. So far as the trade is concerned, the action of the Government was at an end when the Order in Council authorizing the apothecaries' standards was issued, and it now remains for the local authorities to act. It is, therefore, in this direction that application should be made to know how the provisions of the Act are to be carried out in different localities.

Before leaving this subject we venture to suggest an alteration in the mode of using the pipette-shaped vessel, fig. 21, as a standard, which would, in our opinion, be an improvement upon the arrangement which that figure represents. For convenience of manipulation there is perhaps no form of instrument better than the delivery pipette, especially when fitted with a filling apparatus and air taps. In regard to accuracy, also, this form of apparatus leaves little to be desired when the surface of the liquid at the point of reading off the volume is not too extended. Certainly in gauging a number of measures a pipette would be much more convenient to use than a vessel having the form of those represented by fig. 19, or even a flask like fig. 20; but in the way that the graduation of the large pipette, fig. 21, is applied there would be considerable liability to error, owing to the large surface of the liquid at any one of the points of graduation. Considering that the capacity of the graduated portion of the pipette is 40 fluid ounces, the diameter of the vessel must be too great for accurate reading, and the arrangement indicated appears, therefore, unsuited for the purpose in view when such large volumes have to be read off. In the smaller pipette, fig. 22, the objection would not apply with equal force, but in either case we should be disposed to give the preference to a pipette made of such a size as, when filled to a point in the narrow neck, *a*, to hold the particular measure it is intended for. The adoption of this plan would, however, entail the use of a separate pipette for each measure, but much greater accuracy of measurement would thus be ensured and also the possibility of more rapid manipulation.

PAREGORIC WITHOUT OPIUM.

In reference to the case reported in this Journal some weeks ago, and to the comments we felt compelled to make upon the impropriety of the practice disclosed before the Chesterfield police magistrates, we have received a letter from Mr. Greaves in which he seeks to justify the sale of the preparation then called in question. We should have been glad if there had been any possibility of recognizing the sufficiency of the arguments he brings forward for this purpose, but unfortunately we cannot do this. The signification of the term "paregoric" and its application to a compound containing opium is too familiar to admit of the name being applied to a preparation that does not contain opium.

The statement that such a preparation has been for a long time sold as a specialty does not to our apprehension constitute any justification of the use of the term "paregoric" to describe it, nor can we admit that regard for trade interests involves the adoption of such a palpable misnomer.

Another argument put forward by Mr. Greaves is based upon the large area of country round Chesterfield in which there is no registered chemist and druggist and no immediate local provision for the supply of medicine or drugs, but we are equally unable to regard that circumstance as a reason for supplying the population of that district with articles under names that do not belong to them.

As regards the fitness of the repressive action which the Pharmacy Act and the Sale of Food and Drugs Act are intended to exercise, the Legislature has deemed it good for the public welfare that poisons should not be indiscriminately sold by persons unqualified by education and experience to deal in such articles, and we believe it is for the good of pharmacy that this restriction should be enforced. Public feeling is also decidedly opposed to the sale of articles which are not of the nature, substance and quality they purport to be, and though we believe that the state of public opinion as to the extent of such practices is exaggerated we do not think there would be any good done to legitimate trade interests by seeking to excuse any instances in which they have been shown to exist.

Of course we do not intend to suggest that the preparation which Mr. Greaves has sold under the name of "paregoric," may not be, as he states, better adapted for certain purposes than the preparation with opium to which that name properly belongs. All we object to is the misuse of this term, and we would suggest that the popularity of Mr. Greaves's special preparation would be in no way damaged by giving it an appropriate name instead of one which represents a preparation that he contends is not so good.

POISONING OF HORSES.

We learn from the *Lincolnshire Gazette* that a meeting has been held in the Corn Exchange of Lincoln for the purpose of forming an association for preventing the administration of poisonous drugs to horses. It appears that a farmer in the district has recently suffered very serious loss in this way, and several of the speakers at the meeting mentioned cases in which horses had been killed by the administration of arsenic by grooms and waggoners. One of the number expressed the opinion that many chemists and druggists sold poisons recklessly, and thought there should be some more stringent law with regard to them, but in most instances it was considered that the mischief was done by hawkers going into the stables and selling poisonous drugs to the persons who had charge of horses. It would appear that the most fitting remedy for this would be to make known to these persons the penalty imposed by the Drugging of Animals Act, 1876, and to warn them against the consequences of their ignorant use of drugs of which they do not know the effects.

We regret to learn that on Tuesday last a fire broke out on the premises of Messrs. Smeeton and Pick, wholesale druggists, Bond Street, Leeds, which, before it could be extinguished, consumed property to the value of several thousands of pounds. The basement was saved by flooding it with water, but the upper stories, partly occupied as a woollen warehouse and by the Globe Parcels Company, were completely destroyed.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The fourth general meeting of the thirty-first session was held at the Royal Institution on Thursday evening, November 20, the President, Dr. Charles Symes, in the chair.

The minutes of the previous meeting were read and confirmed.

The following donations were announced:—The two last numbers of the *Pharmaceutical Journal*, from the Society; and the *Canadian Pharmaceutical Journal*, from the Editor.

The President called attention to the progress which is being made in the preparation of the new United States Pharmacopœia. He said that at a recent meeting of the American Pharmaceutical Association the Pharmacopœia Revision Committee brought up their report, and it was agreed that one thousand copies of the proposed new work should be printed in pamphlet form and distributed amongst the eminent pharmacists of America, thus enabling them to test the merits of the proposed formulæ, processes, etc., and to judge of the merits of each before they became law. This he considered was a broad and liberal spirit, which contrasted favourably with that displayed under similar circumstances in this country.

The President also called attention to some remarks by Heintz, published in the *Pharm. Zeitung*, respecting the influence of tannin in preventing the colour reaction between iodine and starch, and experimentally showed that a few drops of a moderately strong solution of tannin, added to a weak solution of starch, entirely prevented the formation of the usual blue colour on the addition of a solution of iodine.

Mr. Edward Davies, F.C.S., said that this was not a new discovery, for it was mentioned in 'Gmelin's Chemistry.'

The President then exhibited a new form of microphone transmitter which is coming into general use, for the transmission of articulate sounds, possessing the advantage over the telephone, when used in the same capacity, that the speaker might be some feet distant from it and need not raise his voice above an ordinary tone to be distinctly heard. This was practically shown by means of a wire laid between the lecture hall and the library. The instrument was also taken to pieces and its construction explained.

The Honorary Secretary, Mr. M. Conroy, called attention to the immense sensation caused in Birkenhead and elsewhere by that great queen of quackery, Madame Enault; and to show the immense sale which she had for her "Indian Malachite" he read an extract from the *British Medical Journal*, which stated that the manufacturers of the bottles in which it was put up had supplied her with upwards of fifty thousand during the past few weeks. The "Malachite" was a green coloured, aromatic liquid, put up in bottles of $1\frac{1}{2}$ or 2 fluid ounce capacity, and sold at 2*s.* each. He found, however, that it was not at all uniform in composition, three samples which were lately examined by him giving the following respective specific gravities: 1·047, 0·972 and 1·000. The samples also varied in colour and smell. He had made a proximate analysis of one sample, as far as it was possible to do so with such a complex organic mixture, and found it to consist as under. A sample made by this formula was exhibited at the meeting, and the general opinion was that it represented the original in every way:—

"*Indian Malachite.*"

Glycerine	$12\frac{1}{2}$ fluid ounces.
Rectified Spirit . . .	$12\frac{1}{2}$,, ,,
Oil of Cajuput	4 fluid drachms.
,, Cloves	1 ,, ,,
,, Cassia	1 ,, ,,
,, Peppermint . .	20 minims.
Aniline Green	1 grain.

Aniline greens frequently possess a blue tint, but this could be rectified by the addition of a very small amount of aniline yellow.

A brief discussion followed this communication, in which several of those present joined.

The President then called upon the Hon. Secretary to read the paper for the evening, on—

Fucus Vesiculosus.

BY MICHAEL CONROY, F.C.S.

Fucus vesiculosus, commonly known as bladder-wrack, sea-ware, sea-wrack, black-tang and kelp-ware, belongs to the great natural order of marine plants known as *Algæ*, and, as indicated by its name, to the genus *Fucus*. Greville applies to it the following special botanical characters:—*Frond* plane, linear, dichotomous, entire at the margin. *Air vessels* roundish-oval; in pairs. *Receptacles* mostly elliptical, terminating the branches."

The species is very variable; but the varieties pass so insensibly into each other that it is very difficult to strictly define them. Harvey says*: "The first and most obvious distinction is in size; some fully developed specimens in fruit being found under an inch in length, while others reach several feet. Other varieties possess elongated air-vessels, or are entirely destitute of any; while others vary in the shape of the fructification, the receptacles being sometimes globose, sometimes ellipsoidal, and occasionally spindle-shaped. Lastly, the frond is frequently spirally twisted.

It is a perennial plant and a native of the British shores, bearing the fructification in the spring. The root is an expanded, black, woody, callous disk. The frond is smooth and glossy, and in colour is a dark olivaceous green, furnished through its whole length with a darker coloured midrib, as thick as a goose-quill at the root, but gradually growing pale and thin. The vesicles, varying in size from a pea to a hazel nut, of thin substance, and their cavities filled with air, are found imbedded in the membranous part of the frond, near the midrib. The fructification consists of compressed, turgid, solitary or twin receptacles, perforated and filled with a pellucid mucus.

Fucus vesiculosus is the commonest and one of the most widely diffused species of the genus. It abounds on the coasts of our own islands, and along the shores of the Northern Atlantic, extending to the tropics, and is said to have been found in the southern part of the ocean.

The uses made of this weed are manifold. In Northern Europe it is used as thatch and fuel, and when vegetation is scarce, or the land is covered with snow, it furnishes an abundant fodder for cattle, which regularly visit the shore, at the retreat of the tide, in search of it. The Norwegian and Lapland peasants collect and boil it, and when mixed with a coarse meal, feed their pigs, horses and cattle with it. In Ireland and Scotland it is largely used for similar purposes, and it is said to be both grateful and nourishing to the animals, which become very partial to it. Formerly it was largely used in the manufacture of kelp, which is now used for the manufacture of iodine.

Some of its medical properties have been known from early times; the burnt plant, under the name of vegetable ethiops, having long enjoyed considerable celebrity in the treatment of bronchocele and scrofulous diseases, the dose being from 10 grs. to 2 drachms. Dr. Russel found the mucus of the vesicles an excellent resolvent, when externally applied to glandular enlargements and other scrofulous tumours. He also gave the expressed juice of the vesicles in glandular affections.

Since the discovery of iodine it has fallen into disuse for the treatment of these diseases, its place having been more effectually supplied by that agent and its salts.

According to Pereira, its organic constituents are cellulose, mucilage or carrageen, mannite, odorous oil, with colouring and bitter matters. The mineral constitu-

* 'Phycologia Britannica.'

ents, which amount to 16·6 per cent. of the dry fucus, are according to the mean of the analyses by Gödechens, James, Schweitzer and Forchhammer, as under:—

Potash	11·96
Soda	12·25
Lime	10·92
Magnesia	9·53
Sodium Chloride	19·82
Sodium Iodide	0·25
Iron and Lime Phosphates	5·64
Iron Peroxide	0·95
Sulphuric Acid	24·62
Silica	4·06
	100·00

According to Gualtier de Glaubry, the iodine exists as potassium iodide, but I am unable to see how he has determined this point.

It will be seen from the above table that this plant contains little iodine, 0·21 per cent., but even this percentage is greater than what has been found by other chemists. M. Eugène Marchaud states that it is one of the poorest species in this respect, and he mentions that *Fucus digitatus* contains seven times as much.

Recently we have heard a great deal respecting the use of *Fucus vesiculosus* in the treatment of morbid obesity, and if it possesses a tithe of the virtues ascribed to it, it is truly a marvellous remedy, and one well worth the attention of both the medical and pharmaceutical professions. Its fat-reducing properties seem to have been first observed by M. Duchesne Duparc, who, while using it in a case of inveterate psoriasis, in which it had considerable reputation as a remedy, noticed its unexpected effect of reducing corpulency, without in any way causing injury to health. He was thus induced to try it as a remedy in this disease, and prescribed it in the form of powder, decoction and extract (hydroalcoholic). Better results, he states, were obtained from the extract than the powder, but the best results were observed by the combined use of the extract, in pilular form, and the decoction. He recommends the remedy to be taken in the morning, fasting; and observes that no change is needed in the habitual diet. No special action of the remedy is noticed for two or three weeks and the earliest effect observed is generally the more abundant flow of urine, which on standing, becomes covered with a dark coloured film. M. Duchesne states that from this moment the reducing action of the remedy begins, and he ascribes its action to the property it possesses of stimulating the absorbents, concentrating its action principally on the fatty cells. (*Journ. de Pharm. et de Chimie*, Juillet, 1862.) Following the above article in the same journal there is a communication by Dr. Godefroy, wherein he gives an account of the effects of the remedy upon himself. He gives full particulars respecting his age, height and weight, and goes on to say that he commenced the treatment on March 6, by taking, at regular intervals, three pills daily, each pill containing 30 centigrams of the hydroalcoholic extract. One pill was taken before each meal and no alteration whatever was made in his manner of living. He observed that his urine became more abundant, darker in colour, and of a more offensive odour. The treatment was continued until April 10, during which time he took ninety pills and lost in weight 1½ kilos. From the 10th to the 20th April he took two pills a day, and from the latter date until May 18 he returned to the three pills a day, and by this time he had taken ninety more pills, and found that he had lost another kilo in weight, so that from March 6 till May 11 he lost 2½ kilos. The weighings, he states, were carefully taken under the same conditions.

I may here call your attention to Dr. Fairbank's letter, which appeared in the *British Medical Journal* of June 7 last, in answer to a query contained in the previous week's journal respecting the nature of the much advertised nostrum, "anti-fat." He writes:—

"I beg to state that 'anti-fat' is most probably an extract of the *Fucus vesiculosus*, or "popping seaweed." More than fifteen years ago, I gave some of this extract in pill (four grains three times a-day) to a very corpulent lady, who in three months lost three stones in weight without any change of diet. Since then I have frequently given it for reducing weight, depending on the accumulation of adipose tissue, and have never found it fail. The solid extract can be easily made into four-grain pills, which must, however, be kept in a stoppered bottle, as they readily absorb moisture from the air. I may state that a patient who has been lately taking it as an anti-fat, and who always suffered very much from rheumatic pains about the body, has been entirely free from such trouble while she has been taking the extract, a fact which she quite independently noted."

Since the appearance of this above letter there has been a somewhat brisk demand for both the liquid and solid extracts, and no doubt some of you, as well as myself, have been at a loss to find suitable working formulæ for their manufacture. The following formula, by M. Dannecy, is published in the *Journal de Pharmacie*, November, 1862:—In the first place, he insists upon the plant being gathered during the period of fructification, and rapidly dried in the sun until it becomes sufficiently crisp to powder. It is then reduced to coarse powder, and macerated for three days in four times its weight of 86° alcohol. It is then expressed, and the marc again treated in a similar manner with 54° alcohol. The tinctures are then mixed and filtered, the spirit recovered by distillation, and the extract evaporated to a suitable consistence. Of this hydroalcoholic extract, which is one-fifteenth the weight of the dry plant, he makes pills according to the following formula:—

Ext. Fuci Vesic.	30 grams.
Pulv. Fuci Vesic.	5 ,,

Mix and divide into pills of 25 centigrams each (3·75 grains). Three of these pills, he says, may be taken daily in the beginning, and gradually increased to twenty-four pills daily, a quantity which has often been attained without the slightest derangement of the stomach.

I have lately had some experience in the manufacture of both the liquid and solid extracts, and not being aware at the time of the existence of the above formula, I tried a few experiments with the object of finding a suitable menstruum. Without going into details, I may say that I have not tried any spirit stronger than proof, simply because I saw no necessity for so doing, judging by the composition of the *fucus*, as above given. I found even a weaker spirit to give good results; water is unsuitable, as it dissolves the carrageen, thus producing a gelatinous liquid, which is not only difficult to work, but which produces a bulky and almost inert extract, owing to the very large amount of this mucilage which it extracts, and it is on this account that a spirituous menstruum is rendered necessary.

M. Dannecy, in the article above mentioned, lays great stress upon the necessity of rapidly drying the fucus in the sun, until it becomes crisp; and other authorities state that the mode of drying employed greatly influences the therapeutic value of the remedy. Judging by parcels which I have met with, there seems to be good ground for this caution, for it is a common thing to find the plant half rotten by careless drying. As, however, there is no benefit to be derived by drying, I have thought it advisable to work on the fresh plant, and thus avoid any risk on that score. Several experiments made with the object of arriving at the relative values of the fresh and dried plant, gave me the following average results:—

100 parts of fresh fucus dried under ordinary atmospheric influences, in summer weather, yielded 33 parts, nearly equal to one-third.

100 parts dried at 212° F., until it ceased to lose weight, produced 26 parts, or a little over one-fourth;

therefore, for all practical purposes, we may say that 1 part of air-dried fucus is equivalent to 3 parts of the fresh plant and that 1 part thoroughly dried at 212° F., is equivalent to 4 parts of the fresh plant. Using freshly gathered fucus, the following formula will produce a very fine fluid extract:—

Fresh Fucus Vesiculosus . . .	$7\frac{1}{2}$ lbs.
Proof Spirit	1 gallon.

Thoroughly cut and crush the fucus, and macerate it for a couple of days in half a gallon of the spirit, then press, and repeat the process with the remainder of the spirit. Reserve 35 fluid ounces of the first liquor, distil the spirit from the remainder of both liquors and evaporate to a soft extract. Dissolve this in the reserved 35 fluid ounces, make the measurement up to 40 fluid ounces with proof spirit and filter after a few hours; 1 fluid ounce of this extract is equal to 1 ounce of the air-dried plant or to 3 ounces of the fresh.

For the solid extract use the same menstruum and exhaust as above, but evaporate the whole of the liquors to a suitable pilular extract. 1 part of this hydro-alcoholic extract is equal to 7·33 parts of the air-dried plant, or to 22 parts of the fresh.

To make these extracts from the air-dried fucus it would be necessary to use a menstruum consisting of 2 parts of proof spirit and 1 part of water, which would be equivalent to using proof spirit on the fresh plant, for it will be seen from the above formula that 1 gallon of proof spirit is used for $7\frac{1}{2}$ pounds of the fresh plant, and, as this weight only represents $2\frac{1}{2}$ pounds, or one-third of the dry plant, it is evident that the 5 pounds lost by drying should be added to the gallon of proof spirit, if it be thought desirable to keep to the above mentioned alcoholic strength, which, in my opinion, is well suited, as it thoroughly exhausts the fucus without taking up the troublesome and inert carrageen.

Since writing this paper, which was intended to have been read a couple of weeks ago, an article has appeared in the *Lancet*, respecting this remedy, and it is evident that the writer of that article and myself have been fishing in the same waters. There are, however, a couple of points to which I must take exception, namely, that *Fucus vesiculosus* contains "large quantities of iodine," and that in Ireland it is found "invaluable for fattening pigs." Now, it is well known that this fucus contains very little iodine, some varieties containing only the merest trace, in fact, as stated before, it is the poorest species of the genus in this respect. Regarding its invaluable fattening properties, I think the writer must have been drawing upon his imagination, for although it is used as pig food by the poor peasantry, when nothing better is obtainable, it is certainly not a fattening food, and anyone who has travelled in the west of Ireland, where it is largely used for this purpose, will have formed a very high opinion of its non-fattening properties by the appearance and the agility of the pigs themselves. The remark in the *Lancet* that most of our fucus comes from Billingsgate market, where it had been used for packing fish, will account for the horrid fishy taste and smell noticed in some samples of the fluid extract made in London.

In conclusion, I wish to remind you of a remark that we often hear respecting this plant, namely, that any active medicinal properties which it may possess *must* be due to the iodine, which it contains. That the beneficial effects obtained by the use of this and other species of fuci in scrofulous diseases depend upon this agent, there can be no doubt whatever, since the same results are obtained by the use of this element or its salts; but it has not yet been found that either iodine or any of its salts will produce such results, in the treatment of morbid obesity, as those ascribed to the galenical preparations of this plant. Moreover, it is not an easily ascertained point, as to what particular principle the therapeutic value of a remedy of this complex nature is due; and, as an example, I will take the somewhat analogous case of lime-fruit juice, the antiscorbutic properties of which have been attributed to the contained citric acid, still we find that this acid has utterly failed either as a remedy or a preventive of scurvy. It is also very improbable that if iodine or the iodides possessed the fat-reducing properties credited to *Fucus vesiculosus*, that it could have escaped the attention of the medical profession for so long.

The paper, which was illustrated with specimens of *Fucus vesiculosus*, and other species of *Fuci*, together with samples of the fluid and solid extracts, powder and pearl coated pills, gave rise to the following discussion:—

The President said he had listened with pleasure to Mr. Conroy's paper; he had no idea there was so much to be said on the subject, without introducing much that was of medical rather than of pharmaceutical interest. The author had, however, kept the question of the medicinal properties of the fucus within very reasonable limits, and had given a considerable amount of information, and some good working formulæ for the excellent pharmaceutical preparations with which he had illustrated his paper. It was a recognized fact, that this particular fucus contained, on an average, much less iodine than *Fucus digitatus*; but the amount of iodine in seaweeds was known to be influenced by the Gulf Stream. He considered there was no right to assume that the medicinal properties (such as they were) were due alone to iodine. It was a matter of common experience that the so-called active principle of a drug did not always possess the whole of its medicinal properties.

Mr. Edward Davies, F.C.S., considered that, even granting that this fucus constituted a fattening food for pigs, it did not follow that it would have the same effect on man, for it was a known fact that the physiological effects of many drugs on man and the lower animals were very different.

Mr. A. H. Mason, F.C.S., said it afforded him much pleasure, in the name of those present, to express their obligations to the gentlemen who had contributed to the success of the meeting. Firstly, to the President, for his able exposition of the principle and demonstration of the action of Hughes's microphone transmitter; such communications, which kept the members conversant with some of the recent advances in physical science, were of immense value and caused wholesome variety in the proceedings. They are also indebted to Mr. Conroy, their Honorary Secretary, for contributing such a valuable *résumé* of the history and properties of *Fucus vesiculosus*. He congratulated Mr. Conroy upon his having avoided the sensationalism which surrounded this substance in the present time and strongly deprecated the use of "Anti-fat" as empirical and simply a destroyer of vitality, and thought it too bad that foreign adventurers with large capitals should be able to so successfully hoodwink the British people. Without wishing to detract from the value of Mr. Conroy's communication on "Malachite," he considered it would have been much more valuable if it had been contributed a few weeks earlier, when its publication might have put a stop to some of the nefarious practices which had been carried on in Birkenhead. At the time he felt that the excitement produced had received far more attention from the press and the public than it was worthy of. Mr. Mason concluded by moving a vote of thanks to the President and Mr. Conroy for their communications.

Mr. R. M. Sumner, in seconding the vote of thanks, said he fully endorsed all that Mr. Mason had said, but he would like to add, what appeared to him an omission, namely, to congratulate Mr. Conroy upon the great excellence of the preparations of *Fucus vesiculosus* which he had exhibited, which were most perfect.

The President and Mr. Conroy returned thanks, after which the meeting closed.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The first meeting of the session of this Association was held at Britannia Chambers on Tuesday evening, the 4th inst., the chair being occupied by the President Mr. R. Fitzhugh, F.C.S. After the transaction of some preliminary business, the President, with a few appropriate remarks, presented the prizes to the successful associates in last session's classes, the recipients being Messrs. W. W. Talbot, W. Gill, G. E. Hare and H. Granger. He then delivered his inaugural address, in which, after alluding to the apathy shown by many of the members, he reviewed briefly the work of last session, and announced the arrangements already made for the coming one. He then went on to speak of the advantage of study to the chemist and druggist and the relationship existing between masters and apprentices, both of which subjects were treated in an eminently practical manner.

The address was listened to with much attention, and at the close Mr. R. Jackson proposed a hearty vote of thanks to the President, which was seconded by Mr. Warriner and carried unanimously and suitably responded to.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on November 20, 1879, Dr. Gilbert, Vice-President, in the chair.

The minutes of the preceding meeting were read and confirmed.

The Chairman announced that a ballot for the election of Fellows would take place at the next meeting of the Society (December 4).

The following certificates were read for the first time:—J. Howard, J. Knowles, J. Snodgrass, A. Scott, E. J. Day, J. Steiner.

The Chairman then called on Mr. CHURCH to read a paper—

On a Chemical Study of Vegetable Albinism. Part II. Respiration and Transpiration of Albino Foliage.—The author has proved that white foliage does not possess the power even in sunshine of decomposing the carbon dioxide of the air, but adds largely to the normal amount of that gas in the air, thus resembling the petals of flowers and the action of green leaves during darkness. The best results were obtained with the maple (*Acer negundo*), the holly, the ivy and the *Alocasia macrorhiza.* Every care was taken to choose white and green foliage comparable in every respect, age, etc. The leaf stalks were placed in boiled distilled water and covered by a bell-jar inverted over mercury; to the mouth of this bell-jar is fitted a cork through which pass two tubes, one long and the other short. Air is sucked from the long tube through a Pettenkofer tube containing baryta water. At the end of the experiment the Pettenkofer tube is washed out without exposure to the atmosphere, and the carbonate determined after the method of Dupré and Hake (*Chem. Soc. Jour.*, March, 1879). The CO_2 in the atmosphere was found to be 3·21 parts in 10,000. The author embodies his results in a table; 1000 sq. centims of the white foliage of the maple evolved in two hours 16·69 parts of CO_2 per 10,000 of air; 1000 sq. centims of green foliage evolved 0·44 parts CO_2; similarly 1000 sq. centims of white holly leaves evolved 18·82 parts CO_2 per 10,000; of green 4·49; 1000 sq. centims of white alocasia leaves in two experiments evolved 15·06 and 38·96 parts of CO_2 per 10,000; of green 1·14 parts. The author has also studied the comparative loss and gain of albino and green foliage. White holly sprays placed in water gained in two hours 0·29 per cent., green holly under similar conditions gained 1·55 per cent.; when no water was supplied the white holly lost 0·54 per cent., the green 10·26 per cent. The author promises further work on this interesting subject. He exhibited some dried specimens of albino and ordinary leaves, the albino leaves being thinner and altogether much less substantial in their structure.

Dr. Gilbert said that the results obtained by the author seemed to be of considerable importance. In a former paper the composition of the green and white leaves had been investigated, the white leaves containing less lime, but more non-albumenoid nitrogen than the green, indicating a capability for development without actual growth. In the present paper the author shows that these white leaves do not perform leaf functions.

Mr. Warington remarked that in the white leaves respiration seemed to take place in an exalted state. He would like to know whether much starch had been found in the white leaves.

Mr. Groves asked if there was any difference in the number of stomata in the white and green leaves.

Dr. Voelcker inquired where the large amount of carbonic acid given off by the white leaves came from; the researches seemed to indicate that the white leaves seemed to be partially if not quite dead, or at least gradually decomposing; this would account for the evolution of CO_2.

Mr. Church in reply said there was more starch in the green than in the white leaves, and that the leaves used in the experiments were all in active growth and not in the least decaying. In his opinion the CO_2 given off by the white leaves came from substances elaborated by the green leaves; in the same way the flowers of the white lily and green leaves in the dark evolved CO_2, without any actual decay. The green leaves gave off CO_2 as well as the white, but in sunshine they decomposed more than they excreted. As far as he knew, white and green leaves had the same number of stomata.

Mr. KINGZETT then read a paper entitled—

Contributions to the History of Putrefaction. Part I.—The author discusses to a certain extent the process of putrefaction, and concludes that it would naturally be expected that a substance allowed to undergo putrid fermentation without oxidation would more readily undergo chemical oxidation than the original integral mass, and therefore that the oxygen-absorbing capacity of a substance would progress increasingly with such putrefactive decomposition. He therefore endeavoured to determine the oxygen-absorbing capacities of organic solutions from time to time as they passed into putrefaction, and to compare these numbers with the oxygen capacities of similar solutions protected during the same periods by so-called antiseptics. Various difficulties were met with, and the author does not offer all the results obtained. Some of the experiments, however, have an important bearing on Tidy's oxygen process, which, in the words of its author, "undoubtedly furnishes us with exact information as to the relative quantities of putrescent and easily oxidizable matter and of non-putrescent or less easily oxidizable matters present in the water." The author of the present paper thinks that the oxygen process is liable to mislead chemists in interpreting their results if the most pernicious organic matters are those which are in a putrescent state, for from the results obtained by Kingzett, it appears that the oxygen absorbed by a water containing organic matter in a non-putrescent condition is more than that required by the same organic matter in a putrescent state. Thus 5 c.c. of a dilute solution of albumen, which began to stink after 150 hours, requires, when fresh, permanganate equal to 0·008004 grm. oxygen; after keeping 24 hours, 0·008671; after 120 hours, 0·0076038; after 1104 hours, 0·00667; after 1176 hours, 0·0062031; after 1440 hours, 0·0058696; after 1534, 0·0054694; showing after a slight rise (8 per cent.) a decrease of over 30 per cent. in the oxygen absorbed. Similar results were obtained with extracts of beef, fish, etc. Thus the author concludes that the oxygen process might pass a water containing pernicious products, since it is possible to obtain an organic solution in an active state of putrefaction which requires less permanganate than the same solution in a fresh state.

Professor Tidy said that the results obtained by Mr. Kingzett required thinking about. No doubt different materials had different oxygen-absorbing powers. As a practical man he was satisfied with the third place of decimals. He was pleased to see Mr. Kingzett found it necessary to go to the seventh.

Mr. Otto Hehner thought that the results rather proved than disproved the accuracy of the oxygen process, because the oxygen-absorbing power did at first increase. Afterwards, of course, substances nitrified, and in other ways the organic matter disappeared. This rise and subsequent decrease he had himself pointed out, using the albumenoid ammonia process.

Mr. Church suggested that some inaccuracy might arise from the deposit which fell as the solution putrified, the successive quantities of 5 c.c. containing less and less organic matter as the deposit increased.

After some remarks by Dr. Voelcker, and a brief reply by Mr. Kingzett to the various points raised in the discussion,

The next paper was read by Dr. Wright; it was entitled—

Notes on Manganese Dioxide. By C. R. A. Wright and A. E. Menke.—The authors have repeated many of the experiments of former observers, with, in some cases, very different results. They have made many careful gravimetric analyses of the substances precipitated under various conditions, the experiments being more particularly directed to the examination of substances formed in presence of potassium compounds, so as to determine how far potash is carried down in combination with the manganese. Substances were prepared by the action of nitric acid or sulphuric acid on potassium permanganate. By solution in hydrochloric acid, and re-precipitation by water in presence, or absence, of potassium salts; by acting on potassium permanganate with sulphurous acid, alcohol and glycerin; by precipitating manganese salts with potassium permanganate under various conditions; by acting with air and caustic potash on manganese salts (Weldonizing); by precipitating from solution by bromine, etc., under various conditions, and by heating manganese nitrate to 160° alone and in the presence of potassium nitrate. In every case, except the last, potassium was present in the ultimate product in considerable quantity, even though the precipitate was formed in presence of very large quantities of free hydrochloric, sulphuric, nitric or acetic acids. Other metals if present are often carried down in preference to potassium, *e.g.*, calcium; unless the circumstances of the experiments are such as to allow of the precipitation of a large percentage of potassium or other equivalent metal the precipitate never contains as much oxygen as corresponds to MnO_2, the deficiency being greater or less as the quantity of potash present is less or more. The only exception to this rule occurs when hot solutions of manganese salt and excess of permanganate act on one another; with cold solutions the precipitate is deficient in oxygen unless zinc sulphate be added. Manganese dioxide containing potash can be completely converted into MnO, retaining but traces of potash, by long continued ignition in a current of hydrogen; the free oxide thus formed does not spontaneously oxidize in the air. When freshly thrown down and just dry to the sight and touch, the dioxide is a hydrate $4MnO_2+H_2O$; on standing over sulphuric acid this hydrate loses water indefinitely and continuously. MnO_2H_2O is the lowest hydrate stable in dry air. Up to 108° no appreciable loss of oxygen accompanies the expulsion of water; at 210° all the precipitated oxides, etc., dried, lose oxygen slowly and regularly; the nearly anhydrous MnO_2, prepared by heating manganese nitrate to 160°, does not evolve oxygen at 210°. In all cases perceptible amounts of water from a few tenths to 2 per cent. are retained after many hours' drying in a current of dry pure air at 210°. The volumetric processes of Kessler and Pattinson have been examined; they give good results. The authors suggest a convenient modification of Pattinson's method. The diluted solution slightly acid is heated to nearly 100°, a considerable excess of bromine water added and then freshly precipitated zinc carbonate, all free bromine being expelled by boiling. Ferric chloride usually forms permanganate, and thus complicates the manipulation. A more convenient and quite as accurate a method as any of those requiring bromine, etc., was found to be the addition of the diluted and not too acid solution of manganese in the cold, to a small excess of dilute permanganate solution containing zinc sulphate; the precipitate is collected on a glass wool funnel, dissolved in excess of acid ferrous sulphate, and titrated as usual. Three-fifths of the manganese in the precipitate represent the manganese in the original solution. The authors have verified the statement of Gorgeu that actual MnO_2 is obtained by heating manganese nitrate to 160°. The statements of Guyard as to the effect of heat on the precipitate formed by adding manganese salts to permanganate are also corroborated. The recent statements of Pickering as to the deficiency of oxygen in the substances thrown down by acting with water on the superchlorides of manganese are also substantially correct. The accuracy of the results of Volhard, as to obtaining pure MnO_2 free from potash by precipitating manganese sulphate with permanganate in the presence of nitric acid, etc., is questioned by the authors. The experiments of Morawski and Stingl have not been confirmed as far as they have been repeated, viz., hydrated manganese dioxide containing potash does not (as stated by these chemists) lose all its water by ignition, the substance thrown down by the action of manganese sulphate on potassium permanganate is not $3MnO_2 2H_2O$, but an indefinite hydrate containing much potash; on boiling with caustic potash it does not form (after washing and drying at 100°) $Mn_4KH_3O_{10}$ or $8MnO_2K_2O,_3H_2O$ as stated, but a substance much richer in potash $5MnO_2K_2O$; $Mn_4KH_3O_{10}$ does not uniformly result by the action of alcohol, glycerin, etc., on potassium permanganate, but instead, substances of very variable composition. The authors also notice incidentally that manganese chloride is sensibly volatile at a red heat in a current of HCl, and that perceptible errors in alkali determinations may be introduced if solutions containing ammonium sulphide are evaporated down in glass or porcelain. Identical results were obtained when titrating the available oxygen in a substance, whether the material was dissolved in acid ferrous sulphate checked by dichromate, or was distilled with HCl into KI and the liberated iodine estimated by adding excess of thiosulphate, and titrating back with iodine solution.

The next paper was read by the Secretary, on—

The Reaction between Sodium Thiosulphate and Iodine—Estimation of Manganese Oxides and Potassium Bichromate. By S. Pickering.—In a former paper the author suggested a modification of Bunsen's volumetric method, viz., transferring the sample to be analysed to a beaker containing a large excess of potassium iodide, adding a small quantity of acid and determining the iodine liberated by running in sodium thiosulphate solution. This method gives results slightly higher than the original method of Bunsen, viz., boiling the oxides with hydrochloric acid and collecting the evolved chlorine in a solution of potassium iodide. The author has in the present paper exhaustively examined the effects produced by varying the several conditions of the reaction. When iodine and sodium thiosulphate react in warm solution, a decomposition, $4I_2+Na_2S_2O_3+5H_2O=2NaHSO_4+8HI$, attended with the formation of sulphate, occurs, as well as the ordinary reaction $I_2+2Na_2S_2O_3=Na_2S_4O_6+2NaI$. Thus at 52° 3·9 per cent. of iodine reacted to form sulphate, at 0° 1·84 to 2 per cent. reacted in a similar manner. Dilution increases very slightly the amount of sulphate formed. An excess of potassium iodide is without effect. Dilute solutions of iodine do not vary in four days as regards the amount of iodine they contain, whether kept in the dark or in diffused daylight. Within certain limits the amount of iodine liberated at once is proportional to the amount of hydrochloric acid added, but the acid has no influence on the relative proportions in which the two above-mentioned reactions take place. No difference occurs whether the reaction is made by adding iodine solution to an excess of thiosulphate or thiosulphate to the iodine; if, however, hydrochloric acid be present the amount of sulphate is increased. The author discusses the various forms of apparatus for estimating the oxides of manganese by Bunsen's plan. He prefers boiling the oxide in a small flask fitted with a thistle funnel, the chlorine being absorbed in three other flasks containing potassium iodide. Traces of chlorine were retained by the acid liquid, even after prolonged boiling. If undiluted acid be used the Bunsen method gives results almost identical with those obtained by using the plan suggested by the author; if the acid be diluted, the amount of chlorine evolved is diminished in the Bunsen method. If potassium bichromate be estimated by the Bunsen method, a notable deficiency of chlorine is observed, even if the acid be undiluted. If chlorine water be diluted and boiled, considerable loss of chlorine takes place, from the formation of hydrochloric acid; this loss begins at lower temperatures. This probably is sufficient to explain the low results obtained with the Bunsen method. The author's modification is, of course, not applicable to manganese ores, owing to the presence of ferric oxide. Bunsen's method must, therefore, be used with the precautions above indicated.

The Society then adjourned to December 4, when a ballot for the election of Fellows will take place, and the following papers be read:—On the Theory of Fractional Distillation, Part II.; by F. D. Brown; On the Influences exerted upon Certain Chemical Changes by Variations in the Amount of Water of Dilution, by M. M. P. Muir and C. Slater; On α and β Phenanthrene Carbonic Acid, by F. R. Japp; On Some Derivations of Phenylacetic Acid, by P. Phillips Bedson.

Parliamentary and Law Proceedings.

ADULTERATION OF BAKING POWDER.

At the Cambridge Borough Police Court, on Thursday, November 20, before the Mayor, the Master of Christ's, Professor G. D. Livering, Dr. Fawcett, J. Deighton and S. Peed, Esqrs., Messrs. Warren, of Cambridge, wholesale grocers, were charged with selling baking powder containing ingredients injurious to health, viz., 15 per cent. of alum. These were the nominal defendants, the case being really defended in the interests of the manufacturers, Messrs. J. B. Smith and Sons, of Norwich, wholesale druggists, and manufacturers of the "Norfolk Baking Powder." Mr. Cockerell, instructed by the Town Clerk, prosecuted; Mr. Blofeld, instructed by Mr. G. B. Kennett, appeared for the defence. The case lasted upwards of four hours. For the defence it was contended that the powder was not an article of food, and further, that the alum in the powder was neutralized in its effect by the addition of bicarbonate of soda. In the result, the Bench inflicted a penalty of 40*s.* and costs.—Notice of appeal was given.—*East Anglian Daily Times.*

BOOKS, PAMPHLETS, ETC., RECEIVED.

THE RISE AND DEVELOPMENT OF ORGANIC CHEMISTRY. By C. SCHORLEMMER, F.R.S. Manchester: J. E. Cornish. London: Simpkin, Marshall, and Co. 1879. From the Publishers.

THE MEDICAL PROFESSION: being the Essay to which was awarded the First Carmichael Prize of £200, by the Council of the Royal College of Surgeons, Ireland. By WALTER RIVINGTON, B.A., M.B., etc. Dublin: Fannin and Co. 1879. From the College.

THE MEDICAL PROFESSION IN THE THREE KINGDOMS IN 1879. The Essay to which was awarded the Carmichael Prize of £100. By THOMAS LAFFAN. Dublin: Fannin and Co. 1879. From the College.

THE SOCIETY OF ARTS ARTISAN REPORTS ON THE PARIS UNIVERSAL EXHIBITION OF 1878. London: Sampson Low and Co. 1879.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[345]. Mr. Mackay having failed finding any authority upon this, I beg to refer him to Parrish's 'Pharmacy,' page 856, where he will find a formula for an injection containing zinc sulphate and lead acetate, combined with other ingredients, also the following:—"This is an instance in which chemical incompatibles are mixed advisably so as to produce a very fine precipitate, which, being diffused in the liquid and deposited on the mucous membrane favours the therapeutic effect intended." The value of such an authority needs no comment of mine.

FELIX STEVENS.

[345]. A few days ago I dispensed an old prescription of Henry Lee's, containing lead and zinc for an injection, and notwithstanding the opinion of J. B. L. Mackay, with his long list of standard works, I did not filter, but directed the bottle to be shaken.

I have frequently made a similar injection from the late W. Acton's prescriptions, and I venture to think these two eminent surgeons knew as much about injections as all Mr. Mackay's authorities put together.

Some years ago, when living at Cheltenham, a doctor wrote a similar prescription in the shop, and when I pointed out to him the decomposition that would take place he told me he was quite aware of it, that he always prescribed it and it always had the desired effect.

For once, I do not agree with the editor of "The Month;" I would sooner filter it out than leave the precipitate for the last syringeful.

WM. GEO. STRONGITHARM.

[347]. THE COLOUR OF EUONYMIN.—It is doubtless correct that to some extent this varies with the manipulation (see page 325), but to a much greater extent the variation is due to the age of the bark when used. The recent extended demand for euonymin has led to the utilization of whatever bark could be obtained, with perhaps but little reference to its age or the time of collection. The green euonymin is prepared from young green bark, and the brown kind without any shade of green (which is not so acceptable or so powerful) is prepared from bark which is so old that chlorophyll has disappeared from it; the intermediate tints are procured by working bark of which the age varies between these extremes. It may be useful to state here that liquorice powder should not be dispensed with euonymin or other resinoids; in several cases it has been found to have the effect of rendering them all but inert. For instance, when in New York, a few weeks ago, I was informed by a manufacturer that a sufficiently active pill composed of euonymin, ½ grain, podophyllin, ⅛ grain, and leptandrin,

$\frac{3}{8}$ grain, had hardly any purgative power when made up with liquorice powder. JOHN MOSS.

[377]. Would any reader of the Journal kindly inform me the best mode of dispensing the following?

℞ Sodæ Salicylic.	. . . .	ʒij.
Ammonii Bromid.	. . . .	ʒiss.
Sp. Chloroform.	. . . .	ʒij.
Ext. Cinchon. Liq.	. . . .	ʒiij.
Aq. Destil.	. . . . ad	℥viij.

M. Take one tablespoonful every four hours.

NOVIS.

[378]. Would any reader kindly inform me how to proceed with the following prescription? I have been told by the prescriber that it has been dispensed in London to his entire satisfaction.

℞ Zinci Oxidi	. . . .	ʒij.
Calaminæ Pulv.	. . . .	ʒj.
Vaseline	. . . .	℥ss.
Aq. Calcis	. . . . ad	℥iv.

M. ADOLESCENS.

Notes and Queries.

[636]. DR. STARTIN'S POMADE.—In answer to W. Richards's query, I believe that the following is the formula for "Dr. Startin's pomade:"—

℞ Hydrarg. Oxid. Rub.,		
Hydrarg. Ammoniat.	. . . . . āā	℈ss.
Ol. Amygdal. Dulc.,		
Adipis	. . . . āā	ʒj.

M. Ft. pomade. T. ROBERTS.

[640]. SANTONIN WORM CAKES.—Will any correspondent oblige me with a form for "Worm Cakes" containing santonine; also the dose? NU.

[641]. GINGER ALE.—Can any of your readers give a good formula for making ginger ale? J. S. C.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE BOTANICAL ORIGIN OF DAMIANA.

Sir,—In your last issue I observe in the "Answers to Correspondents," on p. 420, that you have attributed to me the determination of the botanical origin of Damiana. This is not strictly correct, for although I identified the true Damiana as a species of *Turnera*, probably hitherto undescribed, but near to *T. microphylla*, D.C., my identification was made from a few isolated flowers found mixed with the Damiana leaves of commerce. Some months after the publication of my paper I accidentally came across a statement that the plant had been identified and described in the United States, and after considerable difficulty traced the article alluded to and obtained a copy of the journal containing it, when I found that it had been published earlier than my paper. It is to be found in the *Virginia Medical Monthly*, vol. iii., No. 1, April, 1876, p. 47. As the description of the plant has not yet been published, so far as I am aware, in this country, I send it herewith:—

"*Turnera aphrodisaica*, L. Ward.—*Calyx* tubular, funnel-shaped, the lobes shorter than the tube; *styles* three, distinct; *stigma* flabellate; *stems* woody, the branches reddish, densely canescent or lanulose, as well as the petioles and lower portion of the midrib; *leaves*, obovate to oblanceolate, 6 to 9 lines long, 2 to 3 lines wide, on short petioles, strongly crenate-dentate, the teeth with revolute margins, prominently veined beneath, nearly glabrous above, glandular below, bearing fascicles of smaller leaves in their axils, together with the flowers; *flowers* shortly pedicelled or nearly sessile, axillary or petiolary, *i.e.*, developed either from the centre of axillary fascicles of minute leaves or from between them and the base of the petioles, or in some cases from the petiole itself above the base, bibracteolate, the bracts ovate, long, acuminate, ciliate; *anthers* somewhat sagittate, introrse, the cells thin, ovaries dehiscent from the apex to near the base; seeds, large, long, kidney-shaped or curved, grooved lengthwise and pitted, only a few maturing, the rest abortive and persistent."

The above is the description given in January, 1876, by Mr. Lester F. Ward, a comparison of which with my description in *Pharm. Journ.* [3], vol. vi., p. 531, will show that the two determinations were made independently, since points omitted in the one are mentioned in the other and *vice versâ*.

The Editor of the *Virginia Medical Monthly* remarks concerning the plant that it differs from *T. carpinifolia* in the shape and serration of the leaves, and that the latter plant, which he thinks is the one most likely to be confounded with Damiana, is a native of damp river bottoms in South America, while the former is found only on dry rocky places in Western Mexico. E. M. HOLMES.

THE EVENING MEETINGS.

Sir,—The voice from the gallery is, I am sure, no less discordant to most of your readers (who know the true state of things) than to me, and the "growler" is but turning into ridicule a subject of vital importance by such a communication.

I fully intended writing upon the death rate among *pharmaciens* myself, but have not had time to give the matter the amount of consideration it deserves. Yet this ridiculous and delusive letter from "One of the Gods" calls for some reply.

He need not liken the house of the Society, so remarkable for its orderliness to the Augean chamber of Grecian mythology.

Comparisons are very odious in this case!

There are not 300 students attending the lectures of the school, but about one-tenth part of that number; while, from personal experience, I can state that the students do not suffer from a tendency to asphyxia during class hours, but rather feel the draughts very much in winter. If, therefore, currents of air are freely established, how can we be suffocated by the emanations from students or exhalations from the lungs of the orators he speaks of? Or how could the products of burning "a few thousand feet of gas" (as if the writer in question daily regulated the metre registration), or the odoriferous remains of three lectures, accumulate against the Wednesday meetings? To carry out the hyperbole why not say six-and-twenty lectures, since the evening meetings are only held once a month?

There are good ventilators in the theatre, for the products of gas combustion are carried off directly into the open air—a thing which seldom obtains in our churches or dwellings or theatres of a lower order.

It should be remembered that it is quite possible to suffocate a crowd of people with the open canopy of heaven overhead, if only confined by four walls, but here more provision is made than simple diffusion of gases.

Again, there are no less than six walls to the lecture theatre at "the Square," and as to the gallery—though such exists—it is not open to the public (save a few ladies of a reserved nature on the occasion of the inaugural meeting), because, unfortunately, the evening meetings are not sufficiently patronized ordinarily to demand the extra accommodation.

But even were the "atmospheric surroundings" so dreadful as he makes out, your correspondent could not sustain much injury if he only inhales the noxious air for the few minutes after ten o'clock once a month.

What must your readers think of our head-quarters from this description of a "subterranean cavern?"

Such a singular collection of inaccuracies one does not often meet with—but the whole story of the perpetrator of the "solitary howl" seems as much a myth as the very fable of Augeas itself.

Evidently he has only visited the building once in his life, and as to his recollections thereof, we might safely say, as Elijah said of Baal to the false prophets, "Peradventure he dreameth," especially when he acknowledges himself to be "One of the Gods." J. B. L. MACKAY.

THE QUESTION OF POLICY.

Sir,—I was very much pleased in reading the remarks of Mr. C. B. Allen, in a recent issue, and to me as an old established pharmacist, it seems to be the best suggestion that has been put forth to counteract the sale of patent and other preparations by unqualified shopkeepers.

I think we as pharmacists should take the initiative to protect ourselves, and have a clause in the proposed new amended Pharmacy Act whereby all preparations, so called patents or any other secret preparations, containing poisons, should not be sold except by registered chemists.

Lodge Lane, Liverpool. J. THOMPSON.

THE PROMOTION OF AMATEUR DISPENSING.

Sir,—If I were Mr. Ellwood I should not think of measuring the strychnine and mixing it with the water unless I were called upon to dispense the whole of the prescription, and I would take care that if the customer purchased the ingredients separately from me, with a view to dispense them herself, that the cost of them should be quite equal to that of my dispensing the prescription.

The method of Anglicizing prescriptions is most objectionable, and I wonder that any surgeon should condescend to lower himself to it. No doubt he took as full a fee as he thought he could get, and then grudged the chemist a fair charge for dispensing his prescription. If he take my advice, next time, instead of Anglicizing the prescription he had better prepare it free of charge, and then it will not involve the patient in any cost whatever, and it will also save her all trouble, which of course would be a great consideration with such a man.

"ONE WHO WOULD TRY TO BE EVEN WITH THEM."

SUNDAY TRADING.

Sir,—In answer to your correspondent "Jek," who wishes for the opinion of others regarding Sunday duty, I would say let us all abide by the rules of that Book of Books given for the guidance of all men; rules for every day, and Sunday too, are copiously given.

"Jek" has heard some say they "cannot refuse to sell other things besides medicine whilst the shop is open."

Would it not be nearer the truth to say "will not" instead of "cannot?" If they are Christians, let them show the light before all men, not hide it on an emergency, or when they think it keeps a 6*d*. or 1*s*. out of their till.

Thinking of "Jek" on Sunday evening, I made a note of my customers' wants, about thirty in number, from 7 to 10 p.m. All but two were medicine, in the truest sense of the word; the two refused were Pears' soap and sachet powder.

I have drawn the line between necessary and unnecessary articles for six years and find it works well, and I believe a good impression is produced by a kind refusal of what can be as well bought on Monday. It is true every rule has its exception. Sometimes, a bottle of eau de Cologne or perfume is required for the "sick room," I then sell it readily. If the customer tells an untruth in order to obtain it, it rests with him; I sell it in ignorance thereof, and on good intent.

I think I am asked prices of hair brushes and combs more on Sundays than any other day, my reply is "I sell nothing but medicines."

Once only, did I break through this rule. A poor woman came one Sunday morning, begging me to let her have a 6*d*. comb; hers had got lost, she wanted to get her little ones ready for church; this was, I thought, a case of necessity.

Let us all strive to elevate our position; by doing what we can to benefit our fellows and drop a good word in season, when opportunity offers itself. VOLO.

THE HEALTH OF THE DRUG TRADE.

Sir,—It will be a cause for regret if the correspondence upon this important subject is allowed to drop without producing any practical effect.

In reply to my challenge I received a large bundle of letters inquiring how a chemist may be as healthy and live as long as his next door tradesmen do.

These letters showed that the writers were in grievous want of the knowledge of self-preservation; I spent a fortnight in answering each in the fullest possible way. I do not pretend to have done any good, for I fear that only a few will make the attempt to do what is required of them, and that the majority will go down to their graves as negligent suicides.

Now, with respect to our vital statistics, taking the thing in the abstract, the early death of a simpleton is not a thing to be deplored; for should he live, there is a danger that, owing to a great compensatory law of nature he will breed a good many more simpletons; should he have already some children, we find that the children of simpletons generally fare better as orphans than otherwise, because they often fall under the care of the wise and the prudent, whereas the children of simpletons under the care of simpletons make a pitiful picture indeed. In this way we may console ourselves while we see the survival of the fittest.

But the point which strikes me is that while this wretched process is going on, that the poor "drugerist" is half dead so long before he dies. If I take a walk round a large town and ask a question of the grocers, I get a smart answer from most of them, but if I venture to call upon the druggists, the result will be just the reverse.

The poor white faced man does not recollect if "he has had any voting papers sent him, he is not sure, he has a great many papers sent him, he does not know where they are now, there is no one that he wishes to vote for, he does not know anything about it, he could not give him an answer to-morrow, no, he would consider the matter." If that will get me out of his shop, this done, he relapses into helplessness and the daily newspaper, wonders when business will improve, thinks that the Council ought to do something!

This is a picture drawn from life, and one which proves that our politics and our health are not disconnected.

Moses of old found that a race of slaves could not be made into a nation, and I find that a race of men like this cannot be raised above their degradation.

The letters which have appeared indicate a consciousness that more outdoor exercise should be taken Well for once we are agreed.

Now, let each reader of the above, who feels that he is a better man than is here described, determine at once to call upon a fellow-sufferer and see if the hours of business can be curtailed. Not that the shutters should be put up and a victim kept to listen to the bell; this is rank hypocrisy. When a companion is found, let them both go round the town and neighbourhood and urge the importance of health *versus* money. Do not be discouraged by refusals; call again and again, and be sure to hunt in couples. The moral effect of two to one is very great. Much more can be done, but begin with this.

Rochester. H. BARNABY.

Ichthyoc.—See an article on the Solidification of Balsam of Copaiba, by M. Thiery, in the first series of the *Pharm. Journ.*, vol. i., p. 655, and another by Roussin in the second series, vol. vii., p. 326.

Apprentice.—Recipes for lavender water may be found in any work on perfumery.

J. W. H.—Full information will be found in the "Students' Number" of any of the medical journals, published in September.

"*Galangal.*"—Recipes for glycerine jelly were given in the Journal Nov. 30, 1878, p. 463.

"*Lapides*" does not say what kind of "stones" he wishes to dissolve. We know of no book treating specially of the subject.

E. Hall.—You are advised to apply for information to the local authority. The law applies to all measures used for the purposes of trade.

Statim.—The recipe has not been published and we must leave to our correspondent the opportunity of making an application to the maker for it. Probably it resembles closely in composition other well known preparations.

R. E.—A simple test is the evaporation of a quantity of the water and noticing whether the residue becomes browned when moderately heated. Positive indications in this case may be relied upon, though a negative result would be less trustworthy.

COMMUNICATIONS, LETTERS, etc., have been received from Warneford, Stevens, Gostling, Brown, Billing, Roberts, Jackson, Osbourn, Young, Culverwell, Beta, Sub Umbra Floresco, Syrupus, Nemo, G. A. F., J. B. O., A. C., A. P. S., J. W. H., J. A.

A METHOD FOR THE VOLUMETRIC ESTIMATION OF ARSENIC ACID.*

BY W. A. H. NAYLOR, F.C.S.

While conducting some experiments upon the action of certain reducing agents upon arsenic compounds, my attention was directed to a peculiar reaction which takes place between arseniate of sodium and the iodine halogen acid. It was found that upon adding a solution of hydriodic acid to an alkaline arseniate, iodine was slowly and continuously set free. As this observation was new to me, the literature on arsenicum was diligently searched with the general result that no mention of this decomposition could be found in any of the well known text-books, or even in Watts's 'Dictionary.' English and French journals were likewise consulted, but with no better result. From a desire to understand more thoroughly the nature of this reaction, and not knowing from whence to obtain the necessary information, recourse was had to experiment. As these experiments progressed they grew in interest and widened in their range, inducing me at last to make a careful and systematic study of the action of the halogen acids upon arsenic compounds. The results embodied in this paper have reference mainly to the reaction above cited, and are intended first to explain the nature of that reaction and then to show how it may be advantageously applied to the volumetric estimation of arsenic acid.

My earliest inquiries led to the establishment of the following, that when iodine acts upon a boiling aqueous solution of arsenious acid no iodo-arsenic acid is produced, but that the acid is partially oxidized with the simultaneous formation of hydriodic acid, and that when this solution becomes concentrated a portion of the arsenic acid suffers reduction, while a proportionate quantity of iodine is set free. It was not until a few days ago that I had the gratification of discovering that these facts formed a substantial epitome of a paper published by M. Wegner† on the action of iodine on arsenious acid. Confirmation in this instance has a certain value quite apart from its independent character, inasmuch as Zinno had previously concluded from his experiments that iodo-arsenic acid was produced under these conditions.

Passing from this preliminary work, it next became a matter of interest to ascertain whether an alkaline arseniate would be completely reduced to the condition of arsenite, and if so, would the amount of iodine set free be constant in its quantitative expression of the reduction. On the supposition that this reduction would be complete it was thought that one of the two following equations would represent the final decomposition.

$$Na_2HAsO_4 + 2HI = Na_2HAsO_3 + I_2 + H_2O$$

or

$$Na_2HAsO_4 + 3HI = NaH_2AsO_3 + NaI + I_2 + H_2O.$$

It will be seen that in each case one molecule of the anhydrous salt would be equivalent to two atoms of iodine. Inasmuch, however, as one equation represents a combination of iodine with sodium, it was not difficult to decide which of the two is the more correct. This was done in the following way. To a 20 per cent. solution of hydriodic acid a little arseniate of sodium was added and allowed to stand for three hours. It was then intimately mixed with recently precipitated well washed mercurous oxide, and evaporated to dryness in presence of metallic mercury. The residue was digested in warm water, filtered, and the filtrate tested for iodine. There was no indication of an iodide. The second equation cannot therefore represent this decomposition. In order to determine the completeness or otherwise of the reduction, the following methods were employed. The hydriodic acid, prepared by the action of sulphuric acid upon iodide of barium and subsequent distillation, was allowed to act for stated and different periods upon the arseniate in an atmosphere of carbonic acid gas. At the end of the allotted time—varying from three to six hours—the free iodine was removed by hyposulphite of sodium, ammonia added in excess, followed by a little ammonium chloride and magnesium mixture. Of a number of experiments made in this way there was not one which showed the reduction to have been complete, although in many cases the solution after standing twenty-four hours gave only a small precipitate.

A second method was to remove the free iodine and hydriodic acid by moist mercurous oxide and metallic mercury; here also a distinct precipitate was observable after long standing. A third method was to add to the neutral solution from which iodine and hydriodic acid had been removed a solution of nitrate of silver drop by drop. No reddish or chocolate-coloured precipitate fell, the deposit was uniformly yellow.

The extent of the most complete reduction hitherto obtained was next determined by titrating, with decinormal solution of hyposulphite of sodium the iodine liberated by a known weight of anhydrous arseniate of sodium. A 20 per cent. solution of hydriodic acid was used and allowed to remain in contact with the arseniate for four hours. The result of this determination showed a deficiency of 3 per cent. of the salt taken. It now became important to ascertain whether the extent of reduction was dependent upon the strength of the hydriodic acid; also, whether by repeated removals of the iodine by mercurous oxide and successive digestions with hydriodic acid solution complete reduction would be effected. To the first query, there was no difficulty in furnishing a reply. A few experiments conclusively proved that the greatest reduction was obtainable by solutions containing not less than 20 per cent. of hydriodic acid, while with 10 per cent. solutions the reduction was relatively small. With reference to the second query the reply must be negative. Complete reduction was not effected by removing the iodine at comparatively long intervals and adding more hydriodic acid. The facts of this experiment taken in conjunction with subsequent ones appear to be capable of explanation only on the ground that reduction proceeds until it arrives at its point of completion and then the free iodine begins a gradual work of oxidation. To decide this point it was necessary to devise some means of removing the iodine as it was liberated from a known weight of anhydrous arseniate of sodium and at the same time determine its quantity. This was done by inclosing the hydriodic acid and a known weight of arseniate of sodium in a tube the air of which was replaced by carbonic acid gas. As the iodine was set free a standard solution of hyposulphite of sodium was run in from a burette in such quantities as to leave a trace of free iodine. When no more iodine

* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, December 3, 1879.

† *Annal. Chem.*, clxxiv., 129—133.

was liberated the decomposition was considered complete. This method was found to give accurate results when calculated on the assumption that every 186 parts of anhydrous arseniate of sodium gave 254 parts of iodine. The length of time, however, consumed in working the process, together with the precautions to be observed in the preparation of the hydriodic acid, proved a fatal objection to its employment. After further experiment, it was found possible to overcome these difficulties, partly by the addition of a little hydrochloric acid to the solution of the alkaline arseniate, thereby substituting free arsenic acid for the alkaline salt, and partly by resorting to the use of iodide of potassium as the source of the hydriodic acid. The operation may be briefly described thus:—Weigh out a quantity of the substance to be examined equivalent to from ·05 to ·03 gram of arsenic acid, and, having dissolved it in just sufficient water or dilute hydrochloric acid, pour in 5 c.c. of a 20 per cent. solution of hydriodic acid. The iodine, as it is liberated, is titrated with a decinormal solution of hyposulphite of sodium. This part of the operation must be conducted in an atmosphere of carbonic acid gas to guard against any decomposition of the hydriodic acid by the surrounding atmosphere. Towards the end of the process the iodine will appear at increased intervals, so that if it is desired to attain the degree of accuracy of which the test is capable, fifteen minutes should be allowed after the decoloration of the solution before taking the final reading on the burette.

The hydriodic acid solution may be conveniently prepared by dissolving 25 grains of iodide of potassium in 80 minims of water, and adding thereto 20 minims of hydrochloric acid 1·16.

Operating in this way upon arseniate of sodium of known purity, the following results were obtained:—

	Na_2HAsO_4 taken.	Na_2HAsO_4 found.
No. 1 . . .	·0615 gram.	·0610 gram.
„ 2 . . .	·0625 „	·0622 „
„ 3 . . .	·1300 „	·1298 „
„ 4 . . .	·0560 „	·0556 „
„ 5 . . .	·0500 „	·0510 „
„ 6 . . .	·0500 „	·0510 „
„ 7 . . .	·0500 „	·0500 „
„ 8 . . .	·0500 „	·0500 „

These figures show a maximum error of 2 per cent., while the minimum is less than ·25 per cent. of the salt taken. They further indicate an almost complete reduction of the arsenic acid. Additional confirmation of this fact was obtained by neutralizing the free acid of the solution with soda, then adding a little ammonia and magnesium mixture; after twenty-four hours a white crystalline film was found coating the side of the tube. By carefully noting the time required to produce turbidity, and imitating the conditions under which it was formed, the amount of arseniate present could be approximately ascertained from experiments made upon solutions containing known weights of the acid. This method usually represented a deficiency in the reduction of ·75 per cent.

There is still one other point which demands attention. Upon a closer examination of the general process it will be seen that the conditions favourable for the formation of iodide of arsenicum are in part fulfilled, since the reduced arsenic acid is in contact with excess of hydriodic acid. The mode of search for iodide of arsenicum was extremely simple. After allowing the mixed solutions of arsenic and hydriodic acids to stand for half an hour the free iodine was removed by ether; the aqueous portion was then carefully neutralized, or rendered feebly alkaline by soda, and evaporated rapidly to dryness; the residue was digested in bisulphide of carbon, which by spontaneous vaporization would deposit any iodide of arsenicum the solution originally contained.

This process was many times repeated, but always with negative results, except when small quantities of the salt were added; its detection then affording corroborative evidence. It now became a matter of interest to ascertain whether after having deoxidized the arseniate concordant results would be obtained by reconverting it into arsenic acid on the addition of iodine to its alkaline solution. For this purpose a definite quantity of arseniate of sodium was treated in the usual manner with hydriodic acid, and the iodine removed by decinormal solution of hyposulphite of sodium; the solution was then rendered alkaline by bicarbonate of sodium, and a decinormal solution of iodine run in until its colour no longer disappeared. The following are some of the results obtained:—

	Na_2HAsO_4. taken.	Na_2HAsO_4 found by de-oxidation.	Na_2HAsO_4 found by re-oxidation.
No. 1 .	·095 gram.	·0945 gram.	·0948 gram.
„ 2 .	·047 „	·0470 „	·0480 „
„ 3 .	·066 „	·0660 „	·0665 „
„ 5 .	·075 „	·0760 „	·0760 „
„ 4 .	·070 „	·0710 „	·0706 „
„ 6 .	·073 „	·0740 „	·0740 „

Here the maximum error is 2·12 per cent. of the salt taken.

It will be observed that these results corroborate those other experiments which represent the reduction as being practically complete.

The facts now acquired present us with a simple explanation of the manner in which arsenic acid and hydriodic acid react upon each other under certain conditions, and may be expressed thus:—

$$\underbrace{H_3AsO_4}_{142} + 2HI = H_3AsO_3 + H_2O + \underbrace{I_2}_{254}.$$

The difficulty of estimating arsenic acid when mixed with relatively large quantities of alkaline arsenites and phosphates suggested the following experiments. Results obtained with arseniate of sodium in presence of alkaline arsenites:—

	Na_2HAsO_4 taken.	$+Na_2HAsO_3$?	Na_2HAsO_4 found.
No. 1 .	·053 gram.	·100 gram.	·0531 gram.
„ 2 .	·067 „	·300 „	·0671 „
„ 3 .	·063 „	·400 „	·0628 „
„ 4 .	·082 „	·800 „	·0817 „
„ 5 .	·062 „	·500 „	·0630 „
„ 6 .	·052 „	1·000 „	·051 „

These numbers show a maximum error of 2 per cent. with a minimum error of ·14 per cent.

From these results it is evident that much arsenious acid does not exert so material an influence as to render the determinations untrustworthy. It must, however, be admitted that some little inconvenience attends this operation; this is caused by the comparative insolubility and consequent separation of arsenious acid. It is important that the iodine be removed as rapidly as it is liberated, otherwise it is apt to form a mechanical admixture with the arsenious acid, a condition in which it cannot readily be attacked.

The following results were obtained when arseniate of sodium was mixed with phosphate of sodium:—

	Na_2HAsO_4 taken.	$+ Na_2HPO_4$.	Na_2HAsO_4 found.
No. 1 .	·050 gram.	·500 gram.	·0493 gram.
„ 2 .	·050 „	·800 „	·0500 „
„ 3 .	·050 „	1·000 „	·0500 „
„ 4 .	·044 „	1·200 „	·0441 „
„ 5 .	·082 „	1·500 „	·0822 „
„ 6 .	·034 „	2·000 „	·0340 „

In connection with these results one remark need only be made, that is, phosphates appear to retard somewhat the rapid progress of the reduction; in such cases all that is necessary is the addition of a little hydrochloric acid.

This method of estimating arsenic acid has been extended to the compounds of metals other than sodium, with this general result: that it is advisable to obtain the acid in the form of an alkaline arseniate before attempting to determine its quantity. In this way those sources of error are obviated which would arise from the action of certain metallic salts upon hydriodic acid. As the one most generally met with may be mentioned perchloride of iron. The two following equations represent its action upon hydriodic acid and hyposulphite of sodium respectively.—

(*a*). $Fe_2Cl_6 + 6HI = 2FeI_2 + 6HCl + I_2$.

(*b*). $Fe_2Cl_6 + 2Na_2S_2O_3 = 2FeCl_2 + 2NaCl + Na_2S_4O_6$.

These last observations are in nowise intended to convey the impression that the method now described for the volumetric estimation of arsenic acid will prove the most serviceable under all circumstances. That it is accurate is clearly shown by the results obtained, and like all other volumetric processes, it requires to be used with intelligence and discretion.

In respect of its capabilities as a qualitative test it may be affirmed that it will detect with ease the one-tenth milligram of arsenic acid when mixed with one gram of arsenious acid.

Remarks upon its comparative merits as a quantitative method form no part of the object of this paper, and are therefore omitted. In conclusion, it may be stated that experiments on the reversal of this method are now in progress, but are not yet sufficiently advanced to warrant its applicability for the estimation of iodine compounds. There only remains for me the pleasurable duty of acknowledging the kind services of Messrs. Corbyn, Stacey and Co., for having placed at my disposal the resources of their laboratory.

TOOTH-WASH.

Take of

Quillaya Saponaria (soapbark) in coarse powder	16 grams
add	
Alcohol	100 c.c.
Aqua Destillata	150 c.c.
macerate for ten days and filter. Then add	
Cochineal	0·5 grams
dissolved in	
Aqua Menthæ Piperitæ	125 c.c.
also:	
Ol. Gaultheriæ	2 c.c.
rubbed up with	
Glycerin	50 cc.

finally sufficient distilled water to make the whole measure ¾ litre.

A few drops on a tooth-brush previously dipped in water will, when rubbed on the teeth, produce a rich lather; it cleanses thoroughly and is also an excellent remedy for soft gums, which it hardens in a short time. It is fragrant and agreeable to use.—W. Myers, M.D., in *New Remedies.*

The Pharmaceutical Journal.

SATURDAY, DECEMBER 6, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

POISON VENDING.

Under the above heading the *Medical Press and Circular* has in its last issue a leading article referring to the popular misuse of poisonous drugs and medicinal agents, and insisting upon the urgent necessity for "demanding a speedy and sweeping "reform in the system by which the chemist and "druggist is empowered, to a great extent, to deal "wholesale destruction in the vicinity of his shop."

One of the reasons assigned for making this demand is the sacrifice of life that has been caused by the improper or ignorant use of chloral, and coupled with the reference to this it is alleged that "in almost every case of death by overdoses of "chloral, the hypnotic has been obtained directly "through the agency of an incompetent adviser, "usually a chemist." It is further stated that there is "constantly accumulating proof that the entire "list of poisonous drugs must be carefully considered "in its relation to the mortality of any given district "and more particularly the larger towns and vil-"lages."

The writer of the article referred to considers that, in the face of the evidence furnished by police courts and coroners' inquests, indicating the immense evil of indiscriminate sales of poisons, it is imperative to raise a protest against the continuance of a system that permits such facilities as are now enjoyed by the incautious and the rash. We are further informed that this is not a singular opinion but one that is "assured of the support of an influential body," on which ground the writer does not hesitate to insist that the right to "sell poisons "irresponsibly be withdrawn from counter prescribers "and every other unqualified dispenser or vendor of "medicines and drugs."

In support of this demand it is further stated that the evil wrought by chemists in the present is not calculable from the evident results, large though they are; but that the cases of severe and even fatal injury brought about by the chemist are much more numerous than those made public.

In reading these very startling remarks our first impression was that the editorial columns of our contemporary had been by some mischance placed at the disposal of a person who from some cause or other was not himself at all, but on reading them over again the phraseology called to mind the diatribes which used to appear in the same journal directed against chemists and druggists from the point of view of the Medical Defence Association. It is true that the writer disclaims any intention to impugn the capacity or the integrity of chemists and druggists as a body; as useful and essential assistants to the medical profession he says the greatest respect is to be entertained for them. But it is contended that the chemist, being only a salesman, can exert only so much control over the use of poisonous materials as the Sale of Poisons Act empowers him to exercise. Besides this, it is held that the Act is framed in a manner so inefficient as to leave great room for improvement; that its provisions are inadequate to prevent the determined suicide from fulfilling his intention; and that even those provisions are not rigorously or invariably enforced.

Hence it is thought that the corporation to which chemists and druggists are subject will be the first to recognize the importance and the justice of the measure advocated by our contemporary, and with this belief, apparently, the Pharmaceutical Society is recommended to perform, in a dignified manner, the happy dispatch, and hand over its powers and privileges respecting the sale of poisons to "one of the three great corporations whose duty "it naturally seems to be, viz., the College of "Physicians or Surgeons, or the General Medical "Council."

Though these suggestions and remarks appear to be put forward seriously, we will not attempt to waste argument upon them, and even in bringing them under the notice of our readers, as having appeared in the editorial columns of a medical journal, we must express the opinion that they are so far eminently suggestive of the "silly season." But there is a further characteristic of this article which cannot be regarded so lightly, and that is the insinuation that since chemists and druggists are sellers of poison, the body representing them cannot be trusted to regulate with propriety the trade in such articles, without a danger that the claims of society and of humanity will be "subordinated to the sordid desire of gain entertained by the vendor." On this we refrain to comment and we leave it to the consideration of our readers whether it is a suggestion that is in any way justified by facts or at all worthy a place in the columns of a journal that professes to represent an honourable profession with which chemists and druggists have intimate relations.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association will be held on Thursday next, 11th inst., at 8.30 p.m., when a paper will be read on "The Manufacture of Sodium Carbonate," by Dr. J. Elliott.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The next meeting of the above Association will be held on Wednesday, December 10, when Mr. C. B. Miller will read a paper on "Sugar."

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, December 3, 1879.

MR. GEORGE WEBB SANDFORD, PRESIDENT.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT.

Present—Messrs. Atkins, Bottle, Frazer, Gostling, Greenish, Hampson, Hills, Mackay, Richardson, Rimmington, Robbins, Savage, Shaw, Symes, Williams and Woolley.

The minutes of the previous meeting were read and confirmed.

The President said it would be remembered that at the last meeting he requested his colleagues to provide for a successor to the presidential chair at this meeting. At that time he felt completely overdone by the very heavy and prolonged work of the day before, and he felt he must resign; but his announcement was received with so many kind remonstrances at that table, which had since been supported by similar expressions from other members of the Society not connected with the Council, that under the circumstances he felt if he were to retire it would be attributed to failing health, from which he was glad to be able to say he did not suffer, or to failing interest in the welfare of the Society; this was certainly not the case; or it might be supposed that his proverbial firmness was drifting into obstinacy. He would, therefore, with the permission of the Council, withdraw his resignation.

Appeal from the Registrar's Decision.

The Secretary placed before the Council a further memorial from Mr. Hardcastle, of Hunslet, accompanied by a certificate from a medical practitioner, who, in reply to a letter from the Secretary, said he fully understood the nature of the declaration, and from inquiries he had made was fully satisfied of the truth of Mr. Hardcastle's representations.

The President thought under these circumstances the Council was bound to instruct the Registrar to put Mr. Hardcastle's name on the register.

Mr. Rimmington said he looked with great suspicion on these applications, and thought they ought to be thoroughly tested. The medical gentleman only said he "believed" Mr. Hardcastle was in business.

Mr. Greenish said he had noticed the word "believed;" it seemed only a matter of opinion.

After some further discussion, Mr. Williams moved, Mr. Woolley seconded, and it was carried by a considerable majority, that Mr. Hardcastle's name be placed on the register.

The Council then went into Committee to consider the circumstances of another case in which an application had been made for registration. In this case the Registrar was advised not to put the name on the register.

Additions to Register.

The Secretary reported that the following persons having satisfied him by proper evidence that they were duly qualified, by being in business before July 31, 1868, he had placed their names on the Register of Chemists and Druggists:—

John Charles Young, Bishop's Waltham.
Charles Stevens Budgett, Pevensey Road, Eastbourne.

Appointment of Examiners for 1880.

England and Wales.

No alteration having been suggested in the constitution of the Boards of Examiners, it was resolved on the motion of Mr. Hills, seconded by Mr. Mackay, that the following pharmaceutical chemists should constitute the Board of Examiners for England and Wales for the ensuing year, subject to the approval of the Privy Council:—Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman, Southall and Taylor.

Scotland.

Mr. Shaw moved and Mr. Atkins seconded and it was carried unanimously that the Examiners for Scotland be also re-appointed, subject to the approval of the Privy Council. The names are as follows:—Messrs. Ainslie, Borland, Gilmour, Kemp, Kinninmont, Noble, Stephenson and Young.

The months for holding the examinations were directed to be the same as during the present year.

Elections.

The following, having passed their respective examinations, and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Cole, Edwin Henry ....Dorking.
Hewlett, James ....Northwich.

Reports of Committees.

Finance.

The report of this Committee was received and adopted, and sundry accounts were ordered to be paid. It was also resolved to purchase £2000 New three per cents.

House.

The report of this Committee recommended that certain repairs to the staircase, skylights, etc., be carried out as per estimate obtained. Also, that the house porter be allowed an addition to his salary to provide sleeping accommodation out of the house, his present bedroom in the basement being considered unhealthy. The Secretary had also been instructed to draw up a memorial to the District Board of Works, asking that wood pavement should be placed in front of the Society's premises in Great Russell Street.

The Council went into committee to consider the report.

On resuming, the report and recommendations were received and adopted.

The Hanbury Memorial Fund.

A letter was read from the Solicitor enclosing the deed of trust of the Hanbury Memorial Fund, duly executed, for deposit in the hands of the Society, and a resolution was unanimously passed thanking Mr. Flux for preparing the said deed free of expense.

Reports of Council Meetings.

Mr. Symes moved according to notice—

"That reporters, other than the one officially employed by the Society, be admitted to the Council room during the ordinary business of the monthly Council meetings."

He said this subject was by no means a new one, and it would probably have been better if it had been in the hands of an old member of Council, but perhaps he had one advantage in bringing it forward, for being a junior member he was able to refer to it from the point of view which he had taken when he had not the honour of being on the Council, and could therefore better represent the views of outside members. He did not wish any of his remarks to be of a vituperative nature, or to blame those who voted against this motion before, because his experience was that all members of the Council were desirous of serving the interests of the trade and of pharmacy to the best of their ability. It was simply a question of what means would be best for that purpose. These opinions had been strengthened the more he had become acquainted with members of Council, and therefore, if there was anything which made him anxious to carry this motion, it was, that others who were outside the Council should participate in a more close acquaintance with their doings and with the feeling he had gained by his membership there. He thought that if the feeling, wishes and views of the Council were better known to the trade generally, there would be much less complaint, because the trade would be better acquainted with the Council, and he believed the Council would be better acquainted with the trade. If this motion were passed to-day, there would not probably be ten members out of the 4000 constituting the Society, or even out of the 10,000 constituting the trade, who would blame the Council for so doing; and, as it legislated for the whole trade, he considered the whole trade had a right to have the fullest information on matters with which it dealt. When this motion was proposed two or three years ago, a large majority felt the proper time had not arrived for carrying it; but opinion had now matured and last year it was only lost by the casting vote of the President. This showed the time was arriving when the Council, in common with all other public bodies, should be fairly and fully reported. In saying this he was not in any way wishing to blame the work of the present reporter. The members of Council could all bear testimony that he did his work well, and if his were a verbatim report, which would perhaps be undesirable, half-a-dozen reporters, if present, could not differently report the proceedings if their accounts were faithful; but as it was necessarily an epitome, several reporters might report the speakers each in a different way, and thus the trade would have a more fair and full representation of what took place. They spoke of the reporter as the "official reporter," which implied to the trade outside that he was acting for the Council, and he could not see why the trade or the body outside should not also be represented. He would not trespass on the time of the Council longer, because the arguments had been very largely thrashed out. He must say, as a member of the Society, he was much disappointed, and he had met with many leading members of the trade who were also much disappointed, in fact there was a general disappointment amongst all who took an interest in the trade throughout the country, when this motion was negatived on the former occasion. It was known that a large number of the trade took, practically, no interest in the Society, but it should be, and was, he believed, the object of the Council to create that interest. The Council desired that the Society should be as comprehensive and broad as possible, and would be only too pleased if every member of the trade could be registered as a member of the Society. One step in that direction would be the passing of this motion, because it would show that the Council was holding out the hand of fellowship to them, that it desired them all to come in and give their numerical strength and assistance to the Society, by doing which they would also elevate the trade. When this subject was first introduced, a considerable anxiety was felt by some as to whether the Council would not be committing itself to something very serious; but the custom of reporting was extending, the reports had grown and become more extensive, and he would ask any gentleman if he would willingly return to the old state of things or if any of the evils had been seen which it was supposed would ensue. His acquaintance with reporters was not extensive, but he had always been treated with the utmost courtesy by them, and he did not anticipate that anyone but gentlemen would be sent there. He had learned to respect the profession and to regard its members as gentlemen, and he was quite sure that if reporters were introduced they might be treated with every confidence, and the reporters being free would give confidence to the whole body. He hoped there would not be a division to-day, but that the Council would be unanimous in deciding that the time had arrived when it would have other reporters than the one employed by itself.

Mr. Hampson had much pleasure in seconding the motion. He said it would be difficult for him to add anything to the remarks made by Mr. Symes. It appeared to him that the time had arrived when the Council probably might vote unanimously in favour of this motion. It was easy to understand that people are disposed to remain on the old lines which they had been accustomed to, but the Council could not ignore the social force outside on such a question as that. The Society surely ought to be above suspicion, and whilst the Council reported itself that could not be the case. The fact of having an independent reporter, who had no interest to serve except to give a faithful report to some journal or journals, would remove all feelings of that kind, and he was quite sure it would also benefit the whole body of the Council in the mode in which the work was done, and it would probably get through the work in a more convenient form. There would probably be less desultory conversation, and members would come prepared with their views on the questions to be discussed.

Mr. FRAZER doubted if Mr. Symes and Mr. Hampson's anticipations could be realized with the motion in its present form, and he would suggest that an intermediate course be taken, and that one additional reporter, namely, one representing the *Chemist and Druggist*, should be invited to co-operate with the present reporter. The reason he named that paper was simply that it undoubtedly represented the trade and the trade interests, and in doing so, it represented the interests of the members of Council, for they were all traders, although the *Chemist and Druggist* had occasionally criticized their proceedings in a manner they did not approve. But there was no question that this had been done entirely in good faith, and he did not expect that even if the *Chemist and Druggist* reporter was to appear there, that the reports would in any sense, differ materially from what they now were; but it would remove any ground of suspicion that the reports did not fully represent the Council. He thought the reports hitherto given were eminently satisfactory, and that an additional one given by another journal would not modify that materially. He did not think it was absolutely necessary as a question of principle that this motion should be carried, but as a matter of the highest expediency he thought the proceedings of the Council should be thoroughly open, and that would be sufficiently insured by having one additional reporter.

The PRESIDENT asked if this was an amendment.

Mr. SYMES said he could not accept Mr. Frazer's suggestion. He had well considered that matter.

Mr. FRAZER said in that case he would move as an amendment—

"That in addition to our present reporter, a reporter from the *Chemist and Druggist* be invited to attend the Council Meetings."

Mr. ROBBINS asked if Mr. Symes meant that any reporter who chose to come in, or that any reporter coming in would have to ask permission?

Mr. SYMES said the reporters would have to send in their application. His motion would cover the whole ground, and the Council having passed this resolution would not be able frivolously or lightly to refuse admission, but only on some special grounds. Still, it would have power on special grounds to refuse admission to anyone.

Mr. WILLIAMS thought taking the words of the motion there was no such power. It simply said that reporters other than the one officially employed be admitted.

Mr. HAMPSON asked if the members of Council thought they were likely to have an avalanche.

Mr. HILLS said he would second the amendment.

The VICE-PRESIDENT said it would be easy to limit the resolution if it were passed. He was not quite so sanguine about it being so unanimously voted, for there might be in the minds of some an opinion that no other reporters should be introduced, and it would be almost better that that point should be decided first. He did not see, therefore, that Mr. Frazer's amendment was quite in order.

The PRESIDENT thought it would be more regular to ut Mr. Frazer's amendment in the ordinary way.

Mr. GOSTLING said he had another suggestion to make, which perhaps would meet the case. He was in favour of the meetings being fully reported. He quite felt, as Mr. Symes had said, that the reports had been most excellent, most faithful, and most true; but it was very disagreeable to hear the remarks which were sometimes heard in the country,—persons calling attention to infringements of the Pharmacy Act, and expressing surprise that the Council was so indifferent to the interests of the trade upon this matter. It was also disagreeable to see in print the ungenerous and unjust remarks which were sometimes seen, and it appeared to him that if the public were in possession of the facts with regard to the attention given by the members of the Council to the work devolving upon the Committees, and also round that table, and the care and anxiety which were given to the proper fulfillment of their duties, they would hear less of those complaints. He therefore would propose that the Council should resolve that it was prepared favourably to consider any application for the admission of independent reporters.

The PRESIDENT said the Council must take one amendment at a time.

Mr. SAVAGE said his object in rising was to support in a large measure, as he had hitherto, that there should be a reporter or reporters; but he was going to suggest that the present motion should only extend to one year, so that there should be no difficulty in the event of its being found inconvenient, or anything arising to justify the Council in changing its opinion at the expiration of a year, in returning to the old system, as it would be then known that the period for which the extra reporters had been elected had then terminated, and there would be no offence committed by not re-electing them. At the same time he had no fear of its being permanent when once adopted; still some gentlemen did object to it, and feared something serious would occur. There was also a feeling outside the Council that the reports of its proceedings were garbled by reason of having only its own reporter. The members of Council knew that such was not the case, and if there were half-a-dozen reporters they could scarcely report better than was already done, except perhaps a little more fully, but it would remove a suspicion which at present existed in the minds of those who did not know the facts. If there were any matter of importance to be brought forward any gentleman who came there, seeing the notice of Committee stuck up, would respect it in the same way as now, and any proceedings which it was not desirable to be brought forward in public might be discussed in Committee, and the Council would not have, as it did frequently, to go over the ground again which had been already gone over by the Committee.

Mr. MACKAY did not agree with Mr. Symes that the time had arrived when other reporters should be admitted, nor even that the amendment should be carried. He certainly, of the two, looked upon the motion of Mr. Symes as being by far the more objectionable, because to put it as he had done, as he said, after full consideration, that reporters of any kind or description and in any number should be admitted would be a thing he thought the Council could scarcely agree to. On the other hand the proposal of Mr. Frazer was not so objectionable, because the members of Council knew the *Chemist and Druggist* found its way into the hands of an immense number of the trade. At the same time, he failed to see the necessity of even a reporter from that journal coming in, and for this reason—the Council meetings took place early in the month, and what to his mind was a fair report of the proceedings was given, although as he had always argued not quite so full a report as might be given, in the Society's own Journal. The *Chemist and Druggist* was published about the middle of the month, and he could not see that it was placed at any great disadvantage, inasmuch, as it had in its hands, ten days or so before hand, the proceedings of the Council. But he rose more to argue that the Council had been hitherto a little remiss in not giving effect to what he had more than once suggested, and which he held more strongly than ever, that it should admit the Editor of the Journal. He should be very much pleased to see some such plan as that tried, that the Editor of the Journal be admitted to the Council room during the ordinary business of the Council meetings. He knew that outside many remarks had been made regarding the reporting of the proceedings; sometimes brevity had been named as a fault, and sometimes it had been stated that they had not been as correctly reported as they might have been. When the Editor had been applied to, his reply had been that he had nothing to do with what went on in the Council room, that he only printed the report furnished to him. Now if he were present in the room the report might be more extended, or he would be in a position to answer some of these complaints. He did not know what effect these two motions might have, but he was exceedingly anxious that the Council should admit the Editor to a seat at the reporter's table.

Mr. Richardson had great pleasure, as a young member of the Council, in supporting Mr. Symes's motion. He might say in the first place how astonished he was at his friend Mr. Mackay, coming from liberal Scotland, not supporting it also.

Mr. Symes here said that he was desirous of adding a rider to his motion, namely—

"That the Council retain power to consider each application for admission on its merits."

Mr. Richardson said he entirely concurred in that condition. The members of Council ought in justice to themselves to have some discretionary power as to the expulsion of reporters if they in any way exceeded their legitimate duty, for they were not now an exclusive body as they were before the passing of the Pharmacy Act, but were legislators for the whole trade. As had been said, the Journal only circulated to 4000 members and associates of the Society; but there were 10,000 chemists and druggists, 6000 of whom, therefore, were not supposed to have a proper knowledge of the actions of the Council, and they ought to be considered. The only way to do that was by the introduction of independent reporters. Having watched the proceedings at the Council, he was much disposed to think that it would facilitate the progress of business if independent reporters were admitted. He might be thought, perhaps, impertinent in saying so, but he did seriously think that a great deal of time was wasted in the Council by work which was really Committee work, and which there was no necessity for dealing with there at all. He maintained that if there were some method of independent reporting those desultory conversations would not occur, and the Council would have a much more progressive mode of conducting business. There was a very great deal of complaint, and those who, like himself, lived in the country, were constantly hearing it. He did not wish to say one word against the Council's reporter, for he had sufficient knowledge of him to see that his sagacity was irreproachable, but if there were a method of open reporting it would take the sting out of a great deal which was now said about the Council, not only by the *Chemist and Druggist*, which was a very excellent journal, but also by those constituents whom the Council was supposed to represent. The *Chemist and Druggist* had been mentioned, but he should not confine himself to that journal. If the *Times* wished to send a reporter there the Council had no right to refuse him admission. It must be remembered that the Council was legislating for the public as well as in the interests of chemists and druggists. It was not an executive body, which was supposed to be legislating for the benefit of chemists and druggists solely, but it also represented the public, and he should be the first to send in his resignation if he thought he did not fulfil his duty to the public as well as to chemists and druggists. He should therefore support Mr. Symes's motion rather than the amendment. He remembered a letter written by Mr. Joseph Ince, who some years ago prognosticated that if the *Chemist and Druggist* did not follow a certain line it would become a matter of history and would be used for lining boxes; but he had watched the progress of that paper, and it had become a very great power in the pharmacy of the country. It had a large circulation and was read very extensively. Mr. Mackay complained that it was only published monthly.

Mr. Mackay said he did not complain at all; he only stated it as a fact.

Mr. Richardson said a very few years ago the *Pharmaceutical Journal* was only published monthly, and possibly when the *Chemist and Druggist* was admitted to report the meetings of the Council it also would become a weekly publication. One other reason why he wished independent reporters to be admitted was that the members of Council might be able to answer the continuous complaints addressed to them by private letters. Since he made a little speech at the last meeting, complaining that the Registrar did not exercise sufficient vigilance in testing applicants to be placed on the register, he had had no less than twenty letters making similar complaints. If the meetings of Council were open the sting might at once be taken out of all these complaints. It was impossible for him to answer twenty letters to twenty gentlemen every month, but if the reporting were thrown open to any papers representing the pharmaceutical body, and to the public prints if they liked to come, it would give very great satisfaction to the trade and especially to those whom he represented.

Mr. Mackay asked if Mr. Richardson meant to convey that if the *Chemist and Druggist* reporter were admitted that publication would change from a monthly to a weekly one?

Mr. Richardson replied that he did not say that at all. He said that perhaps it might be the case.

The Secretary asked Mr. Richardson if he would give him the letters of the gentlemen who had complained, and he would guarantee to satisfy both the Council and those gentlemen that there had been no want of vigilance on his part.

Mr. Williams said if there were twenty reporters present, he did not see how it would affect such a question as this.

Mr. Richardson said he did not come there to be catechized by the Secretary. In no other deliberative assembly did he ever hear of one of the staff being permitted to speak, unless he were asked a question. Those letters were written to him in confidence, and he should certainly not give them up to the Secretary.

Mr. Woolley had much pleasure in supporting the motion with the addition which had been made to it. He had not intended to say anything, thinking it would probably be carried more unanimously than now seemed likely, but for one or two expressions which had fallen from Mr. Gostling and Mr. Mackay. Mr. Gostling had said that the reports were most faithful, most true and most correct, and Mr. Mackay said they were generally very fair. Now he knew one instance where he thought he had very good grounds for complaint and he gave this as an instance to show why it would be better to have other reporters present. He was not complaining of the reporter, who he believed did his work most properly; but at the August meeting, if he recollected rightly, the Council agreed to raise the salary of the Editor and Sub-Editor, the Editor's by £100 and the Sub-Editor's by £50. That piece of business was not reported, and in September he drew attention to it and was most careful in giving the figures, which he had given again now in the hope that they might get into the Journal. He had very good reason to believe that the reporter took due note of those figures both in August and September, but by some mysterious process which he did not understand, and he did not know who was to blame for it, notwithstanding his efforts to get the figures published in the Journal they were left out. He thought ordinary constitutional procedure ought to have dictated to whoever had these reports before him the propriety of making such an expenditure of money as that public to the body which found these funds. That was an illustration of the advantage which would accrue from having an independent reporter present.

Mr. Hills had only one word to say on the subject. Mr. Symes said that other institutions had reporters; but he (Mr. Hills) believed that neither the College of Physicians, nor the College of Surgeons, nor the Society of Apothecaries, ever published reports. All these were qualified gentlemen, and chemists and druggists also were qualified, their qualifications being decided by examination. It was not as if theirs was an open trade. At any trade meeting of the members of these institutions, or at a vestry, reporters might be desirable With regard to the *Chemist and Druggist*, it was a well known paper, which represented chemists and druggists, and therefore stood on a different footing, but he was not prepared to say that this should be the only exception. He should be quite ready to admit any other reporter when he made good his claim.

Mr. Shaw said that on several former occasions when this matter had been before the Council he had voted for additional reporters, and he might remind Mr. Symes that the matter was first brought forward about ten years ago, when it was said to be utterly inpracticable. If his memory served him correctly, at the second meeting he had the honour of attending as a member of Council, the subject was brought forward by Mr. Reynolds, his motion being to the effect that other reporters be admitted, and remain at the continued pleasure of the Council. So far it coincided with Mr. Symes's motion as now amended. Last year, the matter was brought forward by Mr. Hampson, when he moved that an invitation be given to the editor of the *Chemist and Druggist* to send a reporter, and it struck him that it would be very desirable that this should be done. This was what Mr. Frazer's amendment amounted to. There were only two journals which represented pharmaceutical interests, the Society's own Journal, and the *Chemist and Druggist*, and therefore he should like to see an invitation given to the latter to send a reporter. He was quite certain the editor of that paper would not use the information he gained there to the disadvantage of the trade, or members of the Council, for whatever was detrimental to them would certainly be detrimental to that paper. There could be no objection to the present reporter being supplemented by another. For his own part he was thoroughly satisfied with the manner in which the reports were given; in fact, he was astonished at the marvellous accuracy with which they were rendered. At the same time, mistakes occasionally would occur, and he remembered on one occasion, Mr. Woolley making restitution of some speech attributed to him, which had been delivered by someone else. He thought it would be a relief to the present reporter to have another one present, and it would do away with a large amount of feeling throughout the country.

Mr. Atkins said last year he had the pleasure of seconding the motion of Mr. Hampson that a reporter from the *Chemist and Druggist* be permitted to attend the meetings, and he would not detain the Council with the reasons he then gave, but he believed it would be better to pass the wider resolution, because of necessity the greater included the lesser, but the converse did not hold good. There was no doubt that in all these debates what the members of Council had present in their minds was the fact of the reporter of the *Chemist and Druggist* being admitted; they did not anticipate there would be any applications from any other sources whatever, although he should not be at all alarmed at an application from the *Times* if there were any matter coming forward of public interest. He had no complaints to make with respect to the reports in the Journal. He would not stop to repeat the well-earned compliments that had passed round the table on this matter, but, he believed, as a matter of expediency it was very desirable that this motion should be carried. It was deeply to be regretted that there was a considerable amount of estrangement, most undeserved, on the part of some of their constituents towards the Council, and, he believed, the wider the representation was made, and the more broadly the debates were printed and circulated, the healthier it would be, and the more united they would be as a body. With regard to the *Chemist and Druggist* he could speak most impartially, and he believed if the tone of that journal were altered, as he thought it might be and hoped it would be, towards the deliberations of the Council it would very largely affect their constituents outside. A large section of them read that paper, and did not read their own Journal, and if the tone of the *Chemist and Druggist* towards the deliberations of the Council were a little more considerate and impartial it would have a very good effect, not so much on that paper itself as on their constituents at large, and it would be a splendid day for them as a body when they had not, as they now had, a divided camp. He longed for the day when there should be a more thorough appreciation of the work done at the Council Board, and he knew no better means of accomplishing this than that the organ which confessedly took a somewhat antagonistic position towards the members of Council should be brought more thoroughly into accord with them. He would remind Mr. Hills that the nearest analogy he knew of to that Council was the town councils, which were representative bodies, and also to a certain extent executive bodies, and in many respects were parallel in their action to that Council. In their case it was the right of every newspaper to send a representative. Of course they had the power in the case of any private matter coming forward to ask them either not to notice it, or to leave the room, and at present he was not conscious of any reason why the same could not be done in that room.

Mr. Frazer asked if he might be allowed to dissent from the statement made by Mr. Atkins that the *Chemist and Druggist* was antagonistic to that Council? Had he thought so he certainly would not have proposed the amendment. He believed it was thoroughly in accord with the Council, although it sometimes criticized it.

Mr. Atkins said that Mr. Frazer had somewhat misconceived him. He simply referred to the general tone of the *Chemist and Druggist*, a paper which he regularly read himself, and he would ask them, was its general tone one of cordial appreciation or not? He believed it might be brought thoroughly into accord with the Council.

Mr. Greenish did not wish to give a silent vote on this occasion, though he had nothing to add to that which he stated two years ago. He then thought the time had arrived when the Council might admit reporters other than its own to that room. He could not help stating, however, that the present reports were marvellously accurate. In fact, very frequently when the proof was sent to him he had not to make the slightest verbal alteration in anything he had said. If this motion passed, however, he hoped that it would not merely be passed for the editor or reporter of the *Chemist and Druggist* to be admitted, but on the broad principle that, on application being made, any reporter would be admitted. Mr. Richardson had stated that he believed a great deal of time was wasted at the Council. It was possible he had been somewhat unfortunate in the meetings other than those of this Council which he had attended and taken part in, but it seemed to him that time was always more or less wasted, and he did hope that at that Council the time was far distant when members would cease to take an interest in and criticize the reports of the various committees which were brought before them. It would be a most unfortunate thing if when a few gentlemen, forming a committee out of twenty-one, presented a report, the others should simply receive it without any criticism whatever. He was not at all an advocate for the reports of committees being pulled to pieces systematically, but he did hope that members would not cease to take an interest in these matters which were brought before them.

Mr. Bottle said he proposed to give his vote differently to the way he did last year. He then voted in great measure on personal grounds, and that question had again been mooted as to whether the *Chemist and Druggist* commented fairly on the proceedings of the Council. At any rate, he had noted during the past year that there was a manifest improvement in the tone of that paper towards the Council and the Society, and, as showing his appreciation of that, he intended to vote in favour of admitting the reporter of the *Chemist and Druggist*. On the other hand, he should oppose the wider scheme of Mr. Symes's motion, more especially so as it would open the way for what Mr. Richardson said he should like to see, the reporter of the *Times* being there.

Mr. Richardson said he did not say that. He said that if that reporter applied they had no right to refuse him admission.

Mr. Bottle said that to pass such a general resolution was a serious matter, especially considering the limited space at command. If the reporter of the *Times* had a right to admission the Council could not refuse the reporter of any other morning papers or of even the *Figaro* or *Funny Folks*. The accommodation was not sufficient to allow of asking all, and it could not admit one and refuse another; but the *Chemist and Druggist* was a publication which was known to be increasing in circulation among the members and the trade generally, and he would ask the Council, certainly as a first step, to restrict admission to one other reporter, rather than to open the door wide and have to admit any gentleman who might make application.

Mr. Williams said he had hitherto felt it his duty to oppose this motion, and he was sorry to say that notwithstanding all he had heard, he must still hold that opinion. It was not that he in any way wished to restrict reporting; on the contrary he should be very glad to see, if possible, the meetings more fully reported than they were now. But he thought that should be done by an arrangement quite different to that of having extra reporters. He did not see how extra reporters could give the result they were all desiring, viz., increased reports; on the contrary there was no doubt when other reporters were present the Council would have to arrange that a great deal of business should be done not in the presence of reporters at all, and it would be going in the opposite direction to that which was desired. He believed great practical inconvenience would result. As he had said before, he should like to see the reporting done on the principle of taking down all that took place in committee or otherwise, and that then the report should, before publication, be submitted to a committee or some one who should have the power of striking out only portions which would be obviously improper for publication. In that way there would be obtained a full and nearly perfect report of the proceedings of the Council. He need not say that the introduction of a second or non-official reporter to the Council room would stand in the way of any such process as that, and also that it would be very difficult indeed at any future time for the Council to go back from the step it was now proposed to take. If it once passed this resolution it would entail a great deal of odium to attempt to go back from it. He really thought if the Council looked at the question from the proper point of view it would be seen that to accomplish the end the members all desired, namely, fuller and more consistent reports of their own proceedings, so that members in the country and elsewhere might really have a knowledge of all that was doing, as far as practicable, there might be devised a better mode of arriving at it than by having an independent reporter who would be merely present when a debate like the present was going forward, but who would not be able to give the constituents any account of the more private or more important business which might often be of the greatest interest, and might be published without detriment. Under these circumstances he should vote against both the amendment and the motion.

The Vice-President wished to point out a very essential difference in the wording of the motion as it stood, and in the style of language adopted by the mover of the amendment. In the one case something like a broad principle was asserted, in support of which broad principles could be urged; in the other case the attendance of a reporter of a particular journal was invited. He scarcely thought the amendment could be carried, inasmuch as by a strange coincidence, due to the introduction of such an amendment on such a motion, both those who opposed Mr. Symes's motion and many who approved of it would vote against this amendment. On the other hand, if the Council adopted the amendment it would do away with the motion, whilst at the same time it would alter the present arrangements with regard to reporting. He did not see, therefore, any chance of the amendment being carried. With regard to the original motion he should like to say that, for his own part, he thought it should be carried upon the broad principle that the members of the Council were the administrators of an Act of Parliament, in which the whole public were interested equally with themselves, and that all such proceedings ought to be conducted in such a way that the outside public could, if it liked, approach and see what they were doing. If it were carried the chances were there would be no other applications than from the one journal named in Mr. Frazer's amendment, so that practically, in all probability, the result of carrying the resolution would be merely to admit the reporter of the *Chemist and Druggist*, if the editor chose to apply. But the principle should be either that the proceedings should be private or that they should be public and open to any inspection from the outside public which the public chose to require, and this was the view he took, seeing that they were administrators of an Act of Parliament. One more argument he should like to use was, that the Council would better consult its own dignity in adopting this abstract motion than by sending an invitation to the editor of any particular paper. He was not quite certain of the relation in which the members of the Council stood to their present reporter, but he believed they had no asked the Editor of the *Pharmaceutical Journal* to send a reporter, and if so it would be a strange thing to invite the editor of the *Chemist and Druggist* to do so. Be that as it may, he thought the Council would be best consulting its own dignity, and at the same time better consulting the public interests committed to its charge if it left the matter perfectly open, reserving only the right of imposing such limitations on the action of the reporters as it was supposed to do at present. There were certain simple regulations which they would be required to adhere to, and if forty were present, supposing there were room for them, he did not think any harm would be done, while at the same time the Council would be disabusing the public mind of any notion that it was acting unfairly.

Mr. Symes said he would not reply at any length to the observations which had been made, several of which had been ably answered by Mr. Schacht. The editor of the *Chemist and Druggist* was exactly in this position at the present moment. His journal was very largely read by a number of persons who never read the *Pharmaceutical Journal*, and whether it were published at the beginning of the month, or in the middle, was of little importance. It was read by a large number of persons, and the editor was in this invidious position that he had either to copy the report of the *Pharmaceutical Journal*, or to make an epitome of it. He might say that he thought some of the remarks made were rather unjust to that editor, inasmuch as he was placed in this very awkward position. The

Council did not allow him to know anything of the proceedings, except what he gained from the official report. It was not likely that an editor placed in that position would simply copy the report; he made certain inferences and deductions of his own which seemed to some of them ridiculous and perverted, but which were really the natural deductions of any person outside the Council. Anyone else drawing deductions would probably draw deductions quite as full of error as any in the *Chemist and Druggist*. He did not wish to say a word against their own Journal or the *Chemist and Druggist*, but some gentlemen had complained that other reporters being there would merely furnish the editor of the *Chemist and Druggist* with further means of enlarging his reports, but the fact was if his reporter were present the Council could pin him to his own report, and there would be no necessity for deductions. In answer to Mr. Hills, he would say that the Medical Council admitted reporters, and that was the body which practically corresponded to the Pharmaceutical Council, as representing the medical profession. The Colleges of Physicians and Surgeons were private bodies, but the legislative body was the Medical Council. Mr. Bottle had some anxiety as to the room, and he could quite understand his anxiety that the room should not be over-crowded, but the Council could refuse admission to any reporter on any plausible ground, and if ever so eligible a man applied for admission and there was not room, he could be told so, and there was nothing in the motion to prevent that. As had been said, the broader motion was far more dignified, and as the greater included the less, it would be perfectly eligible to anyone to oppose any other reporter being present except the one from the *Chemist and Druggist*, but the question of broad principle was most important. Mr. Williams, he thought, had been a little inconsistent, because he proposed that a committee should be formed which should have the power, not of adding anything, but only of striking out anything which it might think objectionable. Yet the first thing Mr. Williams did that morning was to ask to have something added to the minutes, whereas such a committee as he proposed would be utterly powerless to put in anything that was omitted or to set anything right. He was quite convinced that no ill result would follow from the adoption of his motion, and that if he had the honour of being on the Council three or four years hence when it had been tried he should be able to stand forward and ask if the adoption had not served both the interests of the Council and those of the outside public, in whom it was interested.

The amendment was then put with the following result:—

For—Messrs. Bottle, Frazer, Hills and Shaw.

Against—Messrs. Atkins, Gostling, Greenish, Hampson, Richardson, Rimmington, Robbins, Savage, Schacht, Symes, Williams and Woolley.

The amendment was therefore lost.

The President and Mr. Mackay did not vote.

The motion with the words subsequently added by Mr. Symes was then put with the following result:—

For—Messrs. Atkins, Frazer, Gostling, Greenish, Hampson, Richardson, Rimmington, Robbins, Savage, Schacht, Shaw, Symes and Woolley.

Against—Mr. Williams.

The motion was therefore carried.

The President, Messrs. Bottle, Hills and Mackay did not vote.

Reports of Committees.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to a registered chemist and druggist, aged 68, who had a similar grant in January last.

£15 to a registered chemist and druggist, aged 73, formerly in business, who has had three previous grants.

£10 to the widow of a registered chemist and druggist, who has had one former grant.

£5 to a registered chemist and druggist, aged 70, who had a grant of £10 in May last.

One or two other cases were deferred for further inquiries, and one application was refused.

The report and recommendations were received and adopted.

Mr. Shaw asked if there would be any objection to publishing the balance sheet of the Benevolent Fund in the calendar.

The Secretary explained why he did not think it advisable to do so, his explanation being given in committee.

Personal Explanation.

Mr. Richardson said he understood that some remarks he had made earlier in the day were understood to cast some reflection on the Secretary and Registrar and he wished in the most complete manner to withdraw anything he might have said which was offensive to his friend Mr. Bremridge, or in any way personal to him. He knew that the Secretary exercised the greatest caution with regard to any applications made to him, and what he wished to convey was that if the reports were more open it would remove misapprehensions which existed and tend to lessen the labour of the Registrar.

LIBRARY, MUSEUM AND LABORATORY.

This report included the Librarian's usual report as to attendance in the Library during October as follows:—Total: day, 489; evening 298; average per day, 18; evening 13. Circulation of books town, 213; country 79; carriage paid £1 6*s*. 8*d*.

The following donations to the Library had been received and the Committee had recommended that the usual letter of thanks be sent to the respective donors:—

Dentists Register, 1879.
From the General Medical Council.

Dragendorff (G.), Über die Beziehungen zwischen chemischen Bestandtheilen und botanischen Eigenthumlichkeiten der Pflanzen, 1879.

Kühn (P.), Ein Beitrag zur Biologie der Bacterien, 1879. From Professor Dragendorff.

Royal College of Surgeons of England, Calendar, 1879. From the College.

Royal Medical and Chirurgical Society of London, Catalogue of the Library, 1879, 3 v.
From the Society.

St. Thomas's Hospital, Reports, 1879, n.s., v. 9.
From the Hospital.

Thibaut (P.), Art of Chymistry, 1668.
From Mr. W. Herbert Hyatt.

Tommasi (Dr. Donato).
Sur la Non-existence de l'Hydrogène naissant, 5e partie, Réduction du Perchlorate de Potasse, 1879.
Ricerche sulle Formole di Costituzione dei Composti Ferrici, parte 1, Idrati Ferrici, 1879.
From the Author.

Valentin (W. G.), Twenty Lessons in Inorganic Chemistry, 1879.
From Messrs. W. Collins, Sons and Co.

The Committee had recommended the purchase of the following books for the Library:—

Foster (M.), Text-book of Physiology, 8th ed., 1879.
Godman (F. D.) and O. Salvin, Biologia Centrali-Americana: Botanical portion by W. B. Hemsley; about 20 parts, with 120 pl.
Guy (W. A.) and D. Ferrier, Forensic Medicine, 4th ed., 1875.
Lunan (J.), Hortus Jamaicensis, 1814.
Masters (M. T.), Vegetable Teratology, 1861.
Noad (H. M.), Student's Text-book of Electricity, new ed. by W. H. Preece, 1879.
Pharmaceutisches Repertorium, half-yearly.
Practitioner, monthly.

Physicians of Myddvai, translated by J. Pughe and J. Williams ab Ithel, 1861, (Welsh Mss. Society).

Quain (J), Anatomy, by W. Sharpey, A. Thomson and E. A. Schäfer, 8th ed., 1878.

Spon (E.), Workshop Receipts.

The Committee had ordered that a reward of £5 be offered for information leading to the conviction of any person stealing books from the Library, several being missing.

The Curator had reported that the attendance in the Museum had been:—Morning: average, 15. Evening: average, 3.

The Curator had reported that the following donations to the Museum had been received:—

Specimens of fresh Indian Bael, preserved by sugar. From Messrs. Young and Postans.

Specimens of Quebracho Bark and astringent gum from the same tree.

Specimens of the leaves, flowers, and two sections (one of the stem and the other of the branch of the tree) from which Goa Powder is obtained (*Andira Araroba*, Ag.). From Mr. T. Christy.

The third and final series of plates of Bentley and Trimen's Medical Plants.' From the artist, Mr. D. Blair.

Fourteen specimens of rare and valuable minerals including:—

Two specimens of Vivianite, one in foliated bands, and the other a very transparent crystal.

Ludlamite.

Two specimens of Cronstedtite, one having the new green variety upon it.

Liskeardite.

Tetrahedite.

Tallingite.

Childrenite.

Anabergite.

Limonite.

Blende containing Gallium, Brown Mica, and Lithia Mica.

All the minerals were obtained from Cornish Mines except the Gallium Blende, which came from Cologne.

From Mr. Richard Tallgin of Lostwithiel.

The Committee recommended certain arrangements to be made in the Museum cases to prevent the injury of specimens by dust.

The Professors had attended the Committee and reported on their respective classes.

The report and recommendations of the Committee were received and adopted.

The Council then went into committee to consider some estimates for paper for the Journal which had been submitted to the Committee, and a resolution thereon was agreed to.

GENERAL PURPOSES.

This report included the usual report from the Solicitor with regard to various matters of business in progress.

The Solicitor had reported that—

E. Speight, Doncaster,

had paid £5, as penalty for breach of the Pharmacy Act, without going to trial.

Daniel Tudor Williams, Aberdare,

had also remitted £5 as penalty.

The Committee also recommended that—

Mr. Greaves, Chesterfield,

be requested to resign his appointment as local secretary, a letter from him with reference to the supply of paregoric without opium for sale by unregistered persons, being, in the opinion of the Committee, entirely at variance with the provisions of the Pharmacy Act.

Several cases of alleged infringement of the Pharmacy Act had been considered, and in some it was recommended that proceedings be commenced.

It had been arranged that the appeal in the case of the Society *v.* London and Provincial Supply Association, should not come on for hearing until Hilary Term, in order that the services of the Attorney-General might be secured.

The Council, as usual, went into committee to consider the various cases referred to. After a long discussion, the report and recommendations were received and adopted.

LOCAL SECRETARY AT PRESTON.

Owing to the decease of Mr. Barnes, the late local secretary at Preston, the Council proceeded to appoint as his successor, Mr. J. L. Barnes.

REPORTING THE COUNCIL PROCEEDINGS.

Mr. ATKINS then moved the following resolution of which he had given notice:—

"That the fact of the Council having resolved itself into committee be reported in the record of the proceedings of Council, and that it be left to the discretion of the President and the Secretary in what manner the announcement be made as to the subject matter discussed in Committee."

He thought very little need be said in support of this motion, as the principle had been already ventilated and generally accepted, the only question being as to the form in which the announcement should be made in the publication of the proceedings. At the previous meeting, Mr. Symes proposed a motion, which was afterwards withdrawn, with the spirit of which he was in entire accord though not in the detail, because, as he understood it, Mr. Symes wished the President at the time to formulate the express manner in which the report should be made, which he thought would be throwing a degree of responsibility on the President, which the Council had scarcely a right to do. He believed Mr. Symes would agree with him in what he now proposed, which was, to simply go on as at present. It might be asked why should he move in the matter, but he thought it would be wise to put on the record of the proceedings a law of this kind for the guidance of officials.

Mr. SYMES seconded the motion. A slight alteration, which Mr. Atkins had made in it since he had first given notice, had been brought about by the altered position in consequence of the resolution passed that morning.

Mr. MACKAY asked if it was understood that the new reporters were to remain and hear what passed when any matter was under consideration in committee, or were they to leave the room.

Mr. GREENISH said he should be prepared to move that the reporters leave the room while the Council was in committee.

Mr. MACKAY asked if that were so, was this proposed summary to be made out by the President and Secretary, and a copy handed to each reporter.

Mr. SYMES said it was to be handed to the reporters.

Mr. MACKAY said he understood that reporters, other than their own, should leave the room; that their own report should be noted by their own reporter and handed to the President and Secretary, who should make a condensed report of it, and hand it to the reporters of other journals.

Mr. ATKINS said that was not in his motion at all. If he were asked his opinion with regard to reporters he should differ from Mr. Greenish. He thought it would be impracticable to ask gentlemen to leave the room whenever the Council went into committee, or else they would be trotting in and out all the time.

Mr. WILLIAMS said he should decline to discuss matters of serious importance before strangers.

Mr. ATKINS did not see how the Council could draw any invidious distinctions between its own reporter and others. This was a very important question, but it was not part of the motion at all. It would no doubt require serious consideration how reporting should be dealt with in future, but it was no part of his motion.

Mr. Mackay did not see how the Council could pass this motion until it had cleared the ground by settling the point he had raised. This was one of the most important things that had to be dealt with, and if, as Mr. Atkins suggested, the new reporters were to be allowed to sit and listen to all that took place in committee the tongues of many members would be tied. He looked upon it as an unsafe thing to let other parties listen to a discussion connected with names and other matters which occasionally cropped up. It was quite true that if the Council found an improper use was made of what passed in committee it could pass a vote of censure afterwards, but that would involve great unpleasantness.

Mr. Richardson approved of what Mr. Mackay said, and thought before the Council accepted a motion like this a committee should be appointed to go into the whole matter, and present a report to the Council. He thought a great deal of time might be saved, and a good deal of information given by the Committees' reports being presented in such a form that they could be printed in the Journal, and that that report should be presented by the Chairman of the Committee and explained. If the system were followed it would never be required to go into committee of the whole Council, all the private work might be done in committee, and the Council would be able openly to discuss all that came before it.

Mr. Savage moved that the further consideration of this matter be postponed, because the very essence of the thing was the mode in which it was to be used.

Mr. Shaw seconded the amendment. He thought it would give rise to very great difficulty if reporters were to leave the room whenever the Council went into committee, but if that were not done there would be a great difficulty in carrying out the arrangements.

Mr. Atkins said it was not the custom in council rooms for reporters to be called upon to withdraw. He could give an instance in which a gentlemen who recently served the office of mayor made a statement affecting the character of another person which he asked the reporters not to take notice of. A question was afterwards referred to counsel whether any action could be taken upon it, and his opinion was it could not. He fully agreed that this was an important matter, and if it was felt that the whole question of reporting deserved consideration, he had no objection to letting it go back to the proper Committee, and he would therefore withdraw his motion.

The British Pharmacopœia.

Mr. Hampson then moved the following motion, of which he had given notice:—

> "That the General Medical Council be asked to receive a deputation to respectfully urge upon them the desirability of the Pharmaceutical Council being legally empowered to nominate pharmacists to cooperate with the General Medical Council in framing and amending future editions of the British Pharmacopœia; and also to endeavour to obtain their concurrence and friendly interest in this object."

He said that in July, 1874, the Council passed a resolution to the effect that it respectfully urged upon the General Medical Council the desirability of associating more practical pharmacists with any committee which might be appointed for the purpose of preparing any future editions of the British Pharmacopœia. A copy of that resolution was sent to the Medical Council at the time, and no doubt it was received, but he believed there had been no acknowledgment of it. Pharmacopœias were originally framed by the Colleges of Physicians of England and of Scotland and Ireland, the first English Pharmacopœia being in 1618 and the last in 1851, there being ten in all. Afterwards the responsibility of framing the Pharmacopœia was conferred upon the General Medical Council in 1858 and re-affirmed in 1862, and there were two editions of the British Pharmacopœia, in 1864 and 1867, and the appendix of 1874. He should like here to bear testimony to the great services rendered to the Society by Professor Redwood. The Pharmacopœia of 1874 was no doubt a great improvement on all preceding ones, and it was a great boon that there was only one, the British. But he would call attention to the great authority which this Pharmacopœia proceeding from the Medical Council possessed. The first edition contained a warning to all apothecaries and chemists that on its publication it was necessary to destroy all preparations not made according to its provisions, which of course was a very proper warning; but it was a serious thing that the Medical Council had this unlimited power entirely in its hands. It might alter or expunge a formula, and pharmacists generally had no voice at all in the matter. No doubt the Medical Council had called to its aid Professor Redwood and another practical pharmacist, for it was impossible for its members to give the special attention to that important work which it required. But the position of Professor Redwood and the other gentleman was simply that of assistants to some sub-committee. They had no recognized status. This acknowledged necessity of getting extraneous aid showed that it was really the function of pharmacists to frame the national Pharmacopœia. The book thus framed was accepted as a standard in courts of law and by public analysts, and there was sufficient experience to show that pharmacists were absolutely at the mercy of those standards and were compelled to conform to them, notwithstanding they were not consulted as to their accuracy or suitability, and by their own Act of Parliament also they were subject to penalties if they did not conform to it. Therefore, however impossible the formulæ might be, or imperfect the standards, they were liable to a penalty if they did not conform thereto He did not object to fair restrictions, but he did object to the Pharmaceutical Society being so utterly ignored in the fixing of these standards. There was an old axiom in politics that taxation without representation was tyranny, and he should say that being subject to penalties without representation was injustice. The Pharmaceutical Society was entitled to an equal legal status in framing the national Pharmacopœia with the Medical Council; it had fairly earned that position and recognition on the part of their medical friends. As a voluntary society, it had done much for the furtherance of pharmacy; it had educated many good men who had shone in their ranks of pharmacy and in higher ranks still. It possessed a school and library which was more like the fountain head of pharmacy than any other centre could be, and it had the privilege of examining men who wished to enter the trade. In the culinary art, professed cooks were supposed to be the best authority in preparing a cookery book, and in like manner it was not unnatural to claim the professional services of those whose education and daily occupation fitted them to frame, conjointly with the physician, such an important national work as the national Pharmacopœia. In no other civilized country did pharmacists occupy such an unenviable and undignified position. They were, as it were, ignored, not in an offensive way, but simply because their position was unrecognized. Years ago the Apothecaries' Society and the College of Physicians had the professional knowledge to frame the national Pharmacopœia; but circumstances had now altered, and the Pharmaceutical Society was really now the faculty of pharmacy. It was necessary, he thought, to assert its equitable claim in such a manner as not to give offence to the medical profession in order to receive that fair recognition which was its due. There was no desire to trench in any way on medical grounds. Pharmacists did not want to interfere with doses or therapeutics, but simply to have an equal share in framing that portion of the Pharmacopœia which referred to chemistry, materia medica and pharmacy proper; to be able to do that particular class of work which fell legitimately to their hands.

And he hoped when the Medical Council received the intimation of their desire to confer with them in a friendly manner upon this important subject it would meet them in the same spirit.

The VICE-PRESIDENT had much pleasure in seconding the motion. He was glad Mr. Hampson had framed his arguments mainly on the idea that pharmacy constituted an essential portion of the medical art, because it enabled him with complete cordiality to endorse the views that had been expressed. He had so fully expressed himself upon that subject lately that it was not necessary to trouble the Council with any further remarks upon it, for he thought it was the great argument with which this representative body, the Medical Council, should be approached. He felt sure that all those who in the least degree felt, as he did, that an injustice was done them by the general body of medical practitioners in the non-recognition of the great advance which they had made in the cultivation of their own body and also in the furtherance of the great cause of scientific pharmacy, would hesitate to find a way out of the difficulty, unless it were by some such process as this, which would gain a recognition of themselves at the hands of the Medical Council. If this were once done it would be a recognition of their work in connection with the medical art so clear and plain that all the rest would follow easily enough. Every argument Mr. Hampson had used on the score of justice to pharmacists, who had to obey certain instructions given to them, without the power to say a word as to what was right or wrong in the matter, was unassailable, and he should further like to say that he thought the terms in which he had worded the motion were singularly fortunate. They approached the Medical Council with great respect, and asked to have a hearing, and until he knew the result of such an application he should not like to say a word as to any ulterior course of action. But it would be well for the Council to keep in mind that what it was asking for was a right thing, and if this corporation did not feel inclined to regard the application with full consideration there was a Sovereign on the throne who had the power of appointing a large portion of the Medical Council, to whom an appeal might most properly and fairly be made.

Mr. WILLIAMS sympathized entirely with the position taken up by Mr. Hampson with regard to the necessity and policy of pharmacists generally being permitted to take a part in the formation of the new Pharmacopœia; but he would suggest that he should alter the wording of the motion, and leave out the last clause. Before arguing the question the members of Council should bear in mind their true position. Mr. Hampson had already spoken of the services rendered by Professor Redwood to the Society, but that idea was just what they should guard themselves against. His services were not rendered to the Society, but to the Medical Council. The Act of Parliament under which the Pharmacopœia was framed entrusted to the Medical Council the office and responsibility of framing it, and it had done so, employing certain gentlemen of eminence to assist. What was really wanted was to ask the Medical Council to permit a committee or deputation of pharmacists to be engaged, and employed in assisting it in producing this work. Mr. Hampson might have strengthened his case by pointing out some discrepancies and inconsistencies in the Pharmacopœia as it at present stood. He was in error in supposing that they were responsible for any mistakes that appear in it. At the same time it was a matter of some delicacy to approach the Medical Council, because when the Council did so on a former occasion its request to be permitted to take a part in this matter did not even receive an answer. He feared it must be considered that the medical authorities who had the ordering of this matter did not look with great favour on the legitimate wish of pharmacists to be taken into consultation. It was a pity it should be so, and if by deputation that feeling could be removed it would be most desirable; but it must be still remembered that in approaching the medical body pharmacists must not do so with loss of dignity to themselves, and it would require great care in moving in the matter.

Mr. MACKAY thought there was but one feeling amongst true pharmacists, namely, that they should take a part in framing any future Pharmacopœia. But, having that feeling strongly himself, he felt he could not vote for the motion now brought forward. Going back to the publication in 1864, when the different pharmacopœias were all united in one, there were two pharmacists appointed in Edinburgh to confer with the Committee appointed there, and it must have been a source of satisfaction to them all to know that Professor Redwood did such eminent service with regard to the various formulæ which appear in the present Pharmacopœia. As Mr. Williams said it was a matter of great delicacy to approach the General Medical Council with any such request. The motion suggested the desirability of the Pharmaceutical Council being legally empowered to nominate pharmacists to co-operate; but he did not know how that legal empowerment could be obtained. Did it point to a special Act of Parliament? His great fear was that if the Council went forward with any such request it would be pooh-poohed. It was quite true it might take ulterior measures, but he would suggest a pause for a time. It might be that a new Pharmacopœia would be proposed in a year or two, and then it might be possible to approach the Medical Council, or at all events to take some such steps as would be the means of attaining their object in a much better way than the one pointed out in this motion.

Mr. GREENISH said he should very cordially vote for the motion. It seemed a remarkable thing that in 1879 the pharmacists of Great Britain should be asking to be allowed to take part in the formation of a national Pharmacopœia. When he was on the Continent, attending the International Congress, and mentioned that pharmacists in Great Britain had no voice whatever in the preparation of the Pharmacopœia, his statement was received with the greatest astonishment, that men who were considered by their brethren abroad, to occupy so high a position had really no voice in such a matter. It seemed only right when medical men attended to therapeutics that pharmacists should have a voice in pharmacy. It was only reason and common sense. He had spoken to some members of the Medical Council on the subject, who said the request was quite reasonable and they should be prepared to support it, but there were others who were opposed to it. He, therefore, thought the Council should press the matter on. In Holland, Belgium, Germany, Austria and Russia pharmacists took part in the preparation of the Pharmacopœia, and he hoped the Council would not hesitate to take the necessary and proper steps to advance their claims in this matter.

Mr. HILLS thought it premature to move in the matter at the present time. He had not heard that there was to be a new edition of the Pharmacopœia or another appendix, and he would much rather wait until something had been decided, and then respectfully write and place their services at the disposal of the Medical Council.

The VICE-PRESIDENT, referring to the Act of Parliament under which the Medical Council was constituted, pointed out that it consisted of one person chosen from time to time from various medical bodies and universities, and six persons nominated by Her Majesty with the advice of the Privy Council. They were not all necessarily therefore medical men.

Mr. SYMES said in October last he had brought forward the subject of a new Pharmacopœia, and made it pretty clear that if there was not to be a new one soon there ought to be. According to his idea the Pharmacopœia was a work on pharmacy, but it included therapeutics; in other words the ideas to be carried out were those of medical men, but the men to carry them out were essentially pharmacists. If any evidence was wanted as to who were capable of preparing the Pharmacopœia, he had only to refer to the two which had appeared since it had been in the hands of the Medical Council. They all knew the Pharmacopœia of 1864 was a perfect failure. There were no doubt extenuating circumstances, owing to three having to be brought together into one, but the chief cause of failure was that it was almost entirely a medical production. That of 1867 was probably one of the best which had ever appeared, and the improvement could be attributed no doubt to the fact that an eminent pharmacist was engaged. He, however, had no authority of his own, but was simply the servant of the Medical Council. When the Pharmacopœia appeared it was binding upon pharmacists, and they were obliged to make things in a certain way, although when made they would not sometimes answer to the tests there given. Under such circumstances he could not understand any pharmacist doing anything but most strongly supporting the idea that the Pharmaceutical Council, so far as the law would allow, should be represented fully in the framing of a new Pharmacopœia, and, if necessary, he should have much pleasure in aiding the deputation in endeavouring to impress upon the Medical Council the desirability of a new Pharmacopœia very soon appearing.

Mr. Mackay said there was but one feeling as to the desirability of pharmacists aiding in a new Pharmacopœia, but the question before them was whether this form of motion and the present time were the most suitable.

The President said there was but one feeling as to the abstract view being right, but it was a question of policy. He must correct Mr. Symes in one particular. The Pharmacopœia Committee of 1864 was more fully supplied with men who were supposed to have a knowledge of pharmacy than that of 1867. That Council was requested to send a deputation to the Committee, and it nominated certain persons to act upon it, and those persons set all their hands to work to prepare the edition of 1864. So much fault was found with that work that in 1867 the Committee was very much reduced, and it simply consisted of Professor Redwood and Mr. Warington, of Apothecaries' Hall, under the direction of a Committee of the Medical Council, consisting of Dr. Burrows, Dr. Apjohn, Dr. Sharpy and Dr. Quain. Therefore, pharmacy was very fully represented on that occasion. It was a very difficult thing to go to the Medical Council, to whom was given by Act of Parliament the power and duty of issuing the Pharmacopœia, and say, "Take us in." Of course pharmacists could offer their services with a good grace, but if they went in the way proposed by Mr. Hampson they would probably get a rebuff. He could also remember the time when the College of Physicians were about to issue a Pharmacopœia, though it never came to maturity. That body asked this Council to appoint a committee to work with it and to send the result of its labours. It therefore acknowledged, and he had no doubt the Medical Council acknowleged also, that pharmacists were in possession of much experience and information which would be extremely useful. But although the medical bodies would be glad to take it in the ordinary course, they would not like to have it forced on them by legal measures, and he did think it would be extremely unwise to convert the General Medical Council and the members of it into antagonists of the Pharmaceutical Society, because he happened to know that some of the best friends of the Pharmaceutical Society sat on that Council, and in all things considered and deferred to the interests of that Society. In fact they had done as much to advance the interests of the Pharmaceutical Society as anybody, not being a member of it, could do. He therefore hoped the motion would not be passed, but that the Council would trust rather to assisting the Medical Council by offering it what assistance it required.

Mr. Frazer said he should use the same arguments he used when this matter was before the Council five years ago against insisting on pharmacists having a legal position in the matter. There was one reason why pharmacists should not have it. It was medical men who were responsible for the medicines prescribed, and he did not think pharmacists had any right to arrogate themselves that position. They did not prescribe and it was those who prescribed who had the full responsibility of making the various formulæ. Besides that, although not legally on the Council, they were practically aiding it, as had already been shown. He himself was consulted on many points and he believed the same thing was done in many other instances.

Mr. Williams suggested the word "legal" should be omitted from the motion.

Mr. Hampson said he could not do so. He regretted to find that he lacked the support of several respected members of the Council, as he had five years ago. He expected a hearty support and almost unanimous on that occasion, for he felt that in five years the subject had so ripened, and the position of the Society had been so acknowledged, that the claim he made of a conference with their medical friends would be most readily received. Mr. Mackay seemed to think it was all sufficient that Professor Redwood had been called in to assist, but they could not always have the services of Professor Redwood. He altogether demurred to the position taken by those who opposed him. It was not for them simply to assist in the narrow sense, but to do the work along with the Medical Council; to take the proper position, not as members of the Medical Council, of course. That body had had to go to Parliament to get fresh powers, and certainly in its bill, or in an amended Pharmacy Bill, pharmacists' proper claim should be recognized. He did not attempt to describe the method of this recognition. He simply said it was their natural position as pharmacists to have a fair legal share in the preparation of the Pharmacopœia, so that they might occupy the same status as pharmacists in all other countries. It seemed to him a mistake to wait until a new Pharmacopœia was about to be published. The Committee should sit a considerable time before that, for it was a scientific work which would take two or three years to be put into shape, and all kinds of experiments would be required to be made. He was sorry to find that Mr. Sandford and Mr. Mackay held the opinion they did regarding the feeling of the Medical Council, namely, that this course would put this Council in opposition to it. He had a higher opinion of those gentlemen than to think they would pooh-pooh this proposition. They would surely respect pharmacists more for knowing that they did not undervalue their qualification as pharmacists.

Mr. Williams asked Mr. Hampson to define the word "legal."

Mr. Hampson said this word seemed somewhat misunderstood. At the present time pharmacists could not step into the room with the Medical Council and take any part in its deliberations; but he believed it to be absolutely essential that when the Medical Council, if it agreed with the proposal, went to Parliament for a new medical bill, it should ask for such provisions, that the Pharmacopœia should be framed by a Committee, consisting of so many medical men and so many pharmacists, the latter being nominated by the Pharmaceutical Council.

Mr. Mackay said any remarks he had made with regard to the Medical Council pooh-poohing this proposal simply had reference to the word "legally" in the resolution.

Mr. Williams moved an amendment that the word "legally" be omitted and also the last sentence.

Mr. Robbins seconded the amendment.

The Vice-President opposed the amendment. He thought it would be better to do nothing at all if they did not claim a legal status.

The amendment being put was lost by 8 votes to 3.

The motion was then put with the following result:—

For—Messrs. Greenish, Hampson, Schacht and Symes

Against—Messrs. Bottle, Fraser, Hills, Mackay, Rimmington and Robbins.

The motion was therefore lost.

The President and Mr. Williams did not vote.

Reports of Council Meetings.

Mr. Symes moved and Mr. Greenish seconded,

"That a Committee consisting of Messrs. Hampson, Atkins, Mackay, Bottle, Symes and Greenish, be appointed to make proper arrangements for the admission of reporters to the meetings of this Council and consider if any, and if any, what regulations are necessary to be made in reference to their presence in the room. The Committee to report to this Council at its next meeting."

The motion was carried unanimously.

Loan of Specimens from the Museum.

A letter was read from Mr. Davidson, asking for the loan of some mineral specimens from the Museum, to illustrate a paper on Coal, which he was about to read before the Chemists' Assistants' Association.

The request was granted.

PHARMACEUTICAL MEETING.

Wednesday, December 3, 1879.

MR. GEORGE WEBB SANDFORD, PRESIDENT, IN THE CHAIR.

An Evening Meeting of the Society was held on Wednesday the 3rd inst. The chair was taken at half-past eight o'clock.

The minutes of the last previous meeting having been read and approved,

The Curator called attention to the specimens which were on the table. He said that one was of rather unusual interest, namely, the stem of the araroba tree, presented by Mr. T. Christy, which was the first specimen that had been seen in this country. There was also a specimen of the leaf and a few of the flowers. The leaflets had been put together as nearly as possible to represent the habit of the plant, but the flowers were so broken up that he could not represent them as he should like to have done. In the specimen of the stem they would see that the araroba or Goa powder occurred in the porous vessels of the plant, and the porous vessels seemed to be corroded and run together, so that the small masses of the substance which was now known in commerce as araroba could be seen under a lens. There was also a specimen of bark of the white quebracho tree (*Aspidosperma Quebracho*), which had been sent over by Dr. Lorentz, from Cordoba. This plant was interesting for one or two reasons. Mr. Fielding, who had been staying for some time in the Argentine Republic, told him that it formed a common feature of the landscape, and had somewhat the appearance of that form of English ash tree which was sometimes seen with slightly drooping branches. The bark was remarkably smooth; but became exceedingly corky when once the thin covering became cracked, in which respect it very much resembled the bark of the birch tree. He imagined that the thinner bark of the quebracho was by far the most active portion of the plant, and as it would probably come into use in this country, as it had already done on the Continent, it was well to know that the corky bark was less valuable. It derived its name of "aspidosperma" partly from the very curious circular membranous seed which was attached to the fruit by a very slender thread, so that it resembled somewhat a shield. The name "quebracho," was Spanish, and meant "break axe," because the wood was so exceedingly hard, and could not be cut by ordinary tools without injury to them. There was also one specimen of yellow pareira brava, brought over by Mr. Moss, from New York, it having been presented by Professor Bedford. It had recently come into American commerce, and he believed Mr. Moss was engaged in examining it.

Mr. Greenish asked whether the araroba was a deposition or decomposition, and, if so, in what tissue the araroba was found.

Mr. Holmes said that the araroba could be seen in small patches in the porous vessels of the specimen now exhibited. Whether it was a decomposition or a deposition he had no means of ascertaining.

Mr. Symes said that quebracho wood was being used in large quantities on the Continent. He should like to know whether the bark contained special medicinal activity. The wood was astringent, and used for tanning, and was said to contain double as much tannin as ordinary crushed oak bark. Large quantities were imported into this country, but chiefly on the Continent. He had sent samples of the wood to one large firm of chemists, and they appeared to be satisfied that that was the article they wanted.

Mr. Holmes said that it was the bark of the white quebracho which was used in medicine. The quebracho wood was obtained from a different tree, known as the red quebracho, belonging to a different natural order. He was not aware that that wood was used medicinally. The specimen on the table was white quebracho.

Mr. Greenish thought that it was unusual to find tannin in wood. It had been usually found in the bark.

Mr. Holmes said that tannin was often found in the wood. With regard to the white quebracho, it was curious that the leaves contained more tannin than the bark, namely 27·5 per cent.

Dr. Paul said that the tannin principle of the red quebracho tree was contained in the wood, and that this wood was now being imported largely into France for the purpose of tanning leather. Some months ago some samples had been sent to him for the purpose of ascertaining its value, and he found that the active principle was contained in the wood brought over for the purpose of being used in tanning.

Apothecaries' Weights and Measures.

The President said that there was on the table a set of the new local standards of apothecaries' weights and measures which are to come into use under the new Act. They had been lent for exhibition by the head of the Standards Department, and were placed on the table for inspection. He would call on Dr. Paul to make some remarks in respect to them.

Dr. Paul said that the task which he proposed to undertake that evening was one justified mainly by the special practical importance of the subject. It was not necessary to address pharmaceutical chemists in a descriptive manner on the nature of the weights and measures that they were accustomed to use daily; but hitherto the weights and measures used in pharmacy had been things outside the law, not altogether unlawful to use, but used without any legislative sanction or recognition. In the introduction of new legislation on the subject of weights and measures it had been thought desirable, as in other respects, to bring pharmacy within the protection and control of legislative enactment, and to make the weights and measures used in British pharmacy no exception to weights and measures used for other purposes of trade in the country. The result of this had been that in future the weights and measures used in dispensing would be subject to inspection and verification in the same way as all other weights and measures used in the country; and, as a further result, they saw there some of the standards that had been constructed for the purpose of controlling the accuracy of the weights and measures used by chemists and druggists throughout the country. In the first place he would refer to the weight standards, of which there was a case on the table. These weights were made after the manner of the weights used in chemical analysis and for general chemical work—round blocks of metal with a knob at the top that could be easily grasped. They ranged from 10 ounces down to 10 grains, and then there was a further set of small weights, running from 6 grains to $\frac{5}{10}$ of a grain. The set was exactly a counterpart of the set of standards that would be used by the inspectors in controlling and verifying the weights that were used in pharmacy. With regard to the measures there were, first of all, a set of bronze vessels of certain capacities one made to contain 4 fluid ounces, and others ranging down to one containing a fluid drachm. These vessels were constructed to hold, when filled exactly to the brim, the quantity to which they corresponded. They were struck with a glass disk, used in the same way as striking a measure of corn, so as to remove any superfluous liquid, and leave the exact volume of water weighing, at the specified temperature, the corresponding weight. This was a form of measure which he imagined would be exceedingly difficult to use for the purpose of verification or for any practical purpose which required a number of measurements to be made rapidly and within a short space of time. Another of the measures indicated as competent to be used was the ordinary flask, like a litre flask, with a line in the neck, indicating the level to which it was to be filled for holding a certain volume and weight of water at 62° C. It was a convenient form of vessel, and there was a set ranging down to half an ounce. In vessels of that arrangement there was no provision for anything below the half ounce. In another set there was a pipette which was graduated into minims and containing in all 30 minims. Another form of measure that had been proposed for use for the verification of the ordinary graduated measures in use was made after the manner of an ordinary discharge pipette. By opening the air tap the water was allowed to run in until just above a certain level, when it was shut off and the air tap closed. The liquid then remained suspended. This was exactly the same sort of apparatus that was used in very many forms of volumetric analysis for measuring definite volumes. The one then in position was gauged to contain exactly a pound of water, or 7000 grains. The standard measures were graduated in a different way, not upon the neck, but upon the body of the bulb. The 2 ounce measure was graduated from 8 drachms to 16. There was another one which was graduated to hold 40 ounces, which was the largest volume, and another to hold 10 ounces which was the smallest. The connection of these vessels with the filling apparatus and system of air cocks was made by means of screws. One pipette could be taken off and another put on. It occurred to him, and it had been mentioned in the Journal, that the use of a measure of this kind for the purpose of verification was most objectionable, on account of the very large diameter of the surface of the liquid. The accuracy of such a measure depended upon having the surface of the liquid where the reading was taken reduced to the smallest possible diameter. When in comparison with the bulk of the liquid the diameter was very small, the amount of error made in reading off the level of the liquid was very much less than it would be in reading off from the other level, where the surface of the liquid was large. In point of convenience for use nothing could be preferred to that form of apparatus, and if these vessels were used it would be best, he thought, to have one pipette for each capacity of measure to be tested, and have a fresh one attached on every occasion. This would involve a larger number of vessels, but for facility and accuracy of work the advantage would be very considerable. With regard to the use of these it would be superfluous to say more than had already been stated in the Journal. In future, chemists and druggists throughout the country would be subject to inspection of their dispensing weights and measures, and if those weights and measures were incorrect in any respect, either in excess or deficiency, the owners of them would be liable to a penalty for each one which was so incorrect. Moreover, if they were correct, and were not also stamped with the stamp of verification they would also be liable to a penalty, and therefore it became the business of all who were engaged in pharmaceutical matters to take precautions to ascertain how their weights and measures were to be verified and stamped, so as to leave them safe under the operation of the Act. The provision to be made for carrying out the work of inspection and verification of weights and measures was to be made by the local authorities, that is to say the corporations, town councils, and bodies of that kind in different parts of the country, and it would be extremely desirable, for the sake of preventing inconvenience to individuals, if the local secretaries of the Society or the secretaries of local associations were to inquire of the corporations of their district, or the magistrates at quarter sessions, as to what arrangements were to be made for inspecting weights and measures, and what facilities were to be given for enabling them to be verified. Such a step would remove any possibility of harsh action at a future time and probably do away with a good deal of inconvenience. The Society was indebted to Mr. Chaney, of the Standards Department of the Board of Trade, who at the request of the President had placed these measures at the disposal of the Society for the purpose of this explanation. Dr. Paul said he had omitted to mention the cathetometer, which was the sort of apparatus used in the measurement of gases for reading off the exact level of mercury, and there was a very finely adjusted telescope by which one was enabled to read exactly where the level of the liquid cut the line of graduation. For gas analysis, and in dealing with gases, such an apparatus was exceedingly appropriate and did very good service; but when they had to read a level in the instruments shown such an apparatus as this seemed to be too delicate, and though altogether admirable in its way, quite inappropriate for the purpose specified.

Mr. Mackay said that the meeting was very much indebted to Dr. Paul for the trouble he had taken in this matter, and also for his lucid explanation. There appeared to have been a great deal of work about a very little matter; but, be that as it might, the whole country, and especially the people in the north, had been in very considerable alarm about the subject of weights and measures. He specially wished that, now they had the standards before them, the minds of pharmacists might be set at rest on one point, namely, that although the smaller weights were far better than those in ordinary use, both as to form and material, yet so long as those now in use corresponded with the new standards, the owners would come under no penalty. As to the more intricate set of glass measures he could not understand the wisdom of producing these wonderful gun metal or metallic looking things with ivory bases and very correctly fitted glass tops, with a view to measure from 1 ounce up to 4 or 5 ounces. Perhaps Dr. Paul could explain why they were produced in that particular form. These glass measures, as standards, seemed to be very beautifully made. He did not doubt their correctness, but he should think that the huge 40 ounce pipette was a thing which, in the hands of the inspector, would not be easily managed, and would be likely to lead to error, notwithstanding the aid of that wonderfully constructed telescope. Where the pipette was surmounted, as in this case, with the short tube, and where the indication was made by a small line, any man of ordinary eyesight would be able to verify correctly without the aid of such a curious looking instrument as that which they had before them. He was rather pleased than otherwise to find that there was a complete regiment of pipettes, ranging from 2 pints to ½ an oz. The smaller pipettes for drachms were quite proper. Curious ideas had been taken up by some inspectors. It would be invidious to name the inspector of a particular district, seeing that the business of verification was yet in its infancy; but in Edinburgh they had an inspector who, no doubt, would like to be the prince of all inspectors and to do his work with great skill and accuracy. He seemed to be possessed with the idea that dispensing chemists were to follow the particular form of these verifying measures. In confirmation of this, he might mention that Mr. Gilmour, who had taken a great deal of interest in the subject, and who had been misled once or twice on the subject, had written to him (Mr. Mackay), a note in which he said, "The point principally to be noticed is that there seems to be some important divergence of opinion regarding the interpretation of the Act." "The inspector for this district is prepared to accept and enforce the provisions of the Act in the lines put forward by me at our meeting here." The writer was referring to the last scientific meeting of their Society in Edinburgh in connection with this subject. As he (Mr. Mackay) remarked at that meeting, the inspector was undoubtedly wrong, though Mr. Gilmour thought that he was right. This inspector might be the type of others. It had been promulgated that, even if they departed from the pipette form of measure, still they must have a measure which would represent only ounces, drachms or minims, as the case might be. He apprehended that, in addition to all these new appliances for verification, a compound measure, could still be allowed, so that, if A. B. should take to an inspector a measure graduated from 5 minims up to an ounce, the inspector would verify that measure even though it contained marks for minims, drachms and ounces. Without such compound measures, the difficulty in dispensing would be beyond expression. If they had a measure larger than one ounce, the mode of graduation would be left to the option of the party wishing to have the measure verified. It would give great satisfaction if they could assure their friends in the country that when such a graduated measure came into the hands of the inspector there would be no difficulty in getting it verified. Then there were many wholesale houses which had a great many measures in stock. It seemed a peculiarly hard case that, in the event of these existing measures being found to be a few drops above the standard, there would be no remedy but throwing them into the cullet cask to be used as broken glass. But he supposed that that was a hardship to which they must submit. There was a certain scale of charges for verification, fixed by the Act. Could Dr. Paul tell them whether the charges fixed in the fifth schedule of the Act could be set aside altogether by the local authorities, and higher fees charged in their place? He believed that the fifth schedule apportioned 2*d.* to a local inspector for verifying a set of weights from 1 pound downwards, and one halfpenny for verifying a single measure. Three or four times these charges had been made for verifying solid weights and measures.

Mr. Bottle, referring to the liquid measures, said it would probably become his duty, in the borough of Dover, to instruct the ordinary inspector of weights and measures in the use of the new standards. He confessed that he felt a great deal of apprehension in instructing a non-professional man to use such apparatus. Dr. Paul had told them that it would be much more advantageous to have a series of pipettes graduated on the neck. To a certain extent that would be an advantage. Then one had to set against that the disadvantage of the liability to knock off the extremely fine nipple, and then when they had made sure of fastening the screw connection of the pipette apparatus, he very much doubted whether a series of pipettes ranging from a quart to half an ounce or half a drachm would, in the hands of a non-professional man, be of very much advantage. The old-fashioned flask would be, in the hands of non-professional men, a much more efficient way of getting at a standard, whether quarts or ounces, than the pretty piece of pipette apparatus on the table.

Mr. Greenish said that the inspector of weights and measures had called on him about his measures, and he (Mr. Greenish) had sent down to him four dozen and ten measures, and only two out of that number had been found to be incorrect. On the others the inspector had engraved or scratched a crown, a "V.R.," and the number 21, and for each he had charged one halfpenny. Usually Government officers received a great deal of pay for a very little work; but in this case there was an immense amount of work for very little pay.

Mr. Postans said that he knew there had been considerable activity amongst inspectors in connection with avoirdupois weights, and that, of course, bore on the matter of apothecaries' weights. In future it would become the duty of inspectors to see that chemists properly fulfilled the standard requirements by their weights. But great discretion should be exercised in the summoning and fining of chemists. The fine was in itself small, but there would be a great reflection cast upon its recipient, especially in country places where each person was well known. In most instances, chemists in the country did very little dispensing, and consequently the apothecaries' weights were liable to get into very bad order; and whereas previously a man might get only a few prescriptions per week, he would, after being fined, probably get none at all. They knew how the public took up such matters. He felt sure that the Board of Trade, in suggesting to local authorities their duty in the matter, would be most anxious that great discretion should be exercised as to inflicting fines.

Mr. Williams said that he would like to remind the meeting that the apparatus before them consisted of *standard* pieces of apparatus, not *patterns.* It did not follow that these forms of measures would be sent down to the inspectors for use. These, he imagined, would be kept to be used by scientific and expert men in London, for verifying those measures which would be sent down for use in the country by inspectors and others; and it was not intended that chemists were to use these exact patterns for practical purposes in dispensing. They were simply the standards by which other measures would be made for the guidance of those who had to measure and verify throughout the country. Therefore it was necessary that such apparatus should be very accurate, and they would no doubt be found to be so, or the Government would not have adopted them.

Mr. Robinson asked whether the Act applied not only to the measures used in dispensing, but also to those glass measures which they sold in the course of business.

The President asked if Mr. Robinson meant the glasses graduated for spoonfuls; those would not be interfered with by the Act, but the possession of incorrect ounce or drachm measures which might be used for selling as well as dispensing would he thought be liable.

Mr. Frazer said that his experience differed from that of Mr. Mackay. The inspector, in Glasgow, had told them to be quite easy in their minds as he had got the standards and was able to verify the larger weights at once, and this he had done. There had been no difficulty with him, and the charge was not unreasonable. He (Mr. Frazer) thought it would be well, if pharmacists at once invited the inspectors to come and inspect their weights, or send them to him to be verified.

The President said, that having had several opportunities of attending at the head offices respecting these weights and measures, he could say there was not the slightest inclination at the central office to interfere in any way, hardly or unfairly, with chemists and druggists. Very much would depend on local inspectors, who were very different from each other in their nature and character. Some would be particularly officious, rather more so than they would have occasion to be. Mr. Greenish had told them that he had had his glass measures stamped by a local inspector. When was that done?

Mr. Greenish said that they were stamped about two months ago.

The President said that in the month of August he was at the head office and was then told that the inspectors could not take any steps with regard to the measures for three months to come as the standards were not in their possession. Therefore, he very much doubted whether Mr. Greenish's four dozen measures had been properly verified. He (the President) received his information from the head office, as far back, he believed, as July. As to the weights, he had repeatedly called in at Young's, the scale maker's, in Bear Street, to ask whether they had any weights marked under the new Act, and the scale maker said that he was in constant communication with the local inspector at Westminster, but that officer was not yet in a position to mark his weights, as he had not got the standards. On the day previous to the meeting, he (the President) called at De Grave's, whose house was, perhaps, as high an authority as any in London, and he was told that they had no means of getting the weights stamped, and that the inspector had no authority to stamp them. They were preparing glass measures for standards, but they were not yet in a position to supply any. That seemed to settle the matter for the present; but he had been advised by the head of the Standards Office that it would be well for chemists living in the great centres to make application to the inspectors to have their weights verified the moment that the standards were in their possession. If chemists did that, it would show that they were not trying to evade the Act, but were ready to submit their measures to the inspector. He also advised that chemists should be on their guard, according to the recommendation in the paper last week. He thought that Dr. Paul had been led into a little error with respect to the weights used in dispensing. Those weights would, it was true, be under supervision, inasmuch as they were the weights by which drugs might be sold; but they were told by the Board of Trade, when the Act was coming forward, that the provisions of the Act would have nothing to do with dispensing, and would apply simply to buying and selling; that if they were dispensing a mixture their weights and measures would not be interfered with in so doing. As to the question of the shape and material of the weights, they must remember that the weights now exhibited were simply the standards for the inspectors, and it was not to be supposed that chemists were to have weights of the same shape and material, if the weights were exactly of the same value. They might be the flat grain weights such as they had now, marked as to their denomination, so that there would be no difference in that respect. With regard to the bronze measures of capacity which Mr. Mackay had thought would be very useless, they were simply to be used as standards. He (the President) thought that they were part of the series carried down from the much larger measures which were necessarily in bronze, so as to make a complete set. These others would be used, no doubt, in verifying measures. Then, as to the inspectors, they would have very great power, because it would be for them to say what measure they would stamp as verified, and what they would not. They would put the mark of a certain district on a measure; but it was yet a question whether they would verify from 20 ounces down to the bottom. Chemists had been told that, if the inspectors verified in the latter fashion, the charge would be about 2*d.* for verifying the 20 ounce measure, and about 1*d.* for the rest, but not 1*d.* each. They could only act according to the provisions of the Weights and Measures Act, and their charges could only be according to that statute. Some time ago an inspector led chemists to suppose that they could only use the weights bearing the stamp of the particular district in which they lived. That was altogether a mistake. A weight which was stamped in one district was good in all districts; but on the other hand, a person living in a particular district and wishing to have his weights verified, must take them to the inspector of the district in which he resided. Mr. Mackay said that the Edinburgh inspector led people to suppose that measures of the same shape as the standards must be used; but that was altogether an error. The pipettes were simply standards for the inspectors. He must correct Mr. Williams in the matter of the pipettes. That gentleman had expressed his belief that the district inspectors throughout the country would not have standards similar to these; but he (the President) had been told that they would, and on being told so, he had remarked, "Well, you will find that very few inspectors will be able to use them." These were not absolutely the set of standards which had been used in the Standards Office, but they were copies. He took it that the standards would be verified and prepared before being sent out. Then as to the measures of different denominations, he had been confirmed at the Standards Office in the idea that an 8 ounce measure might be graduated in ounces and half ounces and drachms. And, more than that, he might say that when the Act was framed, a resolution had been carried in the Council, which was published in the Journal, recommending that a 6 ounce measure should have graduations from ½ drachm up to the full measure. This had been laid before the Standards Department of the Board of Trade, and it was fully provided for in the Act, so they were perfectly safe on that point. Mr. Mackay had asked whether the incorrect measures which many possessed should be put into the cullet cask. He (the President) was afraid that if they were incorrect they must go somewhere. If they belonged to him he should be glad to get rid of them. With regard to Mr. Robinson's question, any incorrect measure found in their possession would render them liable to a penalty. He did not mean the measured spoons but any ounce measures must be correct.

Mr. Robinson: I misunderstood you then, sir. I thought that the Act did not apply to compounding, but only to selling.

The President said that it was not a question of selling at all; it was a matter of possession. He could assure them that there was every possible desire on the part of the superior officials of the Standards Department to deal fairly with chemists.

Mr. Cleaver said that he had seen a set of weights that were sold to a chemist, which bore the stamp of verification. He did not know where they were sold, but he had seen them in a chemist's in Chelsea a week ago. He believed that they were procured at one of the wholesale houses in the City. The stamp was a crown.

Mr. Atkins said that he had recently had some grain weights ready stamped from Maw's, but he could not remember what the stamp was.

The President said that they might perhaps remember that grain weights were stamped some years ago with the Westminster mark. Certain chemists were brought up before the magistrate for not having their weights so marked. He did not know whether they were fined or dismissed, but it was then proved that chemists in Westminster must have their weights stamped with the Westminster portcullis.

Mr. Greenish said that this was not the case at the present time.

The President said that he believed not, but no doubt many such weights were still extant.

Mr. Schacht said that there were inspectors still in existence who required people to send their weights and measures down to their office to be rectified and stamped every year. This was so in his own neighbourhood of Clifton, where pharmacists had to send their own weights and measures every year for rectification, so that the fact of the stamp did not involve verification according to the new special standards. The statements of Mr. Greenish and Mr. Atkins were not inconsistent with the President's statement that the authorities who had recently regulated all these fresh standards had not yet issued those standards to the inspectors. There was the old standard and the new standard. He did not know that glass measures had to be stamped, but he saw no reason why the same rule should not be applied to glass as to metal.

Mr. Mackay said that the inspector in his district had for months been stamping, under the new Act, weights up to a pound, but he had declined to mark any kind of glass measure. The chairman had misapprehended his point as to the incorrect measures. He thought that the rule was a severe one that there should be only a margin of so many drops allowed for possible error. Within the the last ten days, he had written to one of the largest glass measure makers, who had confessed their entire ignorance of any law by which they were bound to have any measure verified which they manufactured.

The PRESIDENT remarked that the grain weights were already subject to verification as avoirdupois weights, and could be verified without waiting for the new Act.

Mr. GREENISH said that he had been called upon by the local inspector three or four times, and urged to send his weights and measures down to the Court House for verification. The weights and measures had been sent and each measure verified and stamped. Each glass measure had a "V.R." and a crown, with a special number, 21, for Marylebone, and a definite charge was made of one halfpenny for each measure. Two measures had been rejected as being incorrect, and therefore they had been verified in some way, although he did not know by what means.

Professor REDWOOD wished to remind the meeting that there were three authorities who took cognizance of the subject of weights and measures. In the first place there was the central authority at the Board of Trade, who had all the necessary appliances for submitting weights and measures to strict and severe test. Then below that authority there were the district authorities to whom weights and measures might be sent from time to time to be tested and stamped if found to be correct, and in those cases any weights or measures found to be incorrect would simply be returned to those who sent them, with an indication of their incorrectness, and it would be optional to the owners of those weights and measures to get them corrected. This was frequently done in regard to weights. The weight might become incorrect from wear, and it was then optional to the owner of the weight to have it made correct. And so if a measure was found to have been incorrectly graduated, some correction, if practicable, might be made in it. The third authority was the inspectors, who were distributed over the country. The meeting had before it the standards which were used by the authorities at the Board of Trade. He apprehended that such standards would probably never come into possession of the second and lower authority. These were simply measures which, in accordance with the statute, were constructed upon the same principle as the bushel and the gallon, and so forth. This was simply an extension downwards without any intention of their being used in any other way than that they might possibly be required to be used by the higher authority at the Board of Trade. More practicable means of testing would be supplied to the subordinate authority—probably a set of flasks such as they had been in the habit of using, and which were now pointed out in the Pharmacopœia as affording the most accurate method of determining volumes where it was required to determine them with any great degree of accuracy. He had reason to believe that the Board of Trade had not yet fully decided as to what would be the form of verifying measures. Then there was a third authority upon whom the duty devolved of going round from shop to shop and making a personal examination of the weights and measures, and he (Professor Redwood) was constantly brought into communication with those inspectors, who had other duties to perform besides those of examining the weights and measures, and they were men who, if these pipettes were put into their hands, would be utterly at fault as to using them. Moreover, how could all those apparatus be carried round from shop to shop? There would be provided verifying measures of different kinds. There would be measures of the description now in use, but accurate measures, that had been subjected to examination by the second authority which he had indicated, and measures of that description, once known to be correct, would be used by the inspectors in the same way as at present. He agreed in the main with what Mr. Williams had stated, that there was no probability that the complicated apparatus, which had been put before them that evening, would be used by the ordinary inspectors.

Dr. PAUL, in replying to the discussion said that several points had been raised to which he should not have ventured otherwise to refer; but as they were of some importance he would, in replying, ask their attention to them for a few moments. In regard to the inspectors, who were the persons with whom chemists and druggists would come into contact, it was to be apprehended that some considerable difficulty would arise in many cases. Mr. Mackay had referred to one of those inspectors—the one which they were blest with in Edinburgh, and they had heard of performances of that particular inspector on a former occasion, when he took upon himself to interpret the Act as amounting either to the actual prohibition of the use of apothecaries' weights and measures altogether, or else to establish the other alternative, that the Act itself was null and void. That was early in the present year, and he took that ground with considerable tenacity and excited no little alarm amongst chemists and druggists in Edinburgh and in other parts of the country. It had been necessary to point out to him, somewhat plainly in order to reach his powers of apprehension, that he was totally wrong, and they had heard nothing more of this extraordinary interpretation of the law by the Edinburgh inspector. He (Dr. Paul) inferred that the inspiration of Mr. Gilmour's information given on a recent occasion was derived from the same source, and he had no hesitation in saying that it was equally untrustworthy. It seemed, in fact, that so far as this particular inspector illustrated the state of the case in the north, they might expect a considerable amount of difficulty arising from the blind attempting to lead the blind, and they would have to provide a very considerable ditch to accommodate those who were misled.

Mr. FRAZER: North-east, not north-west, if you please.

Dr. PAUL said that he was referring particularly to Edinburgh. He was glad that Mr. Frazer was more happy in his possession of a sensible inspector. The measure makers appeared to know nothing at all, and to take very little interest as to the provisions of the Act, and as to any necessity for providing accurate measures. He might mention that, as he understood, the owners of apothecaries' graduated measures and weights were to be liable only for the accuracy of the weights and measures which were in use. But however that might be, it surely would not be looked upon by pharmacists as a hardship that they should be expected to have correct weights and measures for use in dispensing. The President had thrown out a suggestion that dispensing was excluded from the operation of the Act, but he (Dr. Paul) could not agree with that view. Probably a medical man in dispensing medicine would not be subject to the visit of the inspector, nor would a private individual be subject to the visit of the inspector to test the accuracy of his graduated ounce measure, or the accuracy of his drachm weights, but a chemist and druggist engaged in trade and dispensing medicines for the purpose of selling them, was undoubtedly using those weights and measures for the purpose of trade, and in doing so he would come within the provisions of the Act. Therefore, he was bound to take care that the weights should be verified and stamped in accordance with those provisions. With regard to the matter of charges, he might mention that the provisions of the Act were very specific. It was stated in section 47, "an inspector under this Act may take in respect to the verification and stamping of weights and measures, such fees, not exceeding those specified in the fifth schedule to the Act, as the authority appointing him may from time to time fix." That was to say, the fees he was to charge for verifying weights and measures were to be those stated in the schedule or something less, but they were not to be anything in excess of that. Those fees were stated in the fifth schedule as follows:—"Each weight under 1 pound, ½*d.*, each set of weights of 1 pound and under, 2*d.*," and so on. Then there was another provision to which Professor Redwood had called his attention, which was that an alteration in those fees could be made on the recommendation of the local authority, but it was only to be done provided it was sanctioned by the Board of Trade, and provided that the representations of the local authority were such as to demand the recognition of the Board of Trade. Therefore there was no shadow of a ground for arbitrary charges, such as were referred to by Mr. Mackay, being made by any inspector. Moreover, with regard to charges for stamping the apothecaries' weights and measures all together, it would be an illegal proceeding on the part of any inspector to receive or to insist upon receiving any charge until this Act came fully into operation. It might be that certain measures used by chemists and druggists, and corresponding with the old apothecaries' weights and measures, might be stamped as provided under the old system, and those might be charged for as hitherto. Those, he apprehended, were the weights and measures referred to in the paper that was published in the Journal of the 29th of November, the last paragraph of which stated that many inspectors of weights and measures were already provided with some of the principal apothecaries' measures. Mr. Bottle had referred to the competence of the inspectors to deal with apparatus of the kind now before the meeting, and he (Dr. Paul) was quite at one with him in thinking that it was very likely indeed that the existing inspectors of weights and measures would be found very unequal to the work which they would have to carry out, and no doubt this would be a fact which would soon call for the attention of the municipal authorities, among whom many gentlemen connected with the Society had a place, to advise measures for supplying more competent persons to carry out the duties that would have to be performed under their control, for it was those local authorities, and they alone, who had any power to take any action in the matter. The inspector had no power at all, except that which was delegated to him and conferred upon him by the local authority which appointed him. With regard to that point, he (Dr. Paul) must differ from what was said by Professor Redwood as to the relative duties of the several authorities. The central authority had no power at all to deal with anything beyond the verification of the standards that were to be used by the local authorities. It might be said that practically it was their sole duty to verify from time to time the standards which were used in, say Manchester, Edinburgh, Glasgow and other towns, and to see that those standards were kept up to the mark and in a proper state to be used. Beyond that they had no power to interfere at all, either as to stamping, or as to the imposition of fees, or anything of the kind. Then, again, with regard to the use of the apparatus then before the meeting which had been referred to by Professor Redwood and other speakers, he must repeat that these several forms of apparatus were not those to be used by the central authority, but were the precise duplicates of the instruments to be sent down to be used by the inspectors as the standards of apothecaries' weights and measures in provincial localities. The Act specifically stated that the inspector was the person who was to use the standards, and to test weights and measures by comparison with the standards. The local authority had no power but to appoint and instruct the local inspector in the nature of the duties that he had to carry out. That was specifically set forth in the sections of the Act which dealt with the verification and local inspection of weights and measures, and was beyond the shadow of a doubt. How the inspectors would carry out their duties of testing druggists' weights and measures by these instruments was a matter which he did not pretend to be acquainted with. That was not disclosed. It might be that chemists and druggists would best anticipate and prevent any vexatious interference of inspectors by sending, as he suggested, their weights and measures to be verified, and then the result would be this—the inspector would come to the shop, and if the weights bore the stamp of verification of the district there would be an end of the matter, but if they did not they would have to go and be tested.

After some further discussion,

Professor Redwood said that he quite conceded the point to Dr. Paul.

Dr. Paul said with regard to the stamp that had been spoken of, one of the points mentioned by Mr. Gilmour, under the inspiration, no doubt, of the Edinburgh inspector, was that the stamp was to be a crown with a "V.R." underneath. Now in the Act it was stated that some "name, number or mark" should be used, and the only stipulation was that there should be a mark distinctive of the district. Some difficulty had arisen in reference to the use of those marks. It appeared that there were no less than 1355 separate districts, and these had all their own particular stamp or mark, so that there was great difficulty in telling whether any mark on a set of weights and measures was a mark of verification or some spurious mark, and in order to prevent the use of fraudulent stamps, and other misleading "practices of itinerant and unauthorized adjusters of weights and measures," a circular had been issued by the Standards Department suggesting the propriety of adopting a uniform mark of verification. It was not competent for the Board of Trade to compel the use of a uniform mark, and it was not necessary that there should be a uniform mark on weights and measures, as stated by Mr. Gilmour, but it was merely suggested that the stamp of verification might well be of the following design—an oval band containing a crown, and underneath that a "V.R." in a sort of cipher, together with a number distinctive of the particular district. With regard to pipettes and measures, there certainly might still be some little question remaining as to which particular form should be adopted for the standards, whether pipettes of the kind which he had recommended, guaged on the neck and delivering a certain volume, or the ordinary narrow necked flasks.

The President said that they were all much obliged to Dr. Paul for the lucid manner in which he had brought the question before them. It was a matter of great interest to pharmacists. He would still advise them to be on their guard. He (the President) happened to know that there still existed a very bad arrangement in some districts between the local authorities and the inspectors. Certain inducements were offered to the inspectors to bring forward cases of false weights and measures, and in some cases the authorities went so far as to give the inspectors half the penalties. This was considered a very objectionable arrangement. He hoped that the country magistrates would bear this in mind.

Mr. Bottle said that there was no such practice prevailing in Dover.

The President said that he was not at liberty to state the district in which it was done.

In consequences of the lateness of the hour when this discussion closed, it was agreed that a paper by Mr. Naylor, on "A Method for the Volumetric Estimation of Arsenic Acid," should be taken as read and published in the Transactions, and it will be found on p. 441, and that a paper by Mr. Collyer, on "Tincture of Senega as an Emulsifying Agent," should be read at the next meeting.

The President announced that the next meeting would take place on February 4.

Communications, Letters, etc., have been received from Messrs. Reynolds, Dewson, Casseebeer, Burt, Woodward, Carr, Maggs, Parker, Golding, Robert, Hurn, Sumner, Wilford, Swenden, Modlen, Ward, Southall, J. A., M.P.S., J. A. H., A. C., G. W., W. R. H., Over twenty years in the trade, London Dispenser, Delta, Quæro, Galangal, Nos, Hoc Age, Labor omnia vincit, Theta, One of the Gods, NH_4.

The length of the reports of the meetings of the Pharmeceutical Society this week necessitates the postponement of several communications.

NOTES ON INDIAN DRUGS.

BY W. DYMOCK.

(*Continued from page* 403.)

VITEX Sp. (?) VERBENACEÆ, HAB-UL-FAKAD (Arab.), TUKM-I-PANJANGUSHT (Pers.), SAMBHALOO-KA-BIJ (Hind. and Bomb.).

This small fruit is considered by native physicians to be astringent, resolvent and deobstruent, and useful for removing obstructions of the brain and liver. It is also given in enlargement of the spleen and dropsy.

Description.—A small dull-grey ovoid fruit the size of a duck-shot, half enclosed in the calyx, to which a portion of the peduncle remains attached. Upon section it is found to be extremely hard, and if perfect to consist of four cells, each containing a small flat seed. Generally one or more of the cells are abortive. The drug is imported from Persia. Value Re. ¼ per pound.

PLUMBAGO ZEYLANICA, *Linn.* PLUMBAGINEÆ. *The root. Vernacular*: CHITRAK (Hind.), CHITA (Beng.), CHITRA (Bomb.), CHITTIRA (Tam.).

History, Uses, etc.—Dutt gives us the following summary extracted from Sanskrit works of the uses to which Chitraka is put. The root is said to increase the digestive power, to promote the appetite and to be useful in dyspepsia, piles, anasarca, diarrhœa and skin diseases. It is much used as a stimulant adjunct to other preparations; in the form of a combination called "trimada," consisting of plumbago root, báberang (fruit of *Embelia ribes*), and the tubers of *Cyperus rotundus*, it enters into the composition of numerous medicines for dyspepsia. The following is an illustration:—Take of plumbago root, rock salt, chebulic myrobalans and long pepper, equal parts; powder and mix. Dose about 40 grains (Chakradatta). A favourite medicine for flatulence is an old prescription of Susruta's called "shaddharanayoga." It is a powder composed of equal parts of the following substances: plumbago root, seeds of *Holarrhena antidysenterica*, roots of *Stephania hernandifolia*, of *Picrorrhiza Kurroa* and *Aconitum heterophyllum*, and chebulic myrobalans. Dose about 1 drachm. The root of *P. zeylanica* is said to exercise a beneficial effect on piles, in which disease it is given in various combinations. One mode of administering it is as follows: An earthen jar or pot is lined in its interior with a paste of the root and curdled milk (dadhi), or kanjika (rice vinegar), is prepared in this pot. Plumbago root reduced to a paste is applied to abscesses with the object of opening them. It enters also into the composition of several preparations used as caustics ('Hindu Materia Med.,' p. 185). Mahometan writers treat of the drug under the name of "sheetaraj," a corruption of the Hindustani "chitrak;" they describe it as caustic and vesicant, an expellant of phlegmatic humours; useful in rheumatism and spleen, digestive. It also causes abortion. For administration it is made into a paste with milk, vinegar or salt and water. Such a paste may be applied externally in leprosy and other skin diseases of an obstinate character, and be allowed to remain until a blister has formed. In rheumatism it should be removed after fifteen to twenty minutes. When administered internally the dose is one drachm. Meer Muhammad Husain speaks of several kinds of "sheetaraj," and says one of them is the "leebadiyun" or "leefadiyun" of the Greeks. Rhazes describes two kinds, Indian and Syrian.

The Sheetaraj of Mahometan writers must, therefore, be considered to refer to the genus plumbago, and not to any particular species. *P. zeylanica* is mentioned by several European writers upon Indian drugs, but has not attracted the same amount of attention as *P. rosea*, which is said to be more active. However this may be, the former is the "chitrak" of the native physicians and very possibly may have been used by some under the supposition that it was the root of *P. rosea*. In the 'Phar. of India' Dr. Oswald is said to have employed *P. zeylanica* in the treatment of intermittents with good effect. It acts as a powerful odorific. In the neighbourhood of Bombay this root is one of the most important drugs of the itinerant herbalist; it is also sold in the shops. Cases frequently occur in which it has been used to procure abortion, a piece being inserted in the os uteri.

Description.—The roots are from ¼—½ an inch in diameter, seldom branched. When dry the external surface of the bark is of a dark reddish-brown colour, longitudinally striated and marked here and there by small warty projections; internally it is also brown and striated; the fracture short, the taste acrid and biting. Wood hard, reddish, close grained.

Microscopic Structure.—A moist section of the bark is of a greenish-yellow colour. The cells of the parenchyma are large and filled with starch. There are numerous large bundles of bright yellow stony cells forming an irregular zone towards the inner part of the middle layer of the bark.

Chemical Composition.—The activity of the drug is stated in the 'Phar. of India' to depend upon the presence of plumbagin. This acrid principle has been separated from the root of *Plumbago Europæa*. It is obtained by repeatedly boiling the ethereal extract of the root with water, whence it is deposited on cooling and may be purified by crystallization from alcohol or ether-alcohol. It crystallizes in delicate needles or prisms often grouped in tufts; has a styptic saccharine taste, with acrid biting after-taste; melts very easily, and partly volatilizes; unaltered when heated. It is neutral, nearly insoluble in cold, more soluble in boiling water, very soluble in alcohol and ether. It dissolves with yellow colour in strong sulphuric and in fuming nitric acid, and is precipitated by water in yellow flocks. Alkalies change the colour of the solution to a fine cherry-red; acids restore the yellow colour. Basic acetate of lead also colours it red, and forms a crimson precipitate (Dulong in Watts' 'Dict. of Chem.,' vol. iv. p. 685).

Commerce.—The shops are supplied by the herbalists, who collect the roots in this neighbourhood, where it is very common.

DATURA ALBA, *Rumph.*, D. FASTUOSA, *Linn.* SOLANACEÆ. *The root, leaves and seeds. Vernacular*: SAFED-DHATURA (Hind., Bomb., Beng.), URNATTAI (Tam.).

History, Uses, etc.—These two species of datura, as well as several varieties which have resulted from cultivation, are all included under the Sanskrit names "dhustura" and "unmatta." Sanskrit writers describe the plant as beneficial in mental derangements, fever with catarrhal and cerebral complications, diarrhœa, skin diseases depending upon the presence of animal parasites, painful tumours, inflammation of the breast, etc. A pill made of the pounded seeds is placed in decayed teeth to relieve toothache, and the leaves are smoked along with tobacco in asthma. According to Dutt no mention of the latter use of the plant is to be found in old Hindu books. Mahometan writers also are silent upon this point. Ainslie found upon inquiry that the physicians of Southern India were unacquainted with the value of datura in spasmodic asthma, but he tells us that his friend Dr. Sherwood, of Chittore, noticed the smoking of *D. fastuosa* as a remedy in that disease. The several species of datura are described by Mahometan writers under the Arabic name of "jouz-ul-máthil." The Persian name is "tátúlah." The author of the 'Makhzan' recommends preference to be given to the purple kind, he says that all parts of the plant are powerfully intoxicating and narcotic; as a local application they relieve the pain of tumours, piles, etc. The roasted leaves applied to the eyes give relief in ophthalmia; similarly they are useful in headache, enlarged testicles, boils, etc. The following description of datura intoxication is by the same author. "Everything he (the patient) looks at appears dark; he fancies that he really sees all the absurd impressions of his brain, his senses are deranged, he talks in a wild disconnected manner, tries to walk but is unable, cannot sit straight, insects and reptiles float before his eyes, he tries to seize them and laughs inordinately at his failure. His eyes are bloodshot, he sees with difficulty and catches at his clothes and the furniture and walls of the room. In short, he has the appearance of a madman" ('Makhzan,' article "Jouz-ul-máthil"). On account of their intoxicating and stupefying effects, dhatura seeds are frequently used in India for criminal purposes. An interesting account of Dhatureeás, or professional dhatura poisoners, will be found in Chever's 'Jurisprudence.' In Bombay country liquor is made more intoxicating by placing some of the seeds upon red hot charcoal and inverting an earthern vessel over them, when this is full of the smoke it is removed, filled with liquor and tied down. The leaves and seeds of *D. alba* have been made official in the 'Pharmacopœia of India;' of these a tincture, extract, plaster and poultice are directed to be made. The tincture of the seeds is highly recommended by the editor of that work as a substitute for opium. An extract of the leaves has been used successfully at the General Hospital, Madras, as a substitute for extract of belladonna, and it appears to me that the alkaloid might well be used instead of atropia in ophthalmic practice. The value of the leaves as an application to painful nodes, tumours, etc., is well known to many European physicians in India.

Description.—The fruit is about the size of a walnut, and nearly globular, covered with sharp tubercles or short spines, the capsule does not dehisce but splits in an irregular manner into numerous fragments. The seeds are ear-shaped, of a light yellowish-brown colour. The testa is rugose and spongy. The ends of the cotyledons in the embryo are turned outwards, which enables it to be distinguished from that of other solanaceous seeds. The tincture of the seeds is not fluorescent. The leaves are from 6—10 inches in length, ovate, acuminate, unequal at the base, very coarsely dentate; they have a fœtid odour.

Microscopic Structure.—The outer envelope of the seed is formed of a layer of thick-walled, sinuous cells with numerous secondary deposits; the second of tangentially extended cells. The albumen consists of polyhedral cells containing granular matter and fatty oil. The structure of the embryo is similar, but the cells are much smaller.

Chemical Composition.—The Indian daturas do not appear to have been examined, but there can be little doubt that the plant contains the alkaloid daturine, which has been separated from *D. stramonium.*

Commerce.—No part of the plant can be called an article of commerce, but the seeds are collected and sold by herbalists. Value nominal.

SOLANUM JACQUINII, *Linn.*, SOLANACEÆ. *The plant.*

Vernacular: BHATKATYA, KATÁI, RINGNI (Hind.), BHU-RINGNI (Bomb.), KANDAN-KATTIRI (Tam.), KANTAKÁRI (Beng.).

History, Uses, etc.—This plant is an article of considerable importance in the Hindu materia medica, as it is one of the dasamula, or ten plants, so much used in preparing a compound decoction by the Hindus. It is considered to have expectorant and diuretic properties and is prescribed in asthma, cough, certain urinary affections, catarrhal fever, costiveness, etc. In Hindu practice the drug is generally combined with other expectorants, demulcents and aromatics. The following prescription from the 'Bhavaprakasha' is extracted from Dutt's Hindu 'Materia Medica.' "Kantakáryavaleha, or electuary of *S. jacquinii.* Take of kantakari 12½ seers, water 64 seers, boil till reduced to one-fourth and strain. Boil the strained decoction till reduced to the consistence of a fluid extract and add to it the following substances in fine powder, namely, *Tinospora cordifolia*, *Piper chaba*, *Plumbago zeylanica*, *Cyperus rotundus*, *Rhus succedanea*, long pepper, black pepper, ginger, *Alhagi maurorum*, *Clerodendron Siphonanthes*, *Vanda Roxburghii*, and zedoary root, each 8 tolas, sugar 2½ seers, sesamum oil and clarified butter each one seer. Boil together until reduced to the proper consistence. Lastly, add honey one seer, bamboo manna and long pepper in fine powder each half a seer." Mahometan writers, under the Arabic name of "hadak," or the Persian "badinjan-i-barree" (wild egg plant), mention three kinds of solanum having somewhat similar properties. Their small kind, or "hejazee," appears to be the *Solanum jacquinii*, which they recommend in asthma, cough, dysuria, catarrhal fever, leprosy, costiveness and stone in the bladder. Under the Tamil name of "cundunghatrievayr," Ainslie notices the use of this drug in Southern India as an expectorant. The stems, flowers and fruit, according to Dr. Wilson (*Calcutta Med. Phys. Trans.*, vol. ii., p. 406), are bitter and carminative, and are prescribed in those forms of ignipeditis which are attended with a vesicular, watery eruption. Fumigations with the vapour of the burning seeds of this plant are in high repute in the cure of toothache. The mode of application followed by the natives is given in detail by Morehead (*ibid.*, vol. vii., p. ii., p. 489). It acts as a powerful sialogogue and thus affords relief (Confer. 'Phar. of India,' p. 181).

Description.—Root at least biennial. Stem none, but several flexuose, ramous branches, spreading close on the ground, for an extent of some feet, often striking root at the insertion of the leaves; angular, nearly void of pubescence. Leaves frequently in pairs, oblong, pinnatifid or laciniate, smooth, but armed on both sides with long, strong, straight spines. Racemes between the leaves, and almost as long, bearing 4—6 alternate, pedicelled, large, bright blue flowers. Calyx armed with straight spines. Berries spherical, size of a large gooseberry, very smooth, drooping, while immature variegated with green and white, when ripe with different shades of yellow only (Roxb.). No chemical examination of the plant appears to have been made.

Commerce.—The dried plant is kept in every druggist's shop in India. It is not an article of commerce, but is supplied by the herbalists as required.

SOLANUM INDICUM, *Linn.* SOLANACEÆ. BIRHATTA (Hind.), MOTIRINGNI (Bomb.), MULLI (Tam.), BYÁKURA (Beng.).

This owes its importance to being one of the plants used for the preparation of the Dasamala Kvatha. It is called "vrihati" and "bhantáki" in Sanskrit and does not appear to be used except in combination with more important drugs. According to the author of the 'Makhzan,' it is cardiacal, aphrodisiacal, astringent and resolvent; useful in asthma, cough, chronic febrile affections, colic, flatulence, worms, etc. (Confer. 'Makhzan,' article "Birhatta.")

Description.—Trunk trifling, but the branches are numerous, ligneous and perennial, forming a large, very ramous shrub of several feet in height, armed with numerous, very acute, somewhat recurved spines; the young parts are downy. Leaves solitary, or in pairs, petioled, ovate, lobate, downy and armed with a few straight spines on both sides from 2—4 inches long. Racemes between or opposite to the leaves, supporting several long pedicelled, middle sized, pale blue flowers. Calyx deeply 5-cleft, armed. Berries erect, round, smooth, size of a marrowfat pea; while immature variegated with deeper and lighter green, when ripe with deep orange yellow (Roxb.).

(*To be continued.*)

ACONITUM HETEROPHYLLUM, WALL.*

BY DR. M. DUNIN V. WASOWICZ.

(*Concluded from page* 343.)

(c). *The filtrate from the lead precipitate.*—After removing the excess of lead the purified liquid always appeared to be coloured darker by ferric chloride, and it also reduced Fehling's solution after long boiling and especially when a small quantity of oxalic acid had been added. It was again treated with acetate of lead and then again purified as before. After this treatment it was pale yellow or brownish-red according to the degree of concentration, had a strong persistent bitter taste, an acid reaction, and in reflected light had a strong green fluorescence; it was no longer coloured by ferric chloride, and did not reduce Fehling's solution in the cold, but only after addition of dilute acid and warming. Mixed with tannic acid solution it gave a very voluminous brownish precipitate, and with double iodide of mercury and potassium a copious white precipitate.

In order to remove the saccharine substance indicated to be present by the reduction of an alkaline solution of cupric oxide, a portion of the liquid was evaporated to the thickness of syrup, and mixed with alcohol and with some water and ether, until there was a perfect separation of the liquid into two layers. In the lower watery layer there would be the principal part of the sugar and the extractive; in the upper alcoholic and ethereal layer the bitter substance or alkaloid was to be sought for.

(1). The watery liquid was still somewhat bitter, readily reduced Fehling's solution, and still gave a precipitate with double iodide of potassium and mercury. It was mixed with animal charcoal and evaporated, with repeated addition of water, and ultimately the extract remaining was dissolved out with warm water, the animal charcoal being afterwards several times digested with small portions of alcohol. The watery extract was no longer bitter but had a dark brown colour. It was evaporated to a small bulk, but after several days it had not deposited any crystals. It was then boiled with albumen, again treated with animal charcoal, boiled with a little dilute acid and left to crystallize. A small quantity of a warty crystalline mass was thus obtained, which was only partially to be freed from adhering extractive by means of absolute alcohol, since the alcohol dissolved a portion of the extractive, but in this way sufficient quantity of the crystalline substance was obtained to establish the fact that it was grape sugar. The extractive substance presented no characteristic reaction except that of reducing Fehling's solution. The alcoholic extract, obtained by digesting the animal charcoal was but little coloured, became turbid upon the addition of the double iodide of potassium and mercury and reduced Fehling's solution. On evaporating it left a very small quantity of extract, which proved to consist of the several substances existing in the original liquid, and accordingly was further treated.

(2). The upper alcoholic and ethereal liquid was first digested for some days with animal charcoal to remove the colour, but this was only partially effected. After distilling off the alcohol there remained a yellow resinous mass with a neutral reaction, readily soluble in absolute alcohol and ether, but only partially soluble in water and dilute spirit. It was then treated with a large quantity of water and some ether added, so as to effect almost complete solution, and the separation of the liquid into two layers. The watery liquid left on evaporation a brown resinous substance, of a bitter taste, only partially soluble in water and not altered by alkalies. In the watery solution tannic acid gave no precipitate; double iodide of potassium and mercury an inconsiderable white precipitate. The portion insoluble in water dissolved readily in absolute alcohol and gave a considerable precipitate with tannic acid. The ethereal liquid deposited on evaporation a tough yellow mass, readily soluble in alcohol and ether and having a strong persistent bitter taste. The solutions gave both with tannic acid and double iodide of potassium and mercury considerable precipitates. This substance was found to contain nitrogen and consequently it consisted of impure atisine. The mass was digested for some time with animal charcoal, extracted with ether, and left to crystallize. After the evaporation of the ether no crystals were left, but a yellowish-white mass that could be readily powdered. The powder, when exposed for some time to light and air aggregated to a tough doughy mass of a dark brown colour, and in experiments with benzol, chloroform

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* *Archiv. der Pharmacie,* vol. xi., p. 19.

bisulphide of carbon, dilute and absolute alcohol as solvents no crystals could be obtained. By repeated solution and treatment with animal charcoal this mass was ultimately obtained quite white, and in that state a combustion was made. 0·3231 of the dry substance (constant under the air-pump) gave—

0·91 CO_2 = 0·248 C = 76·756 per cent. C.
0·3101 H_2O = 0·03445 H = 10·622 per cent. H.

These figures approximate closely to those calculated from the formula assigned to atisine by Broughton; $C_{46}H_{74}N_2O_4$ which requires—

		Found.
C	76·88	76·756
H	10·306	10·662
N	3·899	
O	8·903	

The alkaloid thus purified was white and uncrystallizable, and when dried under the air pump could be readily powdered. By exposure to the air the powder readily became yellowish or yellowish brown and resinous. Heated in a water-bath it also ran into a yellowish brown mass. It was very little soluble in water, rather more soluble in dilute alcohol, but readily and completely soluble in ether, absolute alcohol, benzol, etc. The solutions had a strong clean bitter taste, without any acrid or burning after-taste. The alcoholic solution, strongly diluted with water, was distinctly opalescent and frothed very much when shaken, like saponin; but atisine is distinguished from this latter substance by the slight solubility in water, as on diluting the alcoholic solution the greater part of the alkaloid is separated in white flocks. Alkalies do not produce any colour; concentrated sulphuric acid produces at first a faint violet, which becomes reddish, then dark red, and after about an hour, dirty brown. Sulphuric acid and bichromate of potash produce a green colour, with a distinct reddish violet zone. Nitric acid produces a brown colour. The nitrate, sulphate and acetate of the alkaloid do not admit of being crystallized. As obtained by evaporating the solutions, these salts are readily soluble in water, have a yellowish colour and taste very bitter.

Ammonia precipitates the alkaloid from solutions in white flocks. Tannic acid gives a yellowish brown precipitate, and the iodide of potassium and mercury a white precipitate that is perfectly soluble in alcohol. On evaporating the alcohol a distinctly crystalline mass remains. I did not succeed in obtaining a well crystallized platinum salt.

Only the hydrochlorate, hydrobromate and hydriodate of the alkaloid are crystallizable and sparingly soluble salts, among which the hydriodate is most manageable. This circumstance, and the tedious nature of the previously described method of obtaining the pure alkaloid, induced me to operate upon the second part of the liquid* in a different way, and I added to it iodide of potassium and mercury until no further precipitate was produced. After complete deposition the precipitate was collected upon a suitable filter, carefully washed with distilled water, and while still moist suspended in water and treated with sulphuretted hydrogen. Together with the mercuric sulphide there was formed a quantity of shining pearly scales, which could be dissolved in a sufficiency of boiling water, and separated again on partial cooling. They were separated from the mercuric sulphide by repeatedly boiling with water and filtering the hot solution. The yellowish filtrate upon cooling separated an abundant quantity of the above-mentioned pearly crystals, which proved to be hydriodate of the alkaloid.

* See previous page.

The mother-liquor was concentrated as long as crystals were deposited upon cooling. At a certain point, when crystals were no longer formed and the presence of iodine could no longer be detected, there was still alkaloid in solution, since considerable turbidity was produced by iodide of potassium and mercury and by phosphotungstic acid. On the addition of hydriodic acid to this liquid, however, no further crystals could be obtained. This would apparently lead to the conclusion that the roots examined contained a second alkaloid, the hydriodate of which is not crystallizable, and this is further supported by the circumstance that the precipitate produced by iodide of potassium and mercury, when dissolved in alcohol, gives on evaporation a residue that is not crystalline. This question, however, must for the present remain undecided, as the material at my disposal is too small for the purpose.

The substance considered to be hydriodate of atisine was re-crystallized from water several times and dried under the air pump. It was in the form of scaly crystals having a pearly lustre, soluble in 318 parts of water at 20° C., 420 parts of 96 per cent. alcohol, and very slightly soluble in alcohol. Analyses led to the formula $C_{46}H_{74}N_2O_4\ IH + H_2O$.

The hydrobromate and hydrochlorate have a similar constitution. The hydrochlorate is a white crystalline powder, more soluble in water than the hydriodate, and having a strong bitter taste, but not the disagreeable after-taste that the hydriodate has.

The general results of this investigation are that I have found the root of *Aconitum heterophyllum* to contain (1) a fat of soft consistence, probably a mixture of oleic, palmitic, and stearic glycerides; (2) aconitic acid; (3) an acid related to ordinary tannic acid; (4) cane sugar; (5) vegetable mucilage; (6) pectous substances; (7) atisine, the alkaloid already observed by Broughton, and probably another uncrystallizable alkaloid; (8) starch. The root contained 2·331 per cent. of ash that dissolved partly in water and partially in dilute hydrochloric acid.

It may be remarked that the experiments I have made in administering the alkaloid to rabbits show that it is not poisonous. It was, however, impossible to ascertain whether the alkaloid could be used as a febrifuge, as the quantity in the root was exceedingly small and the entire amount at my disposal was not quite 3 grams.

THE MIGRATION OF PLANTS FROM EUROPE TO AMERICA, WITH AN ATTEMPT TO EXPLAIN CERTAIN PHENOMENA CONNECTED THEREWITH.*

BY PROF. E. W. CLAYPOLE, B.A., B.SC. (LONDON), OF ANTIOCH COLLEGE, OHIO.

(*Concluded from page* 407.)

It is singular that while so many European species have forced their way into possession of the American soil, the cases of counter-migration are exceedingly few—so few that they may be counted on the fingers. It

* Paper read before the Montreal Horticultural Society, 1877.

appears as if some invisible barrier existed preventing passage eastward, though allowing it westward. One or two species may be named which, as exceptions, bring the general truth of this statement into stronger light. The Canadian Fleabane (*Erigeron Canadensis*), a native of North America, "is now established in nearly all temperate and hot countries, and occasionally appears so in England."* The Annual Fleabane (*Erigeron annuus*), though not in England, has become wild in some parts of Europe. Add to these two the so-called "Water Thyme" (*Elodea Canadensis*), and we have all the conspicuous examples with which the writer is acquainted of the eastward migration of American plants to Europe and their naturalization there. The last named plant was first observed about 1847 in the northern and midland counties of England and the south of Scotland, in Yorkshire, Leicestershire and near Berwick and Edinburgh.† How it was introduced is not known. Thence it spread until in about ten years many of the slower streams were almost clogged with it, and the writer well recollects that it was then difficult to row on the upper and middle Thames in consequence of the accumulation of this weed. Fears were even entertained that it would form a serious impediment to inland navigation. But in a short time the evil diminished, and after a few years, though still present, the quantity in the rivers became insignificant, and no inconvenience is now caused by its presence.

Such facts naturally suggest the question: Why are these things so? What invisible door bars the passage of the American flora to Europe, but admits the free passage of the European flora to America? One reply will naturally occur. Seed is mainly brought from Europe to America, and thereby a favourable chance is afforded for introducing the seeds of European weeds. This is so; and to this cause, doubtless, is due the immense number of introduced plants. But, if European seed is largely brought to America, American crops go much more largely to Europe; and it would be absurd to suppose that any crop gathered from the half cleared and weedy fields of this country could be sent thither without, at the same time, sending in abundance the seeds of our native weeds. All the ill weeds that grow in Canada or the States must, ere now, have been many times exported to the mother country. Yet they do not appear. It may be replied that the greater part of the corn crops are destined for the mill and not for the land, and that in this way their chances of propagation are largely diminished. Making all due allowance for this, should we not look for a rank crop of American weeds springing up around the mills from the cleanings and the waste? Yet such is not the case. With all the millions of bushels, moreover, that go to England for feeding purposes, and are never ground, there is the same result. The weeds no more take root and run wild than do the wheat and maize among which they cross the Atlantic. And when, in addition to this, we consider that there has been for two centuries an organized and regular introduction of American wild plants into European botanic and flower gardens, might we not reasonably expect to see at least a few of them, or of others which must have accidentally accompanied them, spreading outside of the limits of these gardens, and becoming naturalized in Europe? Yet nothing of the kind has occurred. Neither the rank and abundant Ragweed (*Ambrosia*), nor the widely diffused Golden Rods (*Solidago*), nor the Protean Asters (*Aster*), nor the wayside Pepper Grasses (*Lepidium*), nor the prolific Sumachs (*Rhus*), nor the clinging Burr-marigolds (*Bidens*), nor the ubiquitous and striking Milkweeds (*Asclepias*), have succeeded in naturalizing themselves in England. Even where a genus contains species on both sides of the Atlantic, as is the case with the Houndstongue (*Cynoglossum*), we find that the English species—the common Houndstongue (*C. vulgare*)—has migrated westward, and become so common near Montreal and almost everywhere in the eastern and midland States that Professor Gray can term it "a familiar and troublesome weed;" while at the same time, the common American species, or Beggar-lice Houndstongue (*C. Morisoni*), which the same writer brands as "a common and vile weed," is completely unknown in England.

Some may be inclined to urge that the comparatively cool English summer may not afford sufficient heat to perfect and ripen the seed, which the fiercer sun and continental climate of Eastern America can easily mature. This may account for the inability of some American species to sustain themselves in England, but it is evidently far from sufficient to solve the whole problem. Many of these plants can perpetuate themselves in the short, cool summer of New England and Lower Canada, and we might therefore reasonably expect, even if want of summer heat excluded them from England, that they would find a congenial climate somewhere in the warmer countries of Southern Europe. But not in England only, but throughout Europe, the absence of American species is remarkable. Difference of climate seems insufficient as the only or the chief factor in the solution of the problem, and we are compelled to look farther.

Nor, can it be urged as an objection that European weeds alone have come in. Without at present defining a weed, the reply is obvious that American weeds have not gained a foothold in Europe. It is not to be anticipated that large, conspicuous and slow-growing plants, such as forest trees, or highly developed and cultivated forms, such as garden-flowers, will often run wild. The former require too long a time to grow and propagate themselves, and are subject to too many dangers, while the latter are only maintained at their high standing by constant and careful cultivation. It is only, therefore, among the smaller and more insignificant plants that the facts here detailed can be looked for, and accordingly of such our list altogether consists. It may be that the forest trees of Europe, or some of them, will one day grow wild here. But the life of a tree is so long, and its growth so slow, that the experiment cannot be said to have been yet made. So far from planting and propagating European trees, men are bent in most parts of the country upon destroying their own. The present generation has not outgrown that insane hatred of trees which possessed the past, and was perhaps an almost unavoidable result of the severity of their struggle with the primeval forest. Timber is still contemptuously termed "lumber." No respect is felt for it, and consequently no European tree, if trying to run wild, would stand much chance of life during the attempt. A high authority on forest trees in this country has informed the writer that in his experience some European species have grown better than the American species of the same genus—that the English beech and larch, for example, surpassed the native beech and the tamarack. Time alone can prove this point.

The comparison, therefore, must be made, and can only be made justly, between the weeds of the two continents, or plants which come very near them and may be called almost weeds. By the term "weed" we mean those plants to which the surroundings are so suitable that they increase and multiply, year after year, more rapidly than others by which they are surrounded. Entering into details, the soil affords them the nourishment they need; the spring frosts do not kill them, or they bud and grow only when this danger has passed; they ripen their seed in quantity sufficient before the winter sets in; the heat of summer does not scorch them, nor the cold of winter destroy their roots or seeds; they are not so much injured by insects as to preclude their coming to maturity; while their flowers are sufficiently visited by insects to ensure the fertilization of their seeds, or else they spread so rapidly by underground stems as to render seed unnecessary. Granted all these conditions, and we have weeds of the first order, while the failure of any one of

* Bentham's 'Handbook of the British Flora.'
† *Ibid.*

more of them may reduce such a weed to the position of a very harmless and comparatively rare plant. In fact, the great abundance of a weed or wild flower in one year and its scarcity in another, is often due to its lacking one or more of these requisites. Weeds are the *homely* plants of a country, using the word in its true and original sense. A plant that is perfectly comfortable in its surroundings, if possessing considerable power of reproduction, becomes master of the situation, and is a *weed*.

The weeds of different countries must therefore differ because their conditions differ. For the same reason the weeds of different ages must also differ. Climate changes as geological time passes by, and all plants are not able to adapt themselves to these changes. It is frequently the case that a man placed in new circumstances is quite unable to adjust himself to them. His nature is not sufficiently plastic. So with plants. A wide range in time or space, with changing conditions can only be enjoyed by a plant whose nature is plastic or capable of change. Place a weed of stiff or unyielding nature in less favourable conditions and it cannot adapt itself to them. It becomes unhealthy and lingers on, as it were, by sufferance among stronger neighbours—no longer a weed —or it speedily dies out. But a weed possessing a plastic nature—one capable of being moulded by and to its new surroundings ere long adapts itself, if the change is not too great or sudden, to its new situation, takes out a new lease of life, and continues in the strictest sense *a weed*.

Is it not possible that some such cause as this may lie underneath the facts we detailed in the earlier part of this paper? The true and full explanation of the transfer of European species to America should at the same time explain the absence of American species from Europe. But the partial causes already alluded to fail to do this. There is a residual effect for which they do not account. May it not be true that the plants of the European flora possess more of this plasticity, are less unyielding in their constitution, can adapt themselves more readily to their surroundings, and thus secure their continuance in the New World? And may it not be the lack of this plasticity in the American flora which incapacitates it for securing a foothold and obtaining a living in the different conditions of the Old World? Under the care of the gardener they grow and embellish the gardens and conservatories of Europe, but without this care they speedily fail and die.

To point out the physiological basis of this property of plasticity is at present and will probably long remain impossible. But that such a property exists in both the animal and vegetable kingdoms is beyond a question. It is the secret of that variation which so strongly marks some species, while its absence is the cause of that fixedness which characterizes others. It is the secret of that quick response which some plants make to a change of conditions, and whereby they gain fresh vitality at the cost, it may be, of some slight modification of structure. Its absence, on the contrary, causes that indifference or resistance which characterizes others, and which is almost always followed sooner or later by the extinction of the resisting species.

Though, however, the indication of the exact physiological basis of this plasticity of constitution is as yet beyond our reach, it seems possible to point out one fact which not improbably has had some share in reducing the plasticity of the American flora. To approach a single short step nearer to the object of our quest, when that object is at present unattainable, is so much ground gained. We are all familiar with the effects of habit upon ourselves. We all know how easy habitual actions become; how strong is the tendency to perform them when the conditions recur under which they are usually performed, and how unwillingly we deviate from our daily course after following it for years. To this one fact—the power of habit—is due the uncomfortable, unsettled state of most men who make some great change in their outward surroundings late in life. Few who emigrate in old age ever become quite reconciled to their new home. The habits of many years have so moulded them in body and mind, and set them so firmly in their mould, that the plasticity they may have once possessed is gone, as bricks dried and burnt have lost the pliancy they possessed when in the form of clay. Of the physiological cause of this fact we know nothing, but the fact no one can doubt. Experience shows us that habit is no less powerful in plants than in animals. What a plant has been in the habit of doing that it will incline to do again. The physical organization of the plant, acted upon by the conditions that surround it, produces its habit. The longer these remain unchanged the longer do its habits continue, and the longer its habits continue the more firmly, we must infer, do they become engrained in its physiological structure. Thus do habit and organization act and react on each other. Each may be changed, but all such changes are slow, and we may easily, in view of these facts, believe that after many years or ages of unchanged conditions a plant may become (as many an old man becomes) so firmly set in its habits, so rigid in its nature, as to resist modifying influences with all the energy it possesses, and rather die than change. This is what we mean by losing its plasticity. A plant accustomed in the climate of England to occupy two months in perfecting its seed may, if suddenly removed to another country, continue its former practice or it may not. In the former case if the new climate does not afford the time required, the seed is not ripened and the species fails. If, however, the plant can adapt itself to the shorter season, and ripen its seed earlier, it may survive. But for this result a high degree of plasticity is needed. On the other hand if the change of climate be made more slowly, the habits and organization of the plant may keep pace with it, and with even less plasticity than in the former case, the species may survive.

We may advance at least one step farther. If these views on the relation of habit and organization to time be correct, have we not a possible, though at present a rude, gauge for both? If the strength of habit increases with time, may we not roughly measure that strength by the length of time during which the habit has prevailed? And further, if the plasticity of plant nature diminishes and its rigidity increases with the duration of a habit, may not this duration in like manner be employed to some extent as a gauge of rigidity; that is of want of plasticity? We stand here on new and difficult ground, and any deduction must be tested severely before reliance can be placed upon it. The confines of geology and botany, the place where the two sciences march together, is almost unknown territory over which science is just beginning to extend its conquests. The tracing of earth's existing flowers into her past, the genealogy of plants, is a subject closely connected with that other subject—the descent of species—which now so sorely divides the leaders in natural science. Nevertheless, we propose in the concluding portion of this paper to grope out into this unknown land where the light is so dim, and try to feel our way along the clue indicated above, in the hope of finding some link that may connect the apparently inconsistent facts we are attempting to reconcile—the abundant westward migration of plants from Europe, and their scanty eastward migration from America.

Have we then, at the outset, any reason to believe that the North American flora possesses less plasticity than the European? Let us apply the gauge just mentioned and see the result—the gauge of time. We are in the habit of calling America "The New World." Botanically and also, we may add, zoologically speaking, America is the older and Europe the younger. Europe passed ages ago through the stages of plant life which America exhibits to-day. The trees and plants of America, like most of her native animals, belong to old-fashioned, antiquated types—types that have passed away from European life, and now lie entombed beneath its surface in the records of geology. If we turn for a moment and consult these buried registers of births and deaths, we find that in ages past the existing families of America were living in Europe. Name after name may be turned up, long unknown and long forgotten where once it lived in the Eastern World, but faithfully recorded in these volumes and yet surviving through American relatives in the West. The woods of Europe, once contained trees identical with those now growing in the forests of North America. The miocene formations of Switzerland have yielded to the labour of Professor Heer, of Zurich, a rich harvest of fossil plants amounting to at least nine hundred species. The descriptions and illustrations of these may be found in his great work on the 'Tertiary Flora of Switzerland' (1855–59). These tertiary beds lie in the great valley between the Jura Mountains and the Alps, and bear the name of the Molasse. From other parts of Europe also, and from high northern regions, similar fossil remains have been brought to light, and our knowledge of the European tertiary flora, though still very fragmentary, is in a condition to admit of fair comparison with the existing floras of the world.

Space will not allow a minute enumeration of examples. Nor is it necessary for the purpose of establishing the assertion made above concerning the relationship of the living plants of America to the fossil tertiary plants of Europe. A few illustrations of the better known forms will suffice. Among the relics obtained from the beds at Oeningen are the leaves of a maple tree with flowers and seed. Europe possesses several maples, but these fossils resemble none of them, while they can scarcely be distinguished from the common Red Maple (*Acer rubrum*) of North America. Europe also possesses her Plane-tree (*Platanus orientalis*), but the fossil plane of Oeningen is not identical with this. It much more closely resembles the Western Plane or Button-wood (*P. occidentalis*) of America. The Miocene Vine of Oeningen is of an American type, and very closely allied to the Muscadine or Southern Fox Grape of Maryland and Kentucky. A Fan Palm (*Sabal major*) has been found in the Swiss Miocene. It belongs to a genus now known only in America, and found in the Southern States. The genus Taxodium, to which belongs the beautiful Bald Cypress (*T. distichum*) of the Southern cedar swamps, was once represented in Europe by a species so like the American that its remains can be with difficulty distinguished. The Tulip Tree (*Liriodendron tulipiferum*) is the queen of the forest in the Middle States. In Europe it has passed away, but its remains are entombed in the Swiss Miocene. Another of these tertiary fossils—an elm-like tree—was at first only distinguished from the American Planer Tree (*Planera aquatica*) by Professor Heer on account of the size of its fruit; but on seeing the specimens at Kew he admitted that no distinction could be drawn between them. The Giant Redwood (*Sequoia gigantea*) lingers in California, dependent upon the protection of man to save it from extinction. Though now replanted and flourishing in European shrubberies, it passed away from that continent, ages before the woodman's axe or the more murderous forest fire had begun to destroy. Of somewhat more recent date, but yet fossil, is the European Sweet Gum Tree (*Liquidambar Europœum*), a species closely allied to the Sweet Gum of the Eastern and Middle States of America (*L. styraciflum*), but the genus is now totally unknown in Europe. Again, the Black Walnut of America (*Juglans nigra*) lies buried in the Miocene beds at Oeningen, and Europe has imported the far superior walnut from Persia to supply its place. The writer has been informed that the late Professor Agassiz, on his arrival in this country, applied to a gentleman well known for his study of the American forest trees, and asked for a introduction to the Hickory family of America, remarking that all the members with which he was acquainted in Europe were fossil in the tertiary beds of his native land. Lastly, no fewer than eight species of Smilax, a genus scarcely known in Europe, but abundant in America, have been found in the Miocene of Switzerland.

We may here remark in passing that anyone desiring to see for himself the close resemblance between the European fossils and their living American representatives can do so by paying a visit to the Agassiz Museum at Cambridge where, in one of the upper galleries, may be seen a collection which has no equal or second on this side of the Atlantic.

It is just necessary here, in order to avoid leaving a flaw in the argument, to state that many of these species have been discovered in beds of equal or greater age in this country. It is therefore impossible to urge that they may have passed from Europe to America so lately that changes have not yet had time to develop themselves. On the contrary, some geologists are inclined to maintain that they existed in America before they appeared in Europe. At all events, we are warranted in asserting that during the Miocene age trees of the kinds named grew in Europe and America, as well as in Greenland and Spitzbergen and other points in the far north.

We do not propose here to investigate the causes of these changes. It is sufficient for our purpose to maintain the fact that during tertiary geological time the European flora has changed, and largely changed, while the American flora has remained stationary or nearly so. Plants which have changed in this interval thereby show an ability to change—a plasticity—which may be shown again should occasion arise. Plants which have not changed during the same interval show no proof of possessing the same plasticity. Moreover, if the principle is true that long existence without change strengthens the habits or increases the rigidity of the species, it is a necessary inference that the American flora, or so much of it as has existed during this long interval unchanged, must be less plastic than the present European flora which has during the same interval been so largely modified. So many ages of persistence in type cannot well be without effect. Little as we yet know of geological time, we cannot estimate the age of the Swiss fossil plants at less than 500,000 years, and it may well be twice as much. This would place the European flora just as far later or newer in age and in development than the American—would give it the advantage of so many years of slow change—and may be supposed in some degree to have maintained or developed that plasticity, to the possession of which we incline to attribute its ascendency over the native American flora. On the other hand, the native American flora, living unchanged through all these 500,000 years, may well have lost some of the plasticity it perhaps once possessed, and have become comparatively rigid, so that it is to that extent unable to adapt itself suddenly to the changed condition of Europe at present. It cannot therefore compete with the more plastic and more highly developed forms which it meets in the Eastern World; nor can it, in all cases, even hold its own against them on a soil and in a climate where it has dwelt for so many ages unmolested. The younger plant life of Europe, like the white man, is more than a match for the old fashioned life of this so-called New World of America, and the weaker fails in the struggle. Our country swarms with the weeds of Europe, while our own weeds shrink from the conflict both in Europe and at home.

Summing up the argument, in conclusion, we have pointed out:—

1. That many of the weeds of Europe have migrated to America.

2. That many of these have become so thoroughly naturalized here that they prevail over some of the plants native to the soil.

3. That only two or three American weeds hav crossed the Atlantic and become naturalized in England.

4. That the difference of climate and the conditions of mutual commerce do not fully account for this marked difference in the migrative power of the two floras.

5. That in the Miocene era the European and American floras were very much alike.

6. That since that era the European flora has been vastly altered, while the American flora still retains a Miocene aspect, and is therefore the older of the two.

7. That this long persistence of type in the American flora may have induced, by habit, a rigidity or indisposition to change in the American flora.

8. That the changes in the European flora since the Miocene age betray a plasticity of nature or power of adapting itself to circumstances of which the American flora gives no sign.

9. That in this view the European flora is better able to adapt itself to the strange climate and conditions—that is, to emigrate—than the American flora.

10. That being thus more plastic or adaptable it succeeds in the New World, while the less adaptable American flora fails in the Old World.

The writer wishes to add that in the above paper he has brought forward chiefly the instances of migration from England to America and *vice versâ*. A few other American plants might be found naturalized in other parts of Europe on closer examination, but the list, at best, would be exceedingly scanty.

PODOPHYLLUM.*

BY C. J. BIDDLE, PH.G.

Collections of the root were made in the months named below; it was washed, weighed and carefully dried.

March 3. 1000 grs. when dry weighed 220 grs. Loss, 780 grs.

April 3. 1000 grs. when dry weighed 233 grs. Loss, 767 grs.

May 7. 1000 grs. when dry weighed 245 grs. Loss, 755 grs.

July 16. 1000 grs. when dry weighed 340 grs. Loss 660 grs.

Oct. 12. 1000 grs. when dry weighed 317 grs. Loss, 683 grs.

It will be noticed by the above table that the weight of the dried root increases as the season advances until July is reached, when it is highest; it then begins to decrease, and in October it is much lighter.

A short description of the appearance of the plant at times of the different collections may not be out of place here. In March, when I made the first collection, it had not made its appearance above ground, but the bud was waiting for the heat of the spring sun. In April the plant was just coming above ground; in May it was in bloom; in July the fruit was mature, with the next year's portion of the rhizome near its full growth, and in October the stem of the plant had died away and the next year's rhizome, fully developed, including the rootlets and the bud, was seemingly waiting for spring to come.

The following table will show the yield of resin, etc. The root was treated as directed in U.S. Pharmacopœia for resina podophylli.

It will be noticed that the washings for March and April showed different and more marked results with reagents than those of the three months that follow. All were treated in the same manner and subjected to the same influences. I was unable to get a precipitate with Mayer's test with the mixed washings when they were dilute, so each washing was concentrated to about 6 fluid ounces, when a slight precipitate would show in the liquid near the top; in that of the three later months it could scarcely be seen.

	Yield of resin, in grs., from 1000 grs. of dried rhizome.	Colour of washings of resin.	Per cent. soluble in ether	Washings react with							
				Mayer's test.	Phosphomolybdic acid.	Ferric chloride.	Ferrous sulphate.	Chlorine water.	Argentic nitrate.	Alkalies	Lead acetate.
March	49·30	Reddish brown.	89	Precip.	Precip.	Dark green	No change	Slight coloration.	Heavy white precip.	Dark brown.	Yellow precip.
April .	52·40	"	84	"	"	"	"	"	"	"	"
May .	37·90	Light straw colour.	87	Very slight precip.	No precip.	"	"	Scarcely perceptible.	"	"	Scarcely any precip.
July .	28·30	"	90	"	"	"	"	"	"	"	"
Oct. .	32·40	"	78	"	"	"	"	"	"	"	"

The resins obtained show scarcely any difference in colour, all being light coloured with the exception of that from the April root, which is a little darker than the others, probably due to the chlorophyll of the young buds.

In evaporating the alcoholic tincture of the rhizome, when it had been reduced sufficient to pour in the acidulated water, every lot had small globules of oil floating on the surface.

The washings of March and April were dark coloured, and on evaporating deposited a precipitate; those of May, July and October were very light straw coloured, and also deposited a precipitate. This precipitate is probably a portion of the resin dissolved when it is washed, as I believe, with Professor Maisch, that a portion of the resin is soluble in water, and that which is dissolved is purgative.

I know of a case where a lady purchased five cents' worth of the rhizome, made a tea of it, and drank a portion (the exact amount is not known), and it had a decided cathartic effect, so much so that she returned to the store to ask if she had not been given the wrong article.

One thousand grains of the dried rhizome were boiled with three portions of water and expressed, and the resulting decoction was evaporated to the consistence of an extract, which weighed 540 grains, over 50 per cent. soluble in water. The portion remaining after making the decoctions was exhausted with alcohol and treated for resin; but the yield was scarcely perceptible, not more than two or three grains.

* From a paper read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy, October 21.

PHOSPHORIC ACID.*

BY W. F. HORN.

The acknowledged value of the compounds of phosphorus as remedial and nutritive agents has of late years rendered them particularly interesting to physicians

* From the 'Proceedings of the Pennsylvania Pharmaceutical Association, 1878—9.'

and pharmacists. The numerous papers that have been written, and the discussions which have occurred, abundantly testify to the fact.

Among these compounds, phosphoric acid has received no small share of attention—the modes of manufacture in particular—and the subject has not yet lost its interest. The object of this paper is to bring to your notice a new process, which in the experience of the writer has proved especially satisfactory, and to propound a theory which, in his judgment, best explains the facts. The process is as follows:—Pour 3 fluid ounces of water into a pint or larger flask, beaker glass, or evaporating dish. Put into it 6 drachms of phosphorus (deprived of its coating), observing that it lies in such a position as to be covered by the water. Drop into it 2 grains of iodine, and move the flask gently so that the iodine and phosphorus may come into contact, and lastly, add all at once, 4 troy ounces of nitric acid, U.S.P.

The action begins at once, and the vessel is set aside, the mouth being left open; and no further attention is required until the oxidation is completed, which requires from twenty-four to thirty-six hours.

Under ordinary conditions of temperature and pressure, the rapidity of the oxidation depends upon the amount of iodine used, and should the necessity arise, the process can be proportionately shortened by taking four, six, or more grains, but in that case the vessel must be set in water at the temperature at which it runs from the hydrant. On the other hand, if there is no urgency, one grain, or a fraction of a grain, will accomplish the same purpose in a longer time. After the oxidation is completed, the product is evaporated and finished, as the Pharmacopœia directs.

The advantages of this process are economy of time, attention and material, and absolute safety from explosions. The process may be continued indefinitely, and indefinitely large quantities of phosphorus may be oxidized to phosphoric acid by the addition of new portions of phosphorus and nitric acid as fast as they are consumed, no further addition of iodine being necessary. A much less quantity of nitric acid will accomplish the work, under favourable conditions, owing to the peculiar property which nitric oxide possesses of absorbing oxygen spontaneously from the air, thereby being converted into hyponitric acid, in which condition it is ready to act again on the phosphorus, somewhat similarly to its action in the leaden chamber process for sulphuric acid.

So much for the facts; now for the theory. Brodie, in 1852 (*Chem. Soc. Journ.*, p. 289), discovered that "a small quantity of iodine can convert an almost indefinitely large quantity of phosphorus into the amorphous modification." He supposes the reactions to proceed as follows:—The first stage "is the formation of an iodide of phosphorus, probably the di-iodide, in which the phosphorus exists in the amorphous modification." "This compound is then decomposed with the separation of amorphous phosphorus and formation of a more volatile iodine product, which reacts upon the second portion of phosphorus, reproducing the first decomposable iodide, and so on continually." Again, amorphous phosphorus is acted on directly and rapidly at a comparatively low temperature by nitric acid.

The writer's theory then is, that as the iodine combines successively with the different portions of the phosphorus and liberates them in the amorphous condition at a high temperature, the nitric acid acts rapidly on this phosphorus in the nascent state and oxidizes it to phosphoric acid.

The writer has not failed to consider the experiments of Pettenkoffer, but the cases are dissimilar. Pettenkoffer produced hydriodic acid, by the action of iodine on phosphorus, and then by the double chemical decomposition of the phosphoric iodide with water. The products of the reaction were hydriodic acid, phosphoric acid and phosphorous acid. The first was distilled off, and the latter completely oxidized by the use of nitric acid, so that hydriodic acid and phosphoric acid were the ultimate products. But he used the iodine in saturating quantity, combining the whole of the phosphorus at once, and again the mutual decompositions and recompositions were effected in the absence of nitric acid. It is improbable that the phosphorus, in the presence of a powerful oxidizing agent like nitric acid, would draw on the water for its oxygen: more so, in view of the fact that hydriodic acid is so very unstable, especially in contact with nitric acid. It matters very little, however, on what theory the facts may be explained, in view of the practical results obtained.

ROSE-FARMING AS A COLONIAL INDUSTRY.*

Rose-growing for perfumery is a branch of industry which appears to deserve the attention of some of our colonial friends in localities where the agricultural conditions are favourable and labour cheap. The pursuit would be an attractive one, and tried on a suitable scale, large enough to pay, but not so large as to disturb the market, it might, we consider, be made a very remunerative affair. The pure "attar" or "otto" of roses—never very abundant at the best of times—has risen enormously in price since the despoliation of the Turkish and Bulgarian rose-farms during the war of 1877–78; indeed, we are informed, it is now rarely to be found in the European market, and for this article, even more than the rose-water, a ready sale could doubtless be commanded.

A short account of the methods of growing and manufacturing attar and rose-water followed in Bulgaria and in India may supply some useful hints and suggestions to those disposed to give the subject consideration.

Colonel Baker—not Valentine Baker, by the way—in his recent work on Turkey, gives the following account of the method pursued at Kezanlik, a small district south of the Balkans and about 1500 feet above the sea level, which is or was the centre of the industry:—

"The flowers have the appearance of our common dog-rose, and are of the varieties *R. damascena*, *R. sempervirens*, and *R. moschata*. The last affords the chief ingredient of the attar. The natives know very little of varieties, and are concerned only with the profits they can make out of the oil. The rose is grown by the farmers in every village in the district, and requires a sandy soil on sloping ground exposed to the rays of the sun. The greatest care is bestowed on the cultivation and on the harvesting of the crop. A rose-garden may be laid down in spring or autumn, in ground that has been well cleared and ploughed. The young rose-shoots are torn off larger plants, so as to carry with them a portion of the roots, and these are laid, almost horizontally, in trenches about 1 foot deep and 5 feet apart, so as to form a future hedge; they are then covered with earth and manure and carefully trodden down. Under favourable circumstances the shoots will appear at the end of six months, when they should be earthed up, and the plants will be over a foot high by the end of the year. In the second year they yield a few flowers; but they are not a source of profit till the third year. They are in full bearing in five years, at a height of about 6 feet, and last for about fifteen years, when the trees cease to flower. They require earthing-up four times a year, and should be manured every second year; but, although the manure increases the quantity, it interferes with the quality of the attar. No pruning is required except cutting off dead branches. Very severe cold kills the trees, and those of the whole district were thus destroyed in 1870. Hoar-frost and foggy misty weather are also injurious to the crop, and hot weather during distillation interferes with the yield of oil. The harvest begins in May, and lasts about twenty days. The farmer counts the buds upon his trees, which he makes a

* From *The Colonies and India*, November 15, 1879.

divisor for the whole, and so counts the number of buds which will blossom daily, and the number of days his harvest will last. The flowers must be gathered before the morning dew is off them, and be distilled at once. Herein lies the difficulty, because it is impossible to judge, even approximately, of the rapidity with which the buds will open; consequently, unless a very large staff is kept, so as to pick off all the blossoms of a heavy crop in the short space available, and unless a number of alembics are ready to distil them, a great part of the crop may be wasted in the case of rapid blowing. When the temperature during harvest is cold and damp, the blowing is gradual; when hot and sunny it is rapid.

"The yield of attar varies, but, on an average, it takes 4000 rose-blossoms to make 1 lb. of oil. Best quality attar varies in price from 17 to 18 Turkish piastres the miscal, or 15*s.* 4*d.* to 16*s.* 10*d.* the ounce; inferior qualities, 14 to 15 piastres the miscal. The mode adopted for testing the purity of different qualities of oil is to put the essence into flasks, which are immersed in water of 63 to 68 degrees Fahr., when, if good, it congeals. This is considered the purest oil. A stony, sandy ground, impregnated with iron, produces the best oil, while a hard, badly cultivated land will only yield an inferior quality, which will not congeal at temperatures above 52 degrees Fahr. . . . . An English acre produces 4000 lbs. to 6,000 lbs. of blossom in fair years, and 34½ lbs. of blossom produce 1½ drachms of oil, which may be said to be worth in this market 4*s.*"

The roses, it may be added, are put in the stills without detaching the calices, the charge being 25 lbs. to 50 lbs. of roses per still. The above description was written previous to the war, it should be said. The last really good year in Bulgaria, 1873, produced a rose-crop valued at 70,000*l.*

At the recent Agricultural Exhibition at Kilburn, Messrs. Piesse and Lubin exhibited a vase of attar distilled by MM. Pappazouglou Brothers, of Constantinople, from roses grown in the Kezanlik district, the price of which was marked 35*s.* per oz.

Turning next to India, we find roses grown for attar and rose-water at Lahore, Umritzur, and elsewhere, but the chief site of the industry is Ghazepore, on the Ganges, where about 150 English acres in the suburbs are grown with *Rosea damascena* for that purpose.

According to information quoted by Dr. W. W. Hunter, in his 'Statistics of Bengal,' the ground is divided into small fields carefully protected on all sides by high mud walls and prickly pear fences to keep out the cattle. These fields, which belong to the zemindar, are planted with rose-trees and let by the year, at so much per *biggah* for the ground, and so much extra for the trees on it. The rent is generally 5 rupees per *biggah* for the ground, and 25 rupees extra for the rose-trees, of which there are 1000 on each *biggah.* If the season be good, these 1000 trees should yield 1 lac of roses, the value of which will vary with the year from 40 to 70 rupees, *i.e.*, 4*l.* to 7*l.* The purchases are always made at so much per lac. The rose-trees come into flower in March and continue so throughout April. The flowers are plucked in the early morning by men, women and children, and are conveyed in bags to the contracting parties for distillation into rose-water. The growers themselves rarely distill. The stills are of the most primitive make. There is a great variety of rose-water manufactured in the bazaar, and much that bears the name is nothing more than a mixture of sandal-oil. The best rose-water procurable may be computed as requiring 1000 roses to a seer of water, which yields 1½ seer of rose-water. The boiler of the still holds from 8000 to 12,000 or 16,000 rose-blooms. On each 8000 roses 10 to 11 seers of water are placed, and 8 seers of rose-water distilled. This is placed in a glass carboy, and exposed to the sun for a few days to become *pucka*, or ripe; it is then stopped with cotton and luted with wet clay to prevent the scent escaping. The 8 seers of rose-water will fetch 12 to 16 rupees. The value of the roses sold at Ghazepore is estimated at 15,000 to 20,000 rupees per annum, and the profit thereon, at the prices asked and given, 40,000 rupees (£4000).

To procure the attar or otto the roses are put into the still and the water passed over gradually, as in the rose-water process; after the whole has come over, the rose-water is placed in a large metal basin, which is covered with wetted muslin to prevent insects or dust getting in. The basin is then let into the ground about two feet, the ground having previously been watered, and allowed to remain quiet all night. This is always done at the beginning of the season, when the nights are cool; in the morning the little film of attar or oil which has collected on the surface during the night is removed with a feather and placed in a small phial, and day by day, after the collection has been made, it is placed for a short period in the sun, and after a sufficient quantity has been procured, is poured off clear into fresh phials.

From one lac of roses it is estimated that 180 grains or one *tolah* of attar can be obtained, or more if the roses are full-sized and the nights at the same time cool enough to admit of perfect congelation. The attar sells in India at 50 to 90 rupees the *tolah.* None has hitherto been exported.

In both cases it will be seen the processes of culture and manufacture are of the most primitive kind. In skilled hands they might, no doubt, be materially improved at comparatively small cost, and the profits, already considerable, increased proportionately.

LIQUID EXTRACT OF ERGOT FOR SUBCUTANEOUS INJECTION.*

BY P. YVON.

Subcutaneous injections of ergotine are very difficult to make with the aqueous extract of ergot generally known as ergotine. In fact this extract when dissolved is muddy, thick and requires to be filtered; the solution then gives only feeble results, as the best part of the extract remains upon the filter. I therefore prefer the following formula:—

The ergot is coarsely powdered and deprived of its fixed oil by treatment with carbon bisulphide; afterwards it is dried in the open air, sheltered from light, until the odour of the solvent has totally disappeared. The powder is then introduced into a displacement apparatus and exhausted in the cold with distilled water containing four parts in a thousand of tartaric acid. This liquid is heated so as to coagulate albuminoid matters and then reduced in a water-bath to about one-third of its volume, allowed to cool and filtered. It is then treated with a slight excess of freshly prepared carbonate of lime, so as to saturate the excess of tartaric acid, filtered, evaporated to a syrupy consistence and precipitated with 90° alcohol. After another filtration it is decolourized with washed animal charcoal, again filtered and evaporated so as to drive off all the alcohol. It is then taken up a second time with distilled water and to this solution is added 0·15 gram of salicylic acid for each 100 grams of ergot, and it is completed with water or cherry-laurel water so as to make a liquid equal in weight to that of the ergot employed. The extract is allowed to deposit some days in a cool quiet place and then divided into small bottles.

The liquid thus obtained is of a fine amber colour and keeps perfectly. It gives an abundant precipitate with all the reagents for alkaloids and represents the active principle of an equal weight of ergot. As an injection one gram of the liquid gives excellent results.

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* *Revue Médicale* for November 15.

The Pharmaceutical Journal.

SATURDAY, DECEMBER 13, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PATENT MEDICINES.

THE great and growing increase in the demand for secret nostrums is a circumstance that must almost necessarily be highly prejudicial to the legitimate practice of medicine, no less than to that of pharmacy. Though there seems to be little prospect of preventing the public from being influenced by stories of wonderful cures and thus led to seek relief by the use of some of the secret preparations that are now so persistently recommended to them by advertisement rather than have recourse to the advice of a legally qualified medical practitioner, it does seem feasible that the trade in secret preparations or patent medicines might be subjected to some kind of regulation. We cannot pretend to have any opinion as to the merits of these preparations, since the secrecy thrown over their nature and composition renders that impossible except by the aid of analysis, which would at best only give uncertain results. We cannot, therefore, say that in some cases these preparations may not be possessed of all the virtues that are claimed for them, and it would not be a matter of much importance if we could do so, since it is to faith or credulity, and not to reason or common sense, that the recommendation of these secret preparations is addressed.

But without raising any question as to the intrinsic merits of secret preparations, or as to the propriety of recommending them for the relief of disease, the way in which the trade in these articles has lately been developed is a matter that it is impossible for the recognized vendors of medicine to disregard. The effect of the trade in these preparations is no longer merely one which limits the practice of pharmacy as well as medicine, but it is of such a nature as to tend towards entirely superseding the pharmacist, as well as the physician. There is no longer the fatal attraction of a good trade profit to induce the chemist and druggist to engage in the sale of patent medicines, and to contribute as far as he can to the promotion of a system that would eventually make him a superfluity, for under the conditions that now prevail the trade in patent medicines is carried on so as to do away with the possibility of the former profit to the chemist and druggist and put him out of the field altogether.

Under these circumstances it is natural to find correspondents in this Journal inveighing against the competition set up amongst them by the sale of patent medicines and similar articles at rates consistent only with such business as is carried on by the grocer or oilman. No pharmaceutical skill is required in selling a patent medicine; no experienced knowledge of the materia medica is necessary, nor any acquaintance with the characters and doses of potent drugs; a grocer's apprentice can hand over the package and take the price of it as well as the most scientifically trained pharmacist. Consequently, it is not at all unfrequent that chemists and druggists find themselves suddenly cut off from what was formerly no inconsiderable portion of their business and see this transferred to establishments with which they are wholly unable to compete.

How this state of things is to be remedied in the interest of chemists and druggists is a question to which many of our correspondents have addressed themselves, but notwithstanding the various suggestions that have been offered we appear to be as far as ever from combating the evil. Some have advised the entire abandonment of the patent medicine trade, others have recommended carrying on the trade so as to compete with the co-operative stores and other dealers who sell them at reduced rates; but we do not think that either course would be productive of much benefit to the chemist and druggist regarded simply as a trader. The former plan would have the advantage of being sound in principle from a pharmaceutical point of view; but there is reason to question its expediency, since patent medicines have so much popularity with the public, and they are so much in demand, that a refusal to sell them might be productive of damage to the pharmacist's more legitimate business. This has actually been found the case in some parts of Germany where there are numerous English residents, and although it is in that country generally considered to be unpharmaceutical to deal in secret remedies, the necessity of meeting the demand for them on the part of customers has been found imperative, or as an alternative result, business has been lost.

The plan of meeting the competition in patent medicines by selling them at what are termed "store" rates is one that may be said at first sight to be compatible only with a low class of business, and it would not in any case be a remedy conducive to the general interests of pharmacy. A recent correspondent has suggested the adoption of this course in a somewhat heroic fashion which, he thinks, would be quite effectual. He proposes that the chemists and druggists of a particular locality should unite and form a Patent Medicine Defence Association, each member subscribing a small sum annually, so that whenever patent medicines are sold by anyone in the neighbourhood for less than the advertized prices a shop should be opened by the association where patent medicines should be given away or sold at a mere nominal price until the competition was suppressed. Our correspondent is of the opinion that in a brief period this procedure would suffice to bring the short-sighted under-sellers to their senses, and impress upon them that business cannot be carried on without a fair remuneration. We confess that we do not share this opinion, and are far from being so sanguine as our correspondent as to the probable consequences of the plan he suggests.

Another correspondent suggests that the best way of stopping or, at any rate, curtailing the sale of patent medicines by others than registered chemists and druggists would be to increase the payment for the licence to deal in patent medicines to as much as twenty or thirty pounds a-year. Doubtless, such a step would put a stop to the sale of patent medicines by many small shopkeepers, and if it could be carried out, some good might be done in the interest of chemists and druggists. We have always thought that the reduction of the charge for the selling licence was a great mistake in this respect. Now that the licence can be obtained for the trifling sum of 5*s*., it is within the power of a large number of small dealers to qualify legally for the sale of patent medicines, and thus to take away from chemists and druggists a considerable share of the trade that ought to be restricted to them.

But if an attempt were made to increase the charge for licences there is reason to expect objection would be offered by the proprietors of patent medicines and the wholesale dealers in them. From their point of view the small shopkeepers and the "stores" serve as well, for the retail sale of their articles, as the educated pharmacist, and it might be difficult to convince them that they would not be prejudiced to some extent by transferring the trade from a large number of grocers, drapers, booksellers and general stores to the hands of a much less numerous class of tradesmen.

As regards those preparations which contain poisons or drugs of dangerous potency, another consideration, viz., that of public safely, is involved. In regard to patent medicines of this class at least there is a more reasonable prospect of restricting the trade to registered chemists and druggists by means of the provisions of the Pharmacy Act.

WEIGHTS AND MEASURES.

As it may be useful to some members of the trade to know what is being done in regard to the inspection and verification of apothecaries' weights and measures, we take this opportunity of stating that we have received a letter from Mr. T. Fell Abraham, of Liverpool, in which he informs us that, as Local Secretary for that town, he has called upon the inspector of weights and measures, as suggested in the Journal of 29th ult. Mr. Abraham finds that this inspector has been supplied with local standards for 1, 2, and 4 fluid ounces, and for 1, 2, and 4 fluid drachms, also with a 30 minim graduated tube of the kind represented at page 430. None of the other appliances there described have, as yet, been received by the Liverpool inspector, nor has he received any instructions from the corporation to put the provisions of the new Act into force. We shall be glad to learn from the Local Secretaries in other places what progress is being made.

PROPRIETARY ARTICLES AND THE PATENT MEDICINE STAMP ACT.

It appears from the letters of some correspondents that in Sheffield a somewhat unexpected activity has been manifested by the Excise authorities in regard to certain articles sold by chemists and druggists with labels that are held to render the use of patent medicine stamps necessary. Upwards of forty chemists, we are informed, have been fined in sums varying from five shillings to five pounds. In one or two instances the Excise officers have bought a gross of "penny pills" and the sellers have received notice from the Somerset House authorities that they are liable to a penalty of ten pounds for each box sold. The action thus taken is most probably due to the use of labels in which the pills or other preparations are described as being prepared solely by the seller, and as being useful as remedies for certain forms of bodily ailment. We are informed that many of the condemned labels had been in use for a number of years and were considered to be quite safe.

Unfortunately, we have not been able to obtain any particulars of these cases, and cannot, therefore, do more than speak of them in general terms, but this reference to the subject will suffice to point out the desirability of inquiring whether the labels used for such articles may not be of a nature to involve the stamp or liability to a penalty for infringement of the Act. In some instances it is difficult to decide this question, and it is always best to send the labels to Somerset House, and ask whether they require a stamp or not.

HONOURS TO PHARMACISTS.

Another addition to the number of pharmacists who hold the position of magistrates has lately been made by the appointment of Captain J. G. F. Richardson, of Leicester, now a Member of the Council of the Pharmaceutical Society, as one of the magistrates of that borough.

The election of Mr. C. J. Blelock, Chemist and Druggist, as Mayor of Chester, also, has been the occasion of a very graceful compliment from his *confrères* in the city, an address congratulating him upon his attainment to the dignity, signed by twenty-five members of the trade, having been presented to him by Mr. T. Shepheard, on behalf of the chemists and druggists of Chester.

Provincial Transactions.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

On Tuesday evening, Nov. 18th, a lecture was delivered by Mr. J. Young, on "The Ethylic Alcohols of the B.P." Mr. Thirlby in the chair.

The lecturer commenced by referring to the etymology of the word alcohol, and proceeded to define an alcohol as "a compound of a hydrocarbon radical with hydroxyl." Some time was spent in discussing the chemistry of the alcohols in general, and coming more particularly to the consideration of ethylic alcohol, the lecturer treated of its derivation, the process employed in its manufacture and rectification. The researches of Fownes, by which he obtained an absolute alcohol of the specific gravity 0·79380 and their bearing on the absolute alcohol of the B.P. specific gravity 0·795, were noticed, and also the loose way in which, until lately, alcohol was defined to be proof, or over, or under proof. The lecturer showed by experiment that alcohol considerably stronger than proof spirit does not ignite gunpowder when inflamed. Proof spirit was defined to be "an alcohol containing 49·24 per cent. of absolute alcohol." Some interesting experiments on the contraction of mixtures of alcohol and water, were also performed.

A vote of thanks to the lecturer was proposed by Mr. Thirlby, seconded by Mr. Edwards, and carried unanimously.

DOVER CHEMISTS' ASSOCIATION.

The annual meeting of the above Association was held on Friday, November 7.

Mr. Cotterell and Mr. Wilford were re-appointed to the respective offices of President and Secretary for the ensuing year.

After the transaction of business, the members adjourned to the supper table and a pleasant evening was passed.

In replying to the toast "Success to the Dover Chemists' Association," the President expressed his gratification at the continued success and usefulness of the Association, which had now entered upon its fourth year, and hoped that in the future these would be increased.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The annual meeting was held in the Great Western Hotel, on Tuesday, the President, Mr. W. Southall, F.L.S., in the chair. In spite of the unfavourable weather there was a very fair attendance.

The annual report, which was read, spoke with satisfaction of the financial condition of the Association, there being a balance of £57 6*s.* 5*d.* remaining in the Treasurer's hands after payment of all expenses. After referring to the settlement of the action of the Apothecaries' Company *v.* Shepperley, and the death of Mr. Alfred Bird, for many years a valued member and supporter of the Association, the report stated that during the past winter a series of highly interesting and instructing lectures had been delivered, at which the attendance had been very encouraging. The annual *soirée* also, which had been held in the Town Hall, had proved very successful. With regard to the grant which was voted at the last annual meeting to the Chemists and Druggists' Trade Association of Great Britain, the committee said that the hope then expressed had been fully realized, and that many other local Associations had followed the example of the Midland Counties Chemists' Association in voting a grant of money to the above society. The librarian had reported an increased circulation of books, especially among assistants and students, and it is hoped that the new catalogue which is about to be issued will cause a further increase of circulation. Some time ago, on the application of the secretary, the Pharmaceutical Society presented to the Association a parcel of materia medica and dried botanical specimens, and the committee expressed a hope that this example may be followed by pharmacists, and the nucleus of a valuable museum of materia medica may be thus formed. The educational work has proceeded satisfactorily during the past year, but no student has claimed the grant of money in part payment of lecture fees. Finally it was reported that the prices at which patent medicines are sold have had the serious consideration of the committee, but notwithstanding much deliberation it was not yet prepared to recommend any distinct course of action.

The Chairman, in a speech of some length, commented on the report and eventually moved the adoption of it. This was carried.

The Treasurer, Mr. Lucas, proposed that £5 be voted for the purpose of affording temporary relief to any well authenticated case of distress among chemists, and this was agreed to, the treasurer to administer the fund. A sum of money was next voted for the purchase of a bookcase for the library, and £5 was voted for the purchase of new books, the secretary being instructed to draw up a new catalogue of the library and send a copy to each member and asssociate.

On the motion of the Chairman, Mr. J. Green was elected President; Messrs. Holdsworth and Wilcox Vice-Presidents; Messrs. Gibson and Morris Auditors, and Mr. Lucas Treasurer. The following gentlemen form the committee for the year:—Messrs. Arblaster, Bellamy, Barclay, R. Brown, A. Bird, Gibson, Stirling, Grieves, Haydon, Jones, Morris, Partridge, W. Southall, A. Southall, Wilcox, jun.

The committee appointed the following sub-committee to carry out the *soirée* arrangements:—Messrs. Price, Careless, Howes, Bellamy, Arblaster, Thouger, Walker, Haydon, Mantell, Bate, Morris, Grieves, Gould, A. Bird, Barclay, Brown, McCredie, Partridge, Gibson, W. Southall, A. Southall.

A lengthened discussion took place upon the subject of the prices of patent medicines, but no resolution was proposed. There was no other business of importance.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The second meeting of the session was held in Anderson's College, 204, George Street, on Wednesday, December 3, at 9 p.m. Mr. Alexander Kinninmont, F.C.S., President, in the chair.

After the minutes of the previous meeting had been read and adopted, the President called upon Dr. J. S. Whittaker to give a lecture on the "Chemistry of Digestion."

Dr. Whittaker commenced his lecture by a general survey of the various parts of the alimentary canal directly employed in the process of digestion, and with the aid of a large diagram he showed the way in which food introduced into the mouth, after being torn by the teeth and mixed with the saliva, was carried into the stomach to be acted upon by the gastric juice, etc. As the food of mankind consists of various elements, starch, albuminoids and fats, the various juices of the alimentary canal act differently on them; thus the saliva converts starch into glucose but does not act on albuminoids; pepsin of the gastric juice acts on albuminoids but not on starch or fat. Dr. Whittaker, after describing the digestion of food in the stomach, as carried on by the pepsin of the gastric juice in presence of hydrochloric acid, passed on to notice the functions of the liver and pancreas. Although it is known that the bile from the liver aids digestion in the large intestines, yet its real function is not known, and it cannot be said with certainty what is the true part played by the bilious secretion in the human body. After stating the large amount of bile secreted, Dr. Whittaker directed attention to the pancreas, an organ that has occupied the attention of physiologists somewhat largely of late as to its true function in the economy of digestion. From late observations it has been shown that the secretion of the pancreas acts on the various classes of food, viz., starch, albuminoids, and fats; it acts like the saliva and gastric juice together. One of the active principles of the pancreas is called tripsine; it acts on albuminoids. The action of the pancreatic juice in the duodenum was then described by Dr. Whittaker, and its power in changing starch into glucose, dissolving albuminoids, and emulsifying fats and causing them to be absorbed into the system. All the foregoing results could be obtained artificially by using the various medicinal preparations, *e.g.*, pepsine for albuminoids, malt extract for starch, and pancreatic juice either for starch, albuminoids or fats. But the lecturer remarked that the medicinal value of these articles depended greatly on careful preparation, for that from overheating in preparation the majority of commercial specimens of malt extract are inert ; in preparing therefore the fluid from the pancreas artificially great care must be taken not to destroy its activity by too much heat. In continuation the lecturer said that the aqueous extract of the pancreas of the cow or hog contained tripsine, etc., it was therefore useful in some cases of deranged digestion. The extract is best given, if to aid intestinal digestion and the absorption of fats, about two hours after food along with 15 grains of bicarbonate of soda dissolved in water, the soda being to prevent its action being impaired by the gastric juice in passing through the stomach. Dr. Whittaker concluded his lecture by stating that food, artificially digested by the aid of ferments, diastase, pepsine and pancreatine, develops a nauseous disagreeable taste; hence in order to digest milk, wheaten gruel, etc., artificially by the aid of aqueous pancreatic extract and keep it palatable, the process must be arrested before it is completed by raising the temperature to the boiling point.

The Secretary, Mr. John C. Hunter, showed a specimen of the aqueous extract of the pancreas made by Dr. Whittaker's directions, also a specimen of pancreatized cod liver oil prepared with pancreatic liquor made according to Mattison's process, *vide* 'Year-Book of Pharmacy, 1874.' He found that the cod liver oil emulsified very well with the fluid, and it required no gum tragacanth.

After a few remarks from the President, Dr. Whittaker was awarded a very hearty vote of thanks for his instructive and interesting lecture. The meeting then separated.

EDINBURGH CHEMISTS' ASSISTANTS' ASSOCIATION.

The third meeting of the second session of the above Association was held in the rooms of the Pharmaceutical Society (North British Branch), 19A, George Street, on Thursday, December 4. The President, Mr. D. McLaren, occupied the chair.

The minutes of the preceding meeting having been read and confirmed, the Secretary, Mr. J. H. Fisher, read a paper on "Superstition."

In introducing the subject, he remarked that to a large extent superstition had been, and still was, mixed up with the trade of a pharmacist, and pointed out that its agency was very often the cause of remarkable cures. The very fact that the public gazed with awe and wonder on the mysterious operations, quaint symbols and unintelligible writings of the dealer in drugs, was largely taken advantage of, and innumerable preparations bearing the name of medicine—some of them utterly worthless and often pernicious—were palmed off upon the unsuspecting and credulous. Passing from pharmacy proper, the essayist gave a short sketch of witchcraft, and the means employed by its devotees to obtain their desired ends, and showed that their success rested wholly on the superstition of the common herd. The struggles of the alchemists to obtain the "elixir vitæ" and the "philosopher's stone" were noted, as well as the complex calculations of the astrologers in order that they might open up a future closed to all mortal eyes save their own. Mr. Fisher then referred to the mythologies of several countries, and noticed in conclusion the spiritualism of the present day, remarking that superstition could not be said to have disappeared, so long as Dr. Slade and his no less popular transatlantic compatriots could so easily batten on the purses of our gullible countrymen.

The paper was criticized at some length by Mr. Mahen, who concluded by moving a hearty vote of thanks to Mr Fisher, which was seconded by the President, and carried by acclamation.

The President intimated that the committee had fixed upon "Rhubarb" as the subject of the essay for apprentices' prize, and having read over the regulations to be observed by intending competitors, he invited all apprentices who were members of the Association to become competitors.

The President then gave a detailed account of the steps he had taken in the subject of shorter hours, and intimated that for the present the committee had no hope of attaining the object in view. After considerable discussion, it was resolved to discontinue the committee, and defer all further consideration of the subject until the annual meeting in April.

The next meeting would take place early in January, when there will be a debate on the admission of women as members of the Pharmaceutical Society.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on December 4, Mr. Warren De La Rue, President, in the chair.

The following certificates were read for the first time:— J. C. Evans, W. H. Glazier, K. W. Hedges, R. Howell, J. Hogarth, J. McCarthy, A. K. Miller, W. O. Prosser. An election of Fellows was to have been held, but as less than forty Fellows were present, the ballot could not be taken. The President expressed a hope that all members would endeavour to be present at the next meeting (December 18), when, if possible, the ballot would take place.

The following papers were read:—

The Comparative Value of different Methods of Fractional Distillation. By F. D. Brown.—When fractional distillation is carried out on a large scale, either or both of two well defined processes can be used. In the first, "washing," the mixed vapours are passed through several layers of liquid obtained by their own partial condensation; in the second, "cooling," the mixed vapours are partially condensed by allowing radiation to take place or by passing them through a coil kept at a given temperature. In both processes the liquids of highest boiling point are kept back and a better distillate is accordingly obtained. A possible explanation of the success of the first process is that by obstructing the passage of the vapour, the successive layers of liquid give it more time to cool; from this point of view the two processes are identical. In the present paper the author has endeavoured to determine whether there is any essential difference between "washing" and "cooling" or not. The mixture employed throughout the experiments was the one used by the author in his previous research and consisted of carbon disulphide and benzene. The dephlegmator advocated by Linnemann, Bel and Henninger, etc., was first compared with a glass tube, 600 mm. long, inclining gently upwards, exposed freely to the cooling influence of the atmosphere, etc. As a result of several experiments it was found that the distillation with the long cooling tube yielded slightly better results than that in which the vapour was washed by passing through the dephlegmator, and that both the dephlegmator and the cooling tube produced better distillates than the retort or the flask with T piece usually employed. These results were to some extent, however, vitiated by the fact that the distillations were not carried out in equal times, and in order to render the results more strictly comparable, the author constructed a long glass tube and fitted it up with a movable series of disks of wire gauze (each disk containing a short brass tube, trapped at the bottom to prevent the vapour passing up the tube instead of through the layer of liquid condensed on the wire gauze), so that this tube could be used either as a simple cooling tube or by inserting the disks could be converted into a dephlegmator. Great care was taken to make the times of the distillation as equal as possible. As a result of these experiments the author concludes that "washing" and "cooling" are not identical processes and that the dephlegmator has a special value and gives better results, other things being equal, than the simple cooling tube. The author then contrived a more exact and delicate process of cooling by means of which the still-head could be kept at the lowest possible temperature compatible with the passage of vapour into the condenser. This was effected by passing the worm of the still through a strong copper box which is partly filled with a liquid boiling about the temperature desired; the vapour from this boiling liquid is condensed in a worm which returns the liquid to the box, the box, worm, etc., being air-tight and constructed of stout copper. The final adjustment of temperature was obtained by connecting this air-tight system with a pump, so that the pressure under which the liquid boiled in the box could be varied at will; by this means the vapour round the still-head could be kept at a constant temperature for an indefinite period, or could be varied without much trouble by alteration of the pressure. By using this apparatus and charging the box with carbon disulphide and the still with a mixture containing 42·69 per cent. of CS_2, a distillate was obtained containing in two experiments 97 to 99 per cent. of CS_2. The author also tested the apparatus by distilling commercial benzene and separating almost pure benzene. Thus, 1100 c.c. of a very impure sample gave (the still-head being kept at 81°) at 80°·4, 155 c.c.; at 80°·8, 176 c.c; 81°, 180 c.c.; 82°, 191 c.c.; after 500 c.c. had distilled over the experiment was stopped, a sample of the residue distilled as follows:—At 95°, 80 c.c.; at 100°, 130 c.c.; at 105°, 158 c.c.; at 110°, 186 c.c. The paper contains tables of the details of the experiments, curves showing the compositions of the distillates and drawings of the apparatus.

Dr. Armstrong said that as far as he knew no one had previously compared the values of these two processes of washing and cooling from a scientific point of view. He could confirm Mr. Brown's statements as to the importance of the rate of distillation and the extent of cooling surface; he did not think that fractional distillations of homologous bodies, the vapours of which seemed, so to speak, to hang together, were of much value, unless large quantities were employed.

Mr. Neison thought that a separation could be effected by fractionally distilling small quantities. He had used a very simple apparatus with good results; it consisted of a flask, the neck being closed with a cork, through which passed a tube ending inside the flask in a bulb with a drawn out and turned up beak.

The Chairman remarked that he had worked on the same principle as that carried out so completely by the author; but instead of surrounding the still-head with a vapour of constant temperature a thermometer was inserted in the still-head and the temperature carefully watched.

Mr. Brown did not think that any hanging together of vapours took place; in his opinion small quantities could be successfully manipulated by using an apparatus of small size.

The next paper was read by Mr. Muir—

On the Influence Exerted upon the Course of Certain Chemical Changes by Variations in the Amount of Water of Dilution. By M. M. P. Muir and C. Slater.—The authors have studied the influence of the addition of water on the reactions which ensue when solutions of (1) calcium chloride and sodium carbonate, (2) strontium chloride and sulphuric acid, (3) barium chloride and potassium oxalate are respectively mixed at various temperatures and for various times. The two solutions under experiment were mixed, allowed to stand for the required time and the precipitate formed estimated by filtering off or pipetting some of the clear supernatant liquid. In the first reaction, the amount of chemical change decreases regularly as the dilution increases; in the second and third various irregularities occur which the authors have investigated in detail. The paper is lengthy, and contains numerous and elaborate tables and curves, without which the results cannot be given intelligibly. The authors continue:—Every chemical system appears to tend towards that condition of equilibrium which is marked by the greatest loss of energy. This tendency may be arrested in various ways, *e.g.*, by impressing upon the system what may perhaps be described as an artificial state of equilibrium. Thus, the condition of most stable equilibrium for a system originally consisting of barium chloride and potassium oxalate would be that in which barium oxalate and potassium chloride are produced; but by adding much water a portion of the reacting molecules is, according to the hypothesis of the authors, loaded with water of hydration. In this loading energy is lost, but the loss is less than that which would occur were molecules of barium oxalate and potassium chloride formed; the system is therefore unstable, but a certain degree of stability is impressed upon it by the presence of a large mass of one of the products of the dissociation of the complex and unstable hydrated molecules. Thus a system in a state of strain is produced; a small force may be sufficient to relieve the strain and the relief may be attended with a rapid rearrangement of the parts of the system. Accordingly the authors found that small physical differences, such as the roughness or smoothness of a beaker, filtering instead of pipetting, etc., had a large influence in dilute solutions. The authors conclude with the hypothesis that the amount of chemical change which occurs when barium chloride and potassium oxalate are mixed in the proportion of 1 : 1 molecules is irregularly affected by the mass of water of dilution present, because the entire system is brought into a state of strain due to the stress between its parts, and that the principal forces of which this stress is compounded are the force tending to produce cryohydrates and other hydrated molecules, the force tending to split up these molecules and the force tending to separate, and so to impart greater mobility to the chemically active molecules of the system.

Mr. Muir then read a paper—

On the Influence of Temperature upon the Decomposition of Barium Chloride by Potassium Oxalate in Aqueous Solutions.—In concentrated solutions temperature has but little influence; with more dilute solutions, the first increase of about 20° causes a marked increase of action, after this the influence of temperature is more regular. With still more dilute solutions increase of temperature causes at first a slight increase, then a rapid increase of action until a point is reached, after which further increase of temperature but slightly affects the amount of chemical change; with very dilute solutions the influence of temperature again becomes nearly regular.

Mr. Neison showed by the aid of some mathematical formulæ that for the lower temperatures a larger period of time should be given, otherwise the results obtained would not be comparable with those obtained at the higher temperatures.

The next paper was read by Dr. F. R. Japp—

On α and β Phenanthrene Carbonic Acids.—The author has already described with Dr. Schultz (*B. Chem. Gesell.*

x., 1661) the alpha acid, he has since prepared it in a purer state and finds its melting point to be 266° instead of 260°. This acid was prepared from crystallized calcic phenanthrene sulphonate by converting the latter into the sodium salt, distributing the dry sodium salt with potassic ferrocyanide and saponifying the nitrite thus obtained. In the preparation of the calcic phenanthrene sulphonate much dark-coloured syrupy mother liquor was left. This mother liquor was subjected to the same processes which had yielded α phenanthrene carbonic acid from the crystallized salt, in the hope that the corresponding phenanthrene carbonic acid might be more easily purified than the syrupy sulphonate. 80 grams of crude acid were thus obtained from 2 kilos of commercial phenanthrene; after considerable difficulty the acid was purified by recrystallizing it as a sodium salt. By distillation with soda lime phenanthrene was obtained, being identified by its melting point, picric acid double compound, and the quinone obtained by oxidation. By oxidation with chromic anhydride in acetic acid phenanthrene quinone was formed. The author has tabulated a comparison of the salts of the α and β acids. The α acid crystallizes from hot glacial acetic acid in colourless curved blades, melting at 266°; the β acid crystallizes in stellate groups melting at 250°—252°. The α sodium salt crystallizes with 4 mols. of water in colourless pointed blades; the β salt with 5 mols. of water in rhomboidal laminæ. The α barium salt crystallizes with 7 mols. of water in long flexible needles, the β barium salt with 6 mols. of water in long brittle rectangular laminæ. In conclusion the author enters at some length into a theoretical consideration as to the constitutional formula of phenanthrene, which in his opinion consists of three benzene nuclei, one of which shares four adjacent carbon atoms with the two others, one ortho pair with each. Phenanthrene may thus be derived from naphthalene by a repetition of the process by which the latter hydrocarbon is derived from benzene.

After some remarks by Dr. Armstrong, to which Dr. Japp briefly replied, the Secretary read a paper—

On some Derivatives of Phenylacetic Acid. By P. PHILIPPS BEDSON.—This paper contains an account of the separation of para and ortho nitrophenylacetic acids, both of which are crystalline substances; the former melts at 150°—151°, the latter at 137°—138°. Also of para and ortho bromo derivatives which crystallize from water in white needles; the former melts at 114°—115°, the latter at 103°—104°. A dibromophenylacetic acid has also been prepared by the long-continued action of bromine on monobromophenylacetic acid in sunlight; it crystallizes in white needles, melting at 114°—115°. A more detailed account is given of the bromonitrophenylacetic acids and the corresponding bromamido acids, short notices of which have appeared in the *Ber. Deut. Chem. Gesell.*, x., 530 and 1065. A third isomeride has been obtained with these substances by nitrating crude bromophenylacetic acid. This β bromonitrophenylacetic acid crystallizes from glacial acetic acid in small transparent prismatic needles, melting at 162°, yielding by reduction β bromamidophenylacetic acid, melting at 186°.

The Society then adjourned to December 18, when the following papers will be read:—On the Specific Volume and Density of Water of Crystallization. By T. E. Thorpe. On the Analysis of Organic Bodies containing Nitrogen. By W. H. Perkin. A ballot for the election of Fellows will also be held.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association was held on Thursday evening, November 27, when the President, Professor Attfield occupied the chair. A paper on "Study" was read by Mr. E. M. Holmes, F.L.S. Mr. Holmes divided pharmaceutical students into two classes—those who wish to acquire just sufficient knowledge to enable them to pass the examinations and no more, and those who from love of knowlege desire to acquire all the information that they possibly can on matters scientific or otherwise connected with their business. The object that a student ought to have in view when studying at the School of Pharmacy is to obtain such information as cannot under ordinary circumstances be acquired in retail business, but which nevertheless is necessary for the safety of the public and for the proper carrying on of business. Business habits and a sound knowledge of the physical characters of the various galenical and other preparations should have been learnt during apprenticeship, but as long as apprentices are taken merely with a view to get work done cheaply and but little trouble is taken to impart information to them, or to inculcate business habits, so long will the evil recoil upon the masters in the form of incompetent assistants and ignorant members of the trade. If these facts were rightly understood the complaint which is sometimes querulously but most unreasonably made that men who have passed the examinations of the Society are less useful in business than those who have not, and that they are conceited with the knowledge which they have obtained, would never occur. The best reply to such a complaint is the undeniable fact that the most successful students are almost invariably employed in the leading houses of business in London, and that a large number of the best businesses in the country are in the possession of men who formerly took prizes in the School of Pharmacy. Mr. Holmes then gave his advice as to the best time for study, which he considered was the morning, and showed the important influences of rest, diet, and pure air upon the student. The different methods of memorizing by sight, place, sound etc., were then noticed, and the importance of close observation, and the taking of mental notes, as well as the maintenance of a concise and clearly-written note-book, in which the matter can be referred to with ease, were impressed upon the student. In reading books the student was warned against skipping difficult passages or delaying the comprehension of them until a future time, and was advised to thoroughly master the meaning of every sentence at the time of reading. The advantages of recreation by means of physical exercise was noticed and recommended to the student. Mr. Holmes urged all to strive to obtain prizes, arguing that although it was possible only for a few to get them yet the competition served as a stimulus for strenuous study. He considered that those who endeavour to shorten their course of study at the expense of efficiency, are guilty of an attempt not merely to deceive the examiners, but to falsely represent to the public the amount of knowledge they possess. The passing of an examination ought to be an honest guarantee to the public that the examinee possesses the knowledge which the government of the country stipulates he shall have acquired.

After the reading of this paper a lengthy discussion took place, and a hearty vote of thanks was accorded to Mr. Holmes.

The Secretary then announced that at a meeting of the Executive Committee, held on November 21, the following gentlemen were appointed reporters on science for the ensuing session:—

Pharmacy ....H. R. Arnold.
Botany......................F. W. Branson.
Materia Medica ....R. H. Parker.
Physical Chemistry......A. Senier, M.D., F.I.C., F.C.S
Inorganic Chemistry.....C. H. Hutchinson, F.C.S.
Organic Chemistry ......W. R. Dunstan.
Analytical Chemistry....A. F. Dimmock.

The meeting then adjourned.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting was held at 32A George Street, Hanover Square, on Wednesday evening, November 26, Mr. F. W. Branson in the chair, when a paper was read by Mr. A. P. Luff on "Water Analysis." The paper commenced with a description of the substances liable to be present in potable water, the sources of those substances, and the influence that their presence or absence would exercise in deciding as to the quality of a "water." A *résumé* and criticism of the various processes employed in water analysis then followed, the subject being illustrated by several experiments and an exhibition of some of the apparatus used.

A discussion followed in which Messrs. Branson, Nayson, Parker and Wallis took part.

A vote of thanks was proposed by Mr. Wallis, seconded by Mr. Parker, and carried unanimously, by a very large meeting, who evidently fully appreciated Mr Luff's interesting paper.

Parliamentary and Law Proceedings.

Poisoning by Arsenic.—Omission to obtain Signature in Poison Book.

An inquest on Mary Elizabeth Perry has been held by Dr. Thompson, borough coroner, at the Dispensary, Bideford.

Annie Greenoff, a fellow-servant of the deceased, stated deceased asked witness to go on an errand for her, which she consented to do, and she gave her a small bottle, and asked her to go to Mr. Cadd, chemist, and obtain the smallest quantity of arsenic. She went, and Mr. Cadd said three pennyworth was the smallest quantity he could sell, and that if she would leave the bottle he would supply it on the morrow. She left the bottle, and on the following evening she went accordingly, and Mr. Codd gave her the bottle, and told her not to poison herself. The bottle was wrapped up, and deceased seemed pleased on her giving it to her. When going up to bed deceased took the bottle up with her, and placed it on a box. It was labelled "poison," and the contents were of a white colour. Her fellow-servant caught up the bottle, and the deceased ran after her to secure it, saying, "Don't, don't be foolish. Let me have it. It is used for killing blackbeetles." The bottle was given up, and deceased put it in a drawer. On Wednesday deceased got the breakfast as usual, and sat down and partook of it, and then shortly after she became sick, and Mrs. Gottwaltz, her mistress, sent in some brandy and water, and deceased was put to bed. She had heard deceased say something about taking arsenic for spots in the face. Deceased was generally of a quiet disposition. About three weeks ago she remarked, in consequence of her not getting the dinner properly, that she had a "good mind to destroy herself;" but on Tuesday last she said that "life was sweet."

Mr. E. Rouse, medical practitioner, said he was called to see the deceased shortly after ten o'clock on Wednesday morning, and found her quiet and not suffering any pain. On asking her what she had taken deceased replied, "Arsenic," that she had taken more than a teaspoonful, and that she had thrown the bottle with the remainder in the fire. He applied the usual remedies, but without avail, and she died the same evening. When he first saw her she was not suffering from any aberration of mind. He made a *post mortem* examination of the body, and the contents of the stomach indicated strong symptoms of arsenical poisoning. Deceased was not pregnant.

Mr. William Cadd, chemist and druggist, said that he supplied half an ounce of grey arsenic to Annie Greenoff on Tuesday last. It was not much coloured, but the bottle was properly labelled "poison." He made an entry in the book of the sale, but he did not get the young woman to sign it according to the Act; but he knew the young woman very well as he had supplied similar poison to her father for killing rats. He thought it was for a similar purpose. The book was put in.

Mrs. Gottwaltz deposed that the deceased was generally of a quiet and even disposition, and, so far as she was concerned, there had been no unpleasantness with the deceased. On Wednesday morning, when she was taken so ill, the deceased said that she had taken more than a teaspoonful of arsenic. Witness said, "You have taken poison," and the deceased did not reply; but afterwards said that she had taken the poison for the spots in her face, and added, "I have been very silly." Witness replied, "You have been more than silly." This same statement she repeated to her mother in the afternoon. She was perfectly responsible for her acts, and seemed to know perfectly well what she was doing.

The jury, after a brief deliberation, returned a verdict "That deceased died by an overdose of arsenic." The coroner remarked that it did not lay with the jury to take any action against Mr. Cadd, the chemist, who supplied the poison, and who admitted having sold the arsenic without getting the girl to sign the book, and without colouring the poison. The matter of colouring was not important in this case, but had the girl taken the white powder in mistake for starch, or anything uninjurious, it would have been very serious. The jury could scarcely, he thought, let the matter pass without some cognizance.—The jury, however, declined to express an opinion on the subject.—*Western Morning News.*

Obituary.

Notice has been received of the death of the following:—

On the 13th of November, 1879, Mr. Robert Griffith, Chemist and Druggist, Llanbedr. Aged 66 years.

On the 18th of November, 1879, Mr. Edward Preston Hornby, Pharmaceutical Chemist, Lower Hillgate, Stockport. Aged 53 years. Mr. Hornby had been a Member of the Pharmaceutical Society since 1853.

On the 22nd of November, 1879, Mr. Charles Samuel Dale Steward, Great Yarmouth. Aged 78 years. Mr. Steward was one of the earliest Members of the Pharmaceutical Society, but had retired from business several years previous to his death. Mr. Steward was universally respected by all classes and held the office of churchwarden of the parish for thirty years. After the funeral a meeting of the mayor and principal inhabitants of the town was held and £50 were subscribed towards a memorial window to be put into the parish church in respect to his memory.

On the 23rd of November, 1879, Mr. William Smith Lingard, Chemist and Druggist, Stockport. Aged 63 years.

On the 23rd of November, 1879, Mr. William Judson, Pharmaceutical Chemist, High Wycombe. Aged 46 years. Mr. Judson had been a Member of the Pharmaceutical Society since 1869.

On the 25th of November, 1879, at Manchester, Mr. Thomas Simcock, for forty years in business in Manchester and Liverpool. Aged 79 years.

On the 29th of November, 1879, Mr. Ebenezer Vaughan Williams, Chemist and Druggist, St. Thomas Street, Weymouth. Aged 46 years.

On the 3rd of December, 1879, Mr. John Sidney Bowes, Chemist and Druggist, Camp Road, Leeds. Aged 32 years.

On the 6th of December, 1879, Mr. Edward Snape, Pharmaceutical Chemist, Great Hampton Street, Birmingham. Aged 71 years. Mr. Snape had been a Member of the Pharmaceutical Society since 1842.

Notes and Queries.

[632]. CHLORAL HYDRATE.—*Delta* will find that if he keeps his solution of chloral hydrate more concentrated, one minim to represent a grain, no change of importance will take place.

LAVANDULA.

[636]. DR. STARTIN'S POMADE.—I have used the following formula :—

℞ Hydrarg. Subchlor.,
Pulv. Hyd. Ox. Rub. . . . . . . āā ʒss.
Ung. Simplicis. . . . . ℥j
M. bene.

A. T. OSBOURNE.

[642]. PRESERVATION OF JELLIES.—Can any reader inform me of the process adopted in preserving jellies in a large way? A safe way is to immerse the bottles in water up to 140°, cork and then boil. The jelly thus prepared will keep; but it never sets firmly while in the bottle and therefore is of no use in preparing for the trade. ALEX.

[643]. CURING BACON.—Can any reader kindly inform me how the Irish cure bacon in so short a time?

T. H.

[644]. EXTRACT OF SALT.—Does any reader of the *Pharmaceutical Journal* know what it is that confectioners designate by the above? The person who applied for it stated that it was a white crystalline powder used by bakers with carb. soda and hop liquor for making a kind of yeast.

A. P. S.

A NEW MARKING INK.—The use of chloride of lime in washing being now so general, the old nitrate of silver ink is of very little use. I send the recipe of one I have tried and which cannot be removed by any chemical means and does not require heating.

One ounce of phosphate of manganese to 2 ounces of hydrochloric acid; then add ½ ounce of anthracene in ¼ ounce of water with a ¼ ounce of potassic chromate; add gum and well shake. Write with any pen.

R. ROBERT.

GREGORY'S POWDER.—As a note to Mr Gilmour's excellent paper on Gregory's Powder, I may say with others that I have had the same complaint about its non-miscibility with water.

This I believe I have overcome by first wetting the sieve all round, an inch or so from the sides, and drying it to a certain degree of dryness before a quick fire, then sifting the magnesia through in this condition of damp warmth; lastly, making the Gregory and sifting the whole. The resulting powder should be the colour of chamois leather and should be kept air-tight in a cold dry place.

C. BILLING.

THYMIC ACID (THYMOL) AND THYMATE OF SODIUM.—Dr. Alvin gives the following formula for using thymol in place of carbolic acid in caustic, alterative, or astringent applications to the mucous membrane of the throat. He has found these preparations much better tolerated, more agreeable, and quite as active as those of carbolic acid :—

Caustic.

℞	Thymol Cryst.	pt. 1.
	Glycerinæ Puræ	pts. 2–4.
℞	Thymol Cryst.	pt. 1.
	Iodinii	pt. 1.
	Potassii Iodidi.	pt. 1.
	Glycerinæ Puræ	pts. 5–15.

Alterative.

℞	Thymol Cryst.	pt. 1.
	Glycerinæ Puræ	pts. 50.
℞	Thymol Cryst.	pt. 1.
	Iodinii	pt. 1.
	Potassii Iodidi	pts. 1-2
	Glycerinæ Puræ	pts. 12·0.
℞	Thymol Cryst.	pt. 1.
	Tannin	pt. 1.
	Glycerinæ Puræ	pts. 100.

Astringent.

℞	Thymol Cryst.	pt. 1.
	Glycerinæ Puræ	pts. 500.

Pastils.

(Useful in superficial stomatitis, irritation of the upper air passages, and erosion of the mucous membrane in smokers, and they are very useful in quieting spasmodic cough. They should be made trial of in whooping-cough.)

℞ Thymate of Sodium . . . 1 milligr. (gr. $\frac{1}{65}$).
Chlorate of Potassium . . 10 centigr. (gr 1½).

In severer forms of stomatitis, amygdalitis, pharyngo-laryngitis :—

℞ Thymate of Sodium . . 1 milligr. (gr. $\frac{1}{65}$).
Borax . . . . 10 centigr. (gr. 1½).

These pastils may be taken to the number of six to ten daily.

THYMOL-VASELINE OINTMENT is made by dissolving twenty grains of thymol in an ounce of vaseline. It is useful in eczema and as a parasiticide.

GLYCEROLE OF THYMOL.—The formula is: thymol, 20 grains; glycerin, rectified spirit, of each, an ounce; distilled water to 16 ounces. Useful in pityriasis, and, when diluted, as an effective antiseptic mouth-wash

It is said that thymol has the property of immediately removing the smell of tobacco.—*New Remedies.*

INDELIBLE INK WITHOUT SILVER SALTS. —Triturate 1·75 gram of aniline black with 60 drops of strong hydrochloric acid and 42–43 grams of strong alcohol. The mixture is diluted with a hot solution of 2·5 grams gum arabic in 170 grams of water.

This ink does not attack steel-pens, and is neither destroyed by mineral acids nor by caustic alkalies.—*Pharm. Centralh.*

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

Replies.

[345]. To the opinions already expressed on this prescription allow me to add mine.

I am of opinion with Mr. Mackay that chemists are certainly not justified in retaining a precipitate in a preparation, because a certain physician so orders his, or because a similar proprietary preparation contains one, but at the same time I hold that a dispenser is not entitled to filter or otherwise tamper with a prescription unless he has distinct injunctions to do so.

C. BILLING.

[377]. *Novis* will probably find the source of his difficulty (which should have been stated) in an impure specimen of sodæ salicylas. The pure salt, such as is obtained from the natural acid existing as methyl salicylate in oil of wintergreen, should always be used in dispensing, for reasons recorded in *Pharm. Journ.* [3], viii., p. 785.

If the ext. cinch. liq. be added to the other ingredients in solution, a copious precipitate is produced, readily diffusible by agitation, and not at all inelegant. If, however, the sodæ salicylas used has been obtained by the action of carbonic anhydride on sodium carbolate, the precipitate will assume a more or less flocculent and disagreeable appearance according to the amount and character of the impurity present.

R. H. PARKER.

[378]. *Adolescens* will find the following method of dispensing the prescription satisfactory:—

Place 3 ozs. of the lime water in a 4 oz. bottle and pour in the vaseline, previously melted, shaking vigorously immediately, when a nice creamy emulsion will result, now rub down in a mortar the oxide of zinc and calamine, with the emulsion added gradually making up the bulk to 4 oz. with aq. calcis.

THE LONDON DISPENSER.

Query.

[379]. I had the following prescription to dispense, would you kindly publish it in the Journal, so that I may learn which would be the correct way to dispense it?—

℞ Pepsina Porci . . . . gr. 4
Ol. Absinth. . . . . q. s. ft.
Pil. i. Mitte xii.

THETA.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

ELECTION OF THREE ANNUITANTS.

Sir,—I think that I may venture to assume that in recording our votes, we shall all wish to act on the principle of "*Detur digniori;*" but, speaking for myself, I find it impossible to persuade myself that we have sufficient data given us in the voting papers, from which to form a satisfactory judgment, and thus confer our votes on "the most worthy." To a very great extent, I submit, that for present purposes (though *cæteris paribus* or *pæne paribus*, I do not forget other considerations) need is worth, the most needy the most worthy. But how to divine which of the nine are most needy, I find not.

B has about £23 per annum; H (with a child dependent on her) has £32. These are the only two who make at all a definite statement of their resources, for I cannot understand in what sense, D, who has £12 from her son, says, that she "with the assistance of her daughter is keeping a school, the proceeds of which do not cover the expenses." It surely cannot mean that her daughter is helping her to do something which makes her poorer than if it were left undone; to continue in such a course as this were absurd, and suicidal indeed. But I think one may, on consideration, reasonably infer that she does not mean this, and that this school keeping is of some advantage to her, although we are quite in the dark as to its amount, and so can form no definite estimate of D's income. C's children cannot afford "much" pecuniary assistance; F depends on "two daughters in situations;" G, on "two sons, clerks." Now, really, considering C, F and G, we must perforce indulge in such flights of imagination in trying to fix that very elastic quantity "not much," and the multiform capabilities of "daughters in situations" and of "clerks," that I am afraid there would be no reasonable probability of our returning in time to give our votes on the 19th. A "has no means, no children, no friends:" D, "no relations;" T (with a wife subject to epileptic fits), "no relatives, no friends in a position to assist him." Now, are we really intended to suppose from this, that A, D and T, have been, and are, and will be till the time of the election (and, if unelected, after), living on nothing? If we are to take A's account *au pied de la lettre*, we have no alternative, that I can see, about him. About D we might fancy that though he has no relations, he may have means or friends; and that T, though he has no relations and no friends able to assist, may have means.

You see, Mr. Editor, in groping about in a vain endeavour to do my duty, how bewildered I have become for want of more light; shed some of your beneficent rays on my darkness (I will not dare for a moment to hint that it is not as clear as noonday to every other voter), and then I shall see that great desideratum—how to live on nothing! But not like the horse, please, who did without eating, and died as soon as he had learned! Seriously, sir, I do think that we ought to have the exact income of each candidate given to us, and not to be left to the tender mercies of our own unguided imaginations; we are men of business, and should act as such. If we are not in a position to do this, would it not be better to give up the responsibility and the farce of voting, and leave, once for all, the matter to be settled by the Council? But, if this may not be, if we must retain our responsibility, at least, raise your powerful voice, sir, and do your best to make our voting a reality, and the Benevolent Fund the greatest benefit to "the most worthy."

HOC AGE.

41, *Church Road, Tranmere, Birkenhead.*

THE EVENING MEETINGS.

Sir,—I infinitely regret that my modest "growl from the gallery" should have constrained your correspondent Mr. J. B. L. Mackay to dance forth in war-paint and feathers as the champion of "our head quarters."

I am sure my "ridiculous and delusive letter" did not merit such exertions on his part. Nevertheless, your readers, in common with myself, will owe a lasting debt of gratitude to Mr. Mackay for his affecting description of the beautiful arrangements which have made the house of the Society so remarkable.

What more convincing proof is needed of the perfect ventilation of the "lecture theatre" than is to be found in your correspondent's assurance that during class hours the students sit and shiver from the draughts? Besides, who would venture to complain of being nearly choked with foul air, when it is possible, as Mr. Mackay says, to be "suffocated with the open canopy of heaven?"

I would fain hope that Mr. Mackay will not long delay his promised contributions touching the "death-rate among *pharmaciens;*" and if in the meantime he has to submit himself to the surgical operation, of which tradition tell us most of his countrymen stand in need, he may find comfort in the reflection that he will be thereby enabled to more fully appreciate the value of what Horace once said about *ridentem dicere verum.*

Your correspondent has concluded his letter by comparing me to Baal. I must gently disavow any connection with so exalted a personage. Rather than Baal, I would liken myself to the humbler Baalam, inasmuch as I have met with rebuke from an unexpected quarter.

Notwithstanding this, as long as I survive the effects of the Evening Meetings, I shall take my place in the gallery as

ONE OF THE "GODS."

[*** There is much in this letter, as well as that to which it is put forward as an answer, which is quite beside the subject of the ventilation of the Society's lecture theatre. If the discussion is to continue we must request our correspondents to avoid personalities and confine their remarks to that question.—ED. PH. J.]

HEALTH AND LATE HOURS.

Sir,—Another side of this question as affected by late closing is the moral health of chemists' assistants.

Whether justly or unjustly, they are sometimes blamed with being faster than assistants in other lines of business. After all, they are subject to human wants, as much as more favoured mortals. They require the relaxation of company after a long day's work, and into what society can they enter after 9 or 10 o'clock at night? It is too late to visit friendly circles, and there seems only one chance for them. Either they must sink into the creature described by your correspondent in a recent issue, or take the company that is found easiest at such hours. If it is not always of the best class, their employers are largely to blame, and must stand the consequences of not endeavouring to create a steady and trustworthy race of assistants.

True, it is possible to withstand temptation, and it is to their credit that numbers prefer no company to the other alternative, but they belong to two classes. They either swell the ranks of these "poor, white faced men," who, lacking all energy, are not competent assistants; or, they refuse to accept a situation with such unreasonable hours, and failing to find "anything suitable," they leave the business. This may perhaps cast a contradictory light over Mr. Barnaby's source of consolation, "the survival of the fittest."

When an assistant, some years ago, in Edinburgh, where chemists close much earlier than in London, I called upon all those north of George Street, and obtained the signature or assent of all but one to close at 8 o'clock. To this one hung another, and to these more, and the attempt fell through. But there is little reason to think that chemists would suffer from the opposition of an extra hour at night. Did they determine to act reasonably, and in this matter, independently, they might surpass, by additional energy diffused into eleven hours, the business dragged out over thirteen or fourteen.

Menton. G. W.

Sunday Trading.

Sir,—I read with great interest the weekly correspondence on the above subject. I quite agree with the remarks of "Volo" on the unnecessary articles applied for on Sundays. A few Sundays ago I too took notice of a few things applied for at our shop; amongst a host of others were soft soap, turpentine, baking powder, lemon kali, hair oil and vinegar. On inquiring what the vinegar was required for, the customer told me that she had some fish for supper, and wanted some vinegar to it. Could she not just as well have bought her vinegar on Saturday? When the public know that a chemist's shop is open on Sundays (especially if it is a shop where the trade is mixed) they make a "convenience" of it, and think we are compelled to be open as a matter of course. Even the poorest working man has his day of rest on Sunday. Why then should a chemist's assistant have to stand behind a counter for two or three hours on Sunday evenings. Again, if medicines are required they can be supplied at the side-door equally as well as through the shop. Why should the door be thrown open and the place lit up like a public house?

Is a halfpennyworth of laudanum or paregoric to be called medicine specially on Sundays? for such is the nature of a few of the "medicines" applied for at our shop. I think that if some association were formed it might tend to mitigate the evil.

With respect to late closing, which is extremely bad in this town,—indeed I should think it is the worst in England for that,—is not twelve hours long enough for anyone to stand behind a counter? Is it likely that an assistant after working for thirteen or fourteen hours will commence to study at ten o'clock at night? No. If he means to keep in good health he must get a little fresh air then, if he cannot get it at any other time, or else go to bed and prepare for another day's drudgery: for so it is in some shops. I have seen a chemist's shop open here at 11·15 p.m. on an ordinary night (not Saturday) in order that the proprietor might scrape together a few more pence than his brethren who closed earlier. H. Woodward.

44, *Great Alfred Street, Central, Nottingham.*

Wood Sage as a Substitute for Hops.

Sir,—Perhaps it will not be amiss to point out to those of your readers who may be tempted to try the substitution of wood sage for hops in the operations of "home-brewed," that it will not do for pale ales; for upon the authority of Gray it will darken the product.

I had hoped that your suggestion in the "Month," for September 27, as to a new edition of Gray, would have been responded to. Is it too much to ask for one more favour at the hands of Professor Redwood?

Worthing. J. Burt.

Is Nitrate of Potash a Poison?

Sir,—In the report headed "Is Nitrate of Potash a Poison?" (before, p. 417) it should have been stated that the cattle drench weighed over 8 ozs. Your readers will probably differ in opinion from the County Court Judge as to whether containing only a "small admixture" of other substance it was a poison or not.

Richard Young.

How can a New Name be Protected?

Sir,—I should be obliged if some of your readers could inform me how to proceed in order to secure the sole right of using a newly coined word to be applied to a newly devised preparation.

I understand that entry at Stationers' Hall gives no sole right to any word that may be used on a label, and that registration under the "Trade Marks Act" requires something more than a mere name or word in the shape of a "device,' but that the same name or word may be used by any other person in connection with any other device. Am I correct in this?

Σιγμα.

R. Modlen.—As such weights and measures could hardly be said to be used for purposes of trade it is at least doubtful whether their verification would be compulsory under the new Act. But there can be no doubt as to the advisability of having them verified.

W. R. H.—For a recipe for liquid dentifrice, see before, p. 79.

J. Sumner.—The fact that you imply that the preparation is an occult one, prepared only by yourself, would most probably be held to constitute it a patent medicine. But you are recommended to send a copy of the label to the Inland Revenue authorities, as they alone can answer your question with authority.

A. C.—'Historical Sketch of the Progress of Pharmacy,' by Jacob Bell, a copy of which is in the Society's library.

"*Galangal.*"—Back numbers of this Journal may be obtained from the publishers, Messrs. Churchill, 11, New Burlington Street.

J. F. Golding.—We cannot say. You are recommended to make an analysis of it.

Delta.—For a recipe for cherry tooth paste, see before, p. 79.

K.—Pulvis glycyrrhizæ co. of the Prussian Pharmacopœia is the same as the pulvis liquiritiæ co. of the German Pharmacopœia, the formula of which has been already given in this Journal on several occasions:—

℞ Foliorum Sennæ	2
Radicis Liquiritiæ, singulorum pulveratorum partes duas	2
Fructum Fœniculi pulveratorum	1
Sulfuris depurati, singulorum partem unam	1
Sacchari optimi pulverati partes sex	6

Misceantur.

J. L. Wilkes.—Numerous recipes for ink have been already given in the present series Among others see vol. v., p. 704, for coloured inks, and, for black, vol. vi., p. 1004; vol. vii., p. 95; vol. viii., p. 702, and vol. ix., p. 713.

W. Ruthven.—See before, p. 340.

J. H. McIntyre.—(1) Apply to the local authority for the district in which you reside. (2) It must be a matter of arrangement between the buyer and seller, but probably some of the wholesale houses will undertake the work when proper arrangements are made for carrying out the Act.

A. Greaves (Chesterfield).—We regret the discrepancy between your opinion and our own, and can furnish no further explanation of our reasons for not publishing your letter in defence of the sale of paregoric without opium than we have already given in this Journal on pp. 331 and 432.

NH_4.—The formation of a deposit in the B.P. spirit. ammon. aromat. in seasons when the temperature is very low is not of uncommon occurrence. It consists, probably, nearly entirely of bicarbonate of ammonia and is much more likely to occur when the distillate does not contain the full percentage of alcohol. If you take the specific gravity of the preparations in question at 60° F., you will probably have an indication of 0·875 to 0·880, instead of 0·870.

J. D. M.—You are recommended to submit your label to the Inland Revenue authorities, who alone can decide whether it will necessitate the use of a stamp.

Communications, Letters, etc., have been received from Messrs. McNaughten, Reynolds, Cranwell, Mitchell, Goss, Southall, Fair Remuneration, Devon, St. Rule, J. D. M., T. W. L.

NOTE ON ERVUM ERVILIA, THE BITTER VETCH.

BY WILLIAM SOUTHALL, F.L.S.

In the Journal for April, 1873, was given the result of a trial at the Birmingham County Court, as follows:—

"An action has recently been brought to recover damages alleged to have been sustained by the death of fifteen pigs, caused by eating adulterated meal, supplied by the defendant. Evidence was given that the stomachs of the dead pigs presented symptoms of irritant poisoning. Dr. Hill, the borough analyst, said that he had analysed a portion of the meal, and had been unable to detect any trace of poison; but that there was some sand present, to which, perhaps, the inflammation was due. For the defence chemical evidence was given by experts that the meal contained no poison. The judge decided in favour of the defendant, expressing an opinion that the deaths resulted from the improper manner in which the food was given."—*Birmingham Gazette.*

This trial occupied two days, and twenty-four witnesses were called. My firm was employed by one of the several parties interested to analyse the meal but, the result being negative as regarded the ordinary poisons, was not called upon to give evidence. The hypothesis relating to the proper cooking of the meal was raised by my ingenious friend, the late Alfred Bird, who suggested that the meal being mixed with cold water lumps of starchy coagulate were formed which were totally indigestible and so caused death, whereas had the meal been properly cooked with hot water it would have been soluble, and no harm would have resulted. In this view he was followed by a professor of materia medica and by a professional chemist. The manifest effect of the food was severe vomiting, followed by speedy death. The judge delivered an elaborate judgment, in which he said he laid no claim to practical knowledge in feeding pigs, but he adopted the view, and gave a verdict for the defendant. It will presently be seen that this view was in the direction of the truth, but was quite erroneous.

Being interested in the subject, and desirous of solving the obscurity in which it was left by the trial, I procured some of the seeds of which the so-called pea meal was made and found that they had been called Egyptian peas, but that they were really very much smaller than peas, and that the correct name was Rovi seed, a cargo of which had been imported from Turkey. These I sowed in my garden; they sprang up, flowered and bore fruit, and proved to be the *Ervum Ervilia*, or bitter vetch. I sent a specimen to Professor Oliver, at Kew, who confirmed the name. The mystery was now made clear, as these seeds are known to be poisonous.

Since that period I have heard of several cases of pigs being poisoned, but could not obtain the seeds of which the meal they were fed upon was made. During the last summer, however, a number of pigs were poisoned at Stratford-on-Avon, and on examining the seed, I found it to be about half Rovi seed, and the remainder a black tare, or vetch, a much larger seed. It therefore seemed to me desirable that a statement of these facts should be published, for the sake of the pigs and possibly for that of men.

The seed of *Ervum Ervilia* is about the same size and almost exactly the same rufous-brown colour as that of the Egyptian lentils (*Ervum Lens*), and when the testa is removed they are both of an orange-pinkish colour, but the former is not so bright as the latter. The seeds of *E. Ervilia* are not, however, lenticular, but are obtusely triangular, and this serves to distinguish them from lentils, for which popular food they might be an unpleasant substitute.

Modern writers do not take much notice of *E. Ervilia*; it is by several simply mentioned as poisonous. Lindley, in his 'Vegetable Kingdom,'* says that the seeds mixed with flour produce weakness of the extremities and render horses almost paralytic. J. C. Loudon† attributes these same qualities to *Lathyrus sativus*, but his figure of *L. sativus* is that of *L. Aphaca*, so there may be some confusion with both writers. Sir John Hill, whose 'Herbal' is dated 1756, dismisses it as a plant having no properties worthy of notice; but if we gob ack another hundred years we find it to be an article of the materia medica, and that it had the credit of curing the Emperor Augustus, "whose griefe it is probable was a toughe flegme condensate in the lungs, and hard to be avoyded and spit forth."

In those well-known books, Gerarde's 'Herball'‡ and Parkinson's 'Theater of Plantes,'§ the bitter vetch and its virtues are fully described, and the same engraving does service in both. The name given is "*Orobus receptus herbariorum*;" and it is curious to observe how the properties attributed to it by Galen and the older writers are quoted in every book of this and of anterior date, except Celsus, that I have consulted. After the old fashion it is said to be hot in the first degree and dry in the second. Gerarde says that "men do altogether abstain from the bitter vetch, for it hath a very unpleasant taste and naughty juice; but kine in Asia and in most other countries do eat thereof, being made sweet by steeping in water." It is directed to be given as a medicine with honey as an electuary.

In the Commentaries of Matthiolus upon Dioscorides,‖ a book of about the same date, we find that there was then considerable controversy as to the true identity of Orobus, Ervum, and Ervilia, and which of the plants known to the ancients were meant by those names. He quotes Galen, "*Boves apud nos ut apud alios plerasque gentes Ervo in aqua edulcato pascuntur; hominum cibis prorsus hoc semen damnatur, est enim insuavissimum, et pravi succi.*" In Bauhinus' great work, 'Historia Plantarum,'¶ the difficulty is still further worked out, one suggestion being that Ervilia must be the same as *Phaseolus*, the kidney bean, because that is the only legume of which men eat the pods and seeds together. It is even suggested that it may be Dolichos. He says that Brasevolus believes Ervilia to be the legitimate Ervum, but the more general testimony appears to be that it was a different plant, known to the Greeks as *Ochros*. One species of Orobus is spoken of as *Orobus semine obtuso triangulo*," and this answers well to our bitter vetch.

An interesting clue to the name Ervum is given. "*Quòd verò Erbum Avicennæ* (*Orobon Græci appellant, nos Ervum*)." I may say that it appears to me that the name Rovi is also clearly derived and descended from Orobus, it being probably grown on some

* Lindley's 'Vegetable Kingdom,' 1853, p. 548.
† Loudon's 'Encyclopedia of Plants,' 1836, p. 620.
‡ 'The Herball,' J. Gerarde, 1636, p. 1225.
§ 'Theatrum Botanicum,' J. Parkinson, 1640, p. 1079.
‖ P. A. Matthioli 'Opera,' 1674, p. 343.
¶ Bauhini, etc., 'Historia Plantarum,' 1651, tom. ii., p. 296.

shores of the Greek Archipelago. Whilst this note has been passing through the press my attention has been called to the *Gardeners' Chronicle* of December 13, where it is mentioned that Dr. Whittmack recently exhibited some carbonized leguminous seeds disinterred in the ruins of Troy by Dr. Schliemann, which on careful examination proved to be the seeds of *Ervum Ervilia.*

A hundred years further back than Bauhinus, we meet with a mention of Ervum in the works of our first English botanist of repute,* William Turner, 1551, printed in black letter, with beautiful plates. He says, "Bitter fiche burdeneth the hede mych, the same eaten troubleth the belly. It draweth out bloude by the water. This pulse well sodden maketh oxen fatt. Ervum helpeth a mā to pis well. The same maketh a man haue a good colour." He is exercised as to the identity of the plant; scolds Fuchsius for misleading him, and gives for his engraving a species of *Lathyrus*, which he calls *Orobus Sylvestre.*

We now get back to the ancients. I have not Galen to refer to. Celsus† mentions both Lenticula and Ervum, and his editor, Dr. Milligan, notes the first to be, "*Ervi Lentis*, L., *varietas major*," the second, "*Ervum Lens*, L.;" but if the Latin "Ervum" be the same as the Greek "Orobus," this would be incorrect. Pliny,‡ writing soon after, mentions the twenty virtues ascribed to it, including its curing the bite of serpents—and of men—and also adds that if sown in March, it is injurious to oxen, if in autumn, it produces headache, but if sown in early spring, it produces no bad results; but Pliny does not discriminate his facts. Dr. Bostock, his editor (Bohn's edition), says in a note that the blade is said to be poisonous to pigs, and that the farina of *E. Ervilia*, is much advertized as a food—but Revalenta is now supposed to be the farina of *Ervum Lens.*

Having now traced the history of the Rovi seed of the Archipelago up to the Orobus of the ancient Greeks, let me return to its poisonous properties. The ancients and those accustomed to use it knew that these could be eliminated or destroyed, by soaking in water, as is the case with other vegetable products which are poisonous in their natural condition, but which are made wholesome by water, by heat, or by both combined. This property may reside in the testa, which is the most bitter part, so that when decorticated, the seeds would be wholesome, but I am not aware if this be the case or not.

It has been stated that sheep may feed on the Rovi seed. On the other hand, pigs, notwithstanding they are such gross feeders, have delicate stomachs; it is said they cannot eat even haricot beans with impunity. They are probably modified by the artificial life they lead. Darwin§ says that white sheep and pigs are injured by certain plants, whilst dark coloured individuals escape. In Florida, the squatter selects the black members of a litter, as they only have a good chance of living—as the pigs eat the paint root (*Lachnanthes*), which colours their bones pink, and causes the hoofs of all but the black varieties to drop off.

At the trial it was stated that one of the witnesses offered the meal to some pigs who declined to partake of it; he kept them without food all day, and offered it again, but they still declined. Whether these pigs were black or not was not stated, but it would appear that their original aptitude for discernment in the selection of proper food had not been destroyed by their artificial mode of living—whatever their original physical capacity might have been. Light coloured pigs certainly have a much more objectionable appearance than black; their skin is too much the colour of the noble biped to look correct. One witness stated that she had given the meal to her pigs without harm, but then she had only given a small proportion with other food and had first well steeped it in accordance with the ancient custom.

I fear this subject has been treated too much at length, but it is certainly one of importance to the porcine world, and if an occasional cargo of Rovi seed is imported we do not know where it may find its way.

* 'A New Herball,' W. Turner, 1551, sheet p. iii.
† 'A. Com. Celsi Medicinæ, etc.,' 1831, p. 197.
‡ 'Natural History of Pliny,' Bohn, 1856, vol. iv., pp. 51—451.
§ Darwin's 'Origin of Species,' 1869, p. 13.

THE BOTANY OF THE KURAM AND HARIAB DISTRICTS.

The following report, dated 22nd June, 1879, from Surgeon-Major J. E. T. Aitchison, botanist, Kuram Field Force, upon the Kuram and Hariab Districts has been communicated to the *Indian Daily News* by the Press Commissioner, and will be read with considerable interest:—

I have the honour to forward, for the information of Major-General F. S. Roberts, C.B., V.C., commanding the Kuram Field Force, the accompanying report upon our present knowledge of the Kuram and Hariab districts. I have only touched upon the more salient points, and those with which I have been able to make myself familiar during the short period I have been investigating the flora. I consider it a matter of great importance to science if Government would consider the subject, and permit me to remain employed for some time at these investigations, and hope the Major-General will take the matter under his favourable consideration.

Thull.—Thull is a village on the Kuram river, at an altitude of 2500 feet, surrounded closely by low hills, the highest peak in its vicinity being that of Kadimuk, 4900 feet. In the small basin of Thull the flora is peculiarly that of the salt range of the Punjab, consisting of a few stunted shrubs, with occasional trees near water. The hills are, with the exception of grass, nearly barren of anything like vegetation, and when it does exist it is in hollows where shade and moisture can be obtained. Kadimuk would, from its altitude, if it were in the Punjab salt range, be much better clothed. Here, already the crushing-out effects of a winter cold enough to deposit snow, and want of moisture in the atmosphere, point out why, between this and the base of the Safed Koh range, there exists little or no natural vegetation. In summer, for several months the climate is that of the Punjab—a dry tropical heat. There are few plants that can withstand these extremes of temperature. The result is that, as we proceed towards the town of Kuram (4800 feet), we find, except such parts of the country as are cultivated by irrigation, that it is treeless and almost a barren waste. In the basin of Thull, where the Punjab forms are nearly all present, the first characteristic one to be absent is *Capparis aphylla*. The olive is rare; from this to the village of Shaluzan I have only seen it near houses and holy places, as ziarats, its place being taken taken by *Reptonia buxifolia*, which bears a remarkable resemblance to the olive. A little distance out of Thull, in the more open country, *Daphne mucronata*, Royle, *Sophora mollis*, Wall., and *Cotoneaster nummularia*, Fisch, are the plants that make up most of the scrub jungles, and range from this right through the Kuram Valley up to the Hariab, all reaching to nearly 10,000 feet, and from that little scrub there occasionally is amongst the pines at this high altitude. In gradually ascending the Kuram Valley, we soon lose our chief Punjab forms. At Ahmad-de-Shama, eight miles from Thull, *Acacia modesta* and *Dalbergia sissoo* are last seen. *Periploca aphylla*, however, accompanies us to nearly opposite Kuram, and in some quantity, being largely cut and collected as fodder for camels. The only occasional tree, except in the immediate vicinity of water, is *Pistacia integerrima* and a small *Rhus*. Wherever water is employed for irrigation there the crops are good, and trees of various sorts rapidly spring up. At Hazir Pir Ziarat fine trees of *Platanus orientalis* and *Salix* are to be seen. These increase in number and size as we reach Kuram. Up to this *Chamærops Ritchieana* has been more or less frequent, but from this it gradually disappears, along the left bank, at least, of the Kuram Valley, but is found forming a thick, dense, aloe-like scrub on the plateaux that lead west up to the Darwaza Gai Pass. When this palm is not injured or cut, it forms a branching tree of from 15 to 25 feet in height, as may be seen at many of the shrines between Kohat and this, or even within the walls of Peshawur, near one of the gateways. It extends largely into the Khost country. In the Kuram Valley the fibre of the leaves is the usual, and ordinarily the only, source of rope, all imported as leaves from Khost.

Kuram.—Kuram is a large village and fortress situated on the left bank of the river of that name, at an altitude of nearly 4800 feet, in an open valley. The nearest hills to the north being over nine miles off, to the south some low hills descend close into the river; but, speaking generally, it is situated in an extensive open plain, the broad bed of the river lying to its south. At a distance of about fifteen miles running from east to west (slightly south) is the Safed Koh range of hills. The two highest points are at the extreme ends. The one at the east called Karaira is about 15,200 feet, the one at the west called Sika Ram (but by the local natives Spin Ghar) is 15,400. From Kuram, 4800 feet to the base of the hills to its south, up to 6000 feet except for irrigation, which has been most laboriously carried out, the plain country would be an arid, shrubless tract, perfectly treeless; grasses and a few small herbs alone give the little green that occasionally meets the eye. When irrigation is employed then the crops are in profusion and rich, the soil yielding two crops in the year—the first, barley, wheat, and clover; the second, maize, rice, millets, tobacco, peas, cucurbitaceæ, a little opium, and some cotton in the more southern parts of the district, with numerous orchards of large trees. The greatest extent and finest cultivation occurs at the exit of the various streams from the mountains on to the plains, under the protection of the hills; as, for instance, at Shaluzan, where the trees grow to as great a size of their kind as any in Cashmere, and much more healthy, owing to the dryness of the climate preventing the numerous lichens and fungi affecting the trees. There are *Chunars Platanus orientalis* with a girth of 14, 16, 18, 25, and one 33 feet. The walnuts are finer than I have ever seen. Many trees of 9, 11, 12, 13, and one of 17 feet. With rare exceptions, are the trunks ever hollow or unsound. They have neither lichens nor mistletoes infesting them as in Kashmir. The amlok, *Diospyrus Lotus*, is very numerous and a good tree; its fruit is considered next in value to that of the walnut. Apricots, plums, apples, pears, grapes, *Elæagnus*, a few peaches, quinces, pomegranates, and almonds, form the mass of the orchards. There are no cherries.* Mulberries are grown for feeding silkworms with, and, as trees, are not extremely numerous, but are fine trees. In actual gardening the natives do little. Onions, and a large white radish, with numerous cucurbitaceæ, are all they go in for. Cultivated flowers in gardens, and near holy places, are the red Damascene rose, a white one, and the double yellow Persian rose, an iris, a mallow, *Melia Azedarach*, as also an *Elæagnus* cultivated both for its scented flowers as well as its fruit.

The other cultivated trees are *Populus alba*, *Salix babylonica*, and *Celtis australis*, L., besides another poplar, new to me. There is one cypress in the valley of great age: it is on the side of a hill close to Shaluzan, and noticeable at a great distance. On the plains between the Kuram river and Shaluzan, the little scrub that is there consists of *Daphne*, *Sophora Cotoneaster*, some barberries, a *Buddleia*, numerous *Astragali*, *Labiatæ*, *Compositæ*, of which species of *Artemisia* are very numerous; but any or all of them are chiefly found in the more sheltered hollows rather than on the open plain. *Convolvulus lanuginosus* is profuse in small hummocks from the Salt Range to Kuram and Ali Khel. Many species of the numerous *Astragali* found here will prove to be Tibetan in their type. These plains consist of *débris* of all shapes and sizes with mould poured down from the adjacent hills by the force of snow and water deposited in great fan-shaped masses, with a stream belonging to each fan, cutting its way down through its centre and making its way towards the river, usually reaching it with a much diminished supply of water, whether taken from it for irrigation purposes, or absorbed in passing over the lower beds or shingle. In some instances the whole of the water of a stream, especially in summer, is expended long before it has any opportunity of getting to its proper outlet—the River Kuram.

The general outline of the country, and the above peculiar fan-shaped *débris* deposits are best noticed at some distance from the south, as in crossing over the Darwaza Gai Pass towards Kuram, from which the view very much resembles that seen of the Ladakh valley on looking southwards from Leh, as long as one can imagine the distant forests to be mere shading of the hills. In looking over the Kuram Valley and the hills beyond from the Darwaza Gai Pass, we see lying before us (usually) the great mass of the snow-clad peaks of the Safed Koh range, extending from north-east to south-west. The lower hills, or rather high peaks of the spurs of the main range, seem to form two or three lower ranges; these are all covered with forest from the top down to 7000 feet, after which they are seen to be bare as they gradually lose themselves in the plain that extends from nine to fifteen miles before it reaches the river. The first vegetation to be traced on these hills on their southern exposure is *Quercus Ilex* commencing at about 7000 feet, as a good large dense bush; this as it ascends gets more tree-like and begins to be mixed with Deodar, *Pinus excelsa*, *Abies Smithiana*, gradually forming a dense forest when *Abies Webbiana* appears in it, chiefly near the ridges, and continues up to 11,000 feet, when the forests thin off, and gradually cease. At 9000 feet, commonly *Quercus semicarpifolia* appears and takes the place of *Quercus Ilex*, if it has come up as far, or often drives out the pines and forms a forest of its own. East of Shaluzan with a south exposure there is no *Juniperus excelsa* or *Pinus Gerardiana*, and as far as I can hear, and of what I myself have seen, there is no *Pinus longifolia* from Thull to this. *Pinus excelsa* abounds in this district taking to itself the Pashtu term "Nakhtar." Except the bushes being larger of the already specified *Daphne*, *Sophora*, *Cotoneaster*, barberries with an occasional *Viburnum* and honeysuckle, there is no undergrowth or bush vegetation. In this locality these forests of Deodar are very fine, and the timber superb. It forms fully three-fourths of the forests usually. Except of *Quercus semicarpifolia* in certain localities, the timber of the other trees is in too small a quantity to be alluded to when so much deodar is forthcoming.

It is curious to note how the forest of pines is directly got at through the *Quercus Ilex* scrub, there being no intervening forest as in the Himalayan ranges. As already stated these forests reach up to 11,000 feet; here they

* This statement is, I think, incorrect.—H. C.

become less dense, and a few shrubs of *Rhododendron Anthopopon*, the gooseberry and currant with bush juniper (*not excelsa*) and some willows and loniceras fill up the vacant spaces in the ending forest, until the bush juniper along with *Betula Lhojpattra* (in one locality) remain to be superseded by rhubarb, *Eremuri*, *Fritillaria*, some grasses, Carexes and Cruciferæ. Vegetation here is not stopped by perpetual snow, as on the southern exposure of this range there was no snow during the winter of 1878-79. But it is kept down, I should say in its altitude, by want of moisture in the soil as well as air. If snow existed all the year round vegetation would naturally ascend, I believe, higher than it now does. From Thull to Shaluzan and up the southern face of these hills I have seen but one fern, *Adiantum Capillus Veneris*. Heretofore I have gone over the vegetation as presented to us upon the southern aspect of these hills. Let us go along a water-course, or stream-bed, and examine any other exposures of these hills than the south. We find in the first place the pines descending to form a natural forest much lower down, a Deodar and *Pinus excelsa* may be seen at 6500 feet. The forests thin with a great deal of shrub and underwood, and shrubs gradually being removed by other trees than pines. At first it is enlarged bushes of the original *Daphne*, *Sophora*, *Cotoneaster*, barberries, then *Fothergilla involucrata* (a Kashmir type), *Cotoneaster bacillaris*, several roses, *Buddleia* in profusion, several large astragaloid Leguminosœ, another large barberry, two jasmines, several loniceras, pomegranate (wild), all mixing with *Quercus Ilex* as a dense bush, sometimes a tree, and a profusion of grasses. In the "Shud Tor" ravine, with entirely precipitous sides and narrow, we come upon the walnut as a forest tree quite wild, proved by the fruit, and perfectly natural, two species of *Euonymus*, *Viburnum Carpinus*, *Prunus Padus*, *Sterculia*, various *Lonicera*, *Rhamnus*, and in the moisture of this valley *Taxus baccata*, this being its western limit! it occurs in all the valleys to the east in similar positions. At from 8000 to 9000 feet a *Rhododendron*, near *lepidotum* of Wallich, with green flowers. Besides a *Lycopodium*, eleven species of ferns, *Podophyllum*, and quantities of *Hedera Helix*. Neither *Juniperus excelsa* nor *Pinus Gerardiana* exist here.

The Peiwar Kotal range is a spur from Sika Ram (Spin Ghar) extending south-west until it gradually loses itself in numerous small spurs at the Kuram river, round which the Kuram river bends from a southerly to a south-east direction. The range of hills at the Peiwar Kotal has an altitude of from 8400 to over 9000 feet, with a precipitous descent of nearly 1000 feet to the east.

At the base of the Kotal, in the valley leading up to it by the village of Turai, except when cultivated, the ground is covered with a more or less dense jungle of *Quercus Ilex* (covered with two species of mistletoe), but mixed here as we notice for the first time as a shrub soon becoming a tree, *Juniperus excelsa*, and our old friends the *Daphne*, *Cotoneaster* and *Sophora*, besides more numerously the small yellow rose, and *Buddleia*. As the ascent up the precipitous face of the Kotal takes place, Deodar becomes numerous with the oak as a tree, and *Abies Smithiana* and *Pinus excelsa* now forming a tolerable forest. Here an ash, *Fraxinus Moorcroftiana*, Wall., is not uncommon, and *Juniperus excelsa* as a tree numerous.

But not until we get fairly on and into the woods of the Kotal do we come upon *Abies Webbiana*.

Except the two oaks, *Quercus Ilex* and *Semicarpifolia*, there is no undergrowth whatsoever.

Taxus baccata does not exist in the forest, nor do we come upon Gerard's pine until we pass through the forests of Kotal and come upon their north exposure, where, on the lower edge of the forest, it is common.

The Deodar forest from the Spin Ghar Kotal to the Peiwar Kotal, and for miles to the south upon this spur of hills is simply superb, and almost unlimited in extent, and capable of being easily worked.

The other pines are proportionately few, but help to form a very dense forest.

The Hariab district is the basin of the Hariab river, that is formed by the south-western base of Sika Ram (Spin Ghar), and its two spurs, the Peiwar Kotal range running southwards, and the range that ends in Mount Matunge running nearly west. The Hariab falls into the Hazar Darakht river at Ali Khel.

The Hazar Darakht river forms the base of the triangle, with the two ranges of hills already spoken of, and thus completes the boundaries of the Hariab district.

The Hariab river takes its rise from the several streams that rise from the south-west face of Mount Sika Ram (Spin Ghar); it is supplied by tributaries from the hills to its north and south until it reaches Ali Khel, where only the streams from the south and east of Mount Matunge fall into it as it itself joins the Hazar Darakht, a much larger stream. This united stream subsequently flows into the Kuram.

At Zabr-Dast Killa the river may be called Hariab, as here at about 8200 feet the river is joined by several streams of one size.

On its southern or left bank until the river reaches Ali Khel, there is little or no cultivation, as the hills come down to the banks of the river. On the right bank there is a great deal of cultivation, as there is a large amount of good land on this side in plateaux, all of which is fairly cultivated from the base of Sika Ram to Ali Khel.

The land produces but one crop during the year—wheat, barley, maize, rice, millets, pulses, and clover.

Tobacco is occasionally grown and several of the cucurbitaceæ; no vegetables, opium, or oil-seeds.

The climate is much colder and drier than that of Kuram, with a more rigorous winter.

The plane tree, *Diospyros*, and vine do not grow here. The walnut, as a good sized tree bearing fruit, is rare; small trees are not uncommon. In the stream bed, *Salix babylonica* is a large tree, which, with a naturally wild *Salix*, are both cultivated to protect embankments for irrigation purposes.

Hippophae is cultivated as a hedge, and along with it an *Elæagnus* is common. The chief sources of fruit are apricots, plums, and apples, and a few pears.

The jungle scrub of the hills is chiefly *Juniperus excelsa*, with a very characteristic small stiff spinous grey *Prunus*, very handsome when in full bloom, with its peach-like blossom. *Daphne Sophora*, two species of *Cotoneaster*, honeysuckle, *Viburnum*, the single yellow rose, and another, with *Cratægus*. In addition to these, as we get somewhat into the forest, currants, gooseberry, a species of *Colutea*, and a very handsome laburnum-like *Astragalus*, called "jirrel:" the bark of this, cut off in rings, is employed in lieu of brass rings to the sheaths of Afghan knives, and not the bark of *Betula Bhojpattra*, the paper birch; also a most superb, great scandent honeysuckle, rose-red colour, very fine, and I think, a new plant. These forests would grow down to the stream, but they have been driven back by cultivation and search for firewood.

On the southern exposure of the Peiwar Kotal range, from two miles to the east of Zabr-Dast Killa, and in all forests lying to the west of Sergul, is *Pinus Gerardiana*. The Deodar and *Juniperus excelsa* form the forest from this to Ali Khel.

Pinus excelsa, *Abies Smithiana*, and *Webbiana*, are driven out into the higher forests and ridges.

Abies Smithiana and *Pinus excelsa* one can always detect, by their cones in the streams, as occurring somewhere above. *Abies Webbiana* has to be gone and looked for.

No *Taxus baccata*, Rhododendron, or *Betula Bhojpattra*, exist to the west of Sika Ram, at least in the Hariab district.

The fern that is occasionally to be met with is *Asplenium Ruta muraria*, but I have found five others: *Adiantum Capillus Veneris* and *Ceterach officinarum*—both only near Ali Khel; *Asplenium trichomanes*, *Asplenium sep-*

tentrionale, and another *Asplenium*—only in one locality each.

The forests here extend up to 11,000 feet, but higher on the northern side: the hills are not so precipitous and there is more moisture.

In a practical point of view, the great value to be attached to a botanical examination of the Kuram and Hariab valleys is its vegetable products, and the value they may possess for any export trade.

The first of these is timber. The Deodar, our finest Indian Himalayan timber tree, forms dense forests, many of which it will be found can be easily worked. There is at present no limit to the amount and quality of this timber that can be obtained: means of exportation and forest conservancy are the subjects that now require to be studied.

Deodar timber used to be exported from near the Kuram river in Mongul territory by floating down the Kuram *viâ* Thull to near Banu, but this has for some years been given up.

In grain these valleys have heretofore had no export trade, producing no more grain than was absolutely required for local consumption. I may say the same of their fruits, except perhaps walnuts and amlok (*Diospyros*).

The cause of this is simply *oppression*. There is land enough to double or treble the produce.

With a very little more than ordinary care of the water as it is expended, one-third more ground could be brought into cultivation; by appliances of a cheap nature, as wooden troughs, one-third more; and more expensive plant would enable it to be doubled.

The very first effects of our rule in this valley will show itself even this season in there being grain enough for our troops locally produced, and next year exportation will begin to take place towards the Punjab for exchange for cotton goods, which are at present expensive.

I cannot come to any opinion as to whether the nuts of Gerard's pine were exported as a real trade article from the Hariab. I know that it is so from Khost.

The natives use no oil, splinters of the roots of Gerard's pine, or of the stems of *Pinus excelsa*, being used in place of lights.

A crude tar is made from the roots of the above pines for local use. This is their nearest approach to oil. It is employed for local application to wounds and sores.

A little silk is produced at Shaluzan and some other villages; but in this there is no trade.

Probably the substance in which most trade is done, both on a large scale and barter, is honey. This is extensively exported by through-carriers to Kabul and the Khost country. Nearly every house in a village has its bees from Kuram to Ali Khel.

In a scientific point of view, the great value of a thorough and careful research in the vegetation of this altogether new to science district is the material assistance it will give to the better knowledge of the geographical distribution of plants, and the meeting of the several floras of Europe, Persia, Afghanistan, Tibetan, Himalayan, and Punjab tropical, which I already see radiate round the Safed Koh range as a focus, besides enabling one to obtain a more detailed and extensive knowledge of the peculiarities in the distribution of plants dependent on climatic zones, more or less influenced by a moist or dry atmosphere.

From the 600 species I have already collected, I can see already the immense value likely to accrue to scientific botanists by the collections I am now making, and consider that the Government should permit of the subject being thoroughly worked out.

Submitted and recommended.

FRED. ROBERTS, Major-General,
Commanding Kuram Field Force.

Camp Peiwar Kotal, the 5th July, 1879.

PREPARATIONS OF WHITE QUEBRACHO BARK.

(*Aspidosperma Quebracho.*)

BY DR. BURGOS.

The following extract from a thesis by the author appears in the *Revista Farmacéutica* (Buenos Ayres), for November:—

Powder of Quebracho Blancho.—Possesses all the physical and organoleptic properties of cinchona powder; in colour it is intermediate between the red and yellow barks. It is prepared in the same manner and can be used for the same purposes pharmaceutically, as an antiseptic alone or mixed with wood charcoal, or as an ingredient in dentifrice powders, electuaries, etc.

Infusion.—The infusion is similar to sherry in colour, clear and transparent. It has a bitter taste, analogous in every respect to that of an infusion of cinchona, but more pronounced. It is prepared with the same proportions as the decoction.

Decoction.—Quebracho Bark, bruised, 1 part; Water, 20 parts. Dr. Mantegazza prepares it in the proportions of 1 to 12 or 18. The decoction is more intense in colour than the infusion, and if it be concentrated so as to reduce it to one-third it acquires a colour as deep as that of port wine. It remains clear whilst kept at an elevated temperature, but as it cools it deposits an abundant precipitate. A few drops of sulphuric acid restore partially its transparency by dissolving the alkaloid it contains. If added to a solution of sulphate of iron a very large quantity of greenish grey precipitate is produced. With ammonia it undergoes no alteration.

The decoction is used as a tonic and febrifuge and it is the form in which quebracho is administered in the provinces where paludal fevers prevail.

Digestion.—Made with sulphuric or acetic acid in the proportions indicated for the preparation of the alkaloid according to Fraude's method. At the end of four to six days it is as intense in colour as the concentrated decoction and has a much more bitter taste, as it contains much alkaloid in solution.

It can also be prepared for internal use with a smaller quantity of sulphuric acid.

Tincture.—Quebracho Bark, bruised, 1 part; Alcohol, 56°, 5 parts. Macerate during eight days and filter. (This formula corresponds to the tincture of cinchona of the Codex.)

Compound Tincture.—Quebracho Bark, bruised, 2 parts; Orange Peel, 1 part; Alcohol, 56°, 15 parts.

Wine.—Quebracho Bark, bruised, 1 part; Alcohol, 56°, 2 parts; White Wine, San Juan or Mendoza, 16 parts.—Leave the alcohol in contact with the bark during twenty-four hours, then add the wine, macerate for eight days and filter. The use of one or other of these wines is recommended because they contain little tannin and possess a special aroma that communicates an agreeable flavour to the preparation.

An *Elixir*, very pleasant to the palate, is made by adding sugar to this preparation.

Extracts.—Both the aqueous and alcoholic extracts may be prepared by the ordinary processes.

Syrup.—Quebracho Bark, 3 parts; Water, 32 parts; Sugar, 16 parts.—Boil the bark with the water, filter and evaporate down to the fourth part, add the sugar and make the syrup *secundum artem*.

Preparations with the Alkaloid.—Aspidospermine or quebrachine is insoluble in glycerine. It dissolves readily in fats and fixed oils, and may be incorporated with cod liver oil in larger proportion than quinine. The following is a suitable formula:—

Cod Liver Oil, 100 parts; Aspidospermine 6 to 8 parts: Dissolve with the aid of heat. It is easy to conceive the usefulness of such a preparation as this, in which the special properties of the oil are joined with those of the alkaloid, and which in small doses acts as an eupeptic.

THE HECTOGRAPH.*

Some time ago, a new method for rapidly producing copies of letters, or any kind of written matter, was made the basis of a patent in Austria. The simplicity and facility of working the apparatus immediately attracted universal attention, but the high price of the first apparatus was not at all in proportion to the cheap materials, even allowing for a very respectable profit. It was soon ascertained that the process, or rather the composition of the printing material, was not capable of being patented, being nothing else than gelatin (or glue) and glycerin. Since then, in Europe as well as in the U. S., a number of such apparatus, under various names, have made their appearance, some of which may be seen at present at the Exhibition of the American Institute in New York. The price of any of these copying apparatuses is not at all unreasonable, and many will prefer to buy them ready made with all the necessary appliances. But for those who wish to make an apparatus for themselves, we append several methods:—

1. Ten parts of gelatin are softened in water, and then dissolved in 100 parts of concentrated glycerin, on the water-bath. When melted, the mass is slowly and carefully poured into a tin tray, about 1—2 cm. ($\frac{3}{8}$—$\frac{3}{4}$ inch) deep, and of any desired size. Any rising air-bubbles must be removed, and the mass is then allowed to become cold, when it will form an elastic mass, a little firmer than printers' rollers. Such is the process, as it has been published in some foreign journals. We have, however, ascertained that various other ingredients enter into its composition, among which sulphate of barium, sugar, glucose, and chrome preparations are mentioned. The latter, in the form of bichromate of potassium or ammonium, or of chrome-alum, would render the gelatin insoluble in water, after being exposed to light. As soon as we have further information on this subject, we shall take occasion to communicate it to our readers.

This mass has the property of absorbing to the depth of perhaps $\frac{1}{64}$ inch writing or tracings made with certain kinds of ink, particularly aniline inks. Any aqueous ink would answer, but it is necessary to use one which is made of very persistent colour. The writing desired to be multiplied is written upon a sheet of paper with the special ink below to be described; after the ink is completely dry, the sheet is laid on the moistened gelatin-surface (writing down), and gently rubbed over with the hand. After a short time (about 1—2 minutes), the paper is removed, and laid aside. Fresh paper being ready, a sheet is laid upon the writing, and the hand gently rubbed over the back, when a clear and complete copy of the writing will be found on the paper. This may be repeated from sixty to a hundred times, according to the quality of the ink, and the experience of the operator. When no more copies are wanted, or when the ink is exhausted, the surface is washed off with a sponge and cold water. Any traces of the ink left in the mass, after thoroughly washing, will not interfere with the next copy. When necessary, the mass in the tray may be remelted.

The ink may be prepared as follows:—

Violet: methyl-violet, 2; dilute acetic acid, 2; water, 4 parts.

Or, *red:* fuchsine, 2; alcohol, 1; water, 8 parts.

Or: Mix 5 parts of any desirable aniline colour, 5 of alcohol, 5 of mucilage, and 35 of water in a flask, heat until dissolved, and after twenty-four hours strain through flannel or wool. The selection of aniline colours is difficult, as many of them are largely composed of *dextrin*, which dries up or makes the solution thick. The best aniline colour, according to E. Störmer, is the Violet de Paris de Poirrier.

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* Other names of this copying apparatus are: Copygraph, Copygram, Lithogram, Cheirograph, Autograph, etc. Reprinted from *New Remedies*, November, 1879.

IODATED AND CYANATED CAMPHOR.*

Although the iodine and cyanogen substitution products of camphor have not as yet found employment in medicine, like the corresponding bromine compound, yet it seems quite probable that they will be experimented with. Both bodies have been obtained by Haller. His primary object was the preparation of cyanated camphor. For this purpose he dissolved a mixture of iodide of camphor (improperly so called; being equal parts of iodine and camphor) and of sodium-borneol (or natrium-borneol)† in benzine, and treated this, under the application of heat, with a solution of iodide of cyanogen in benzine. He obtained crystals having the composition $C_{10}H_{15}IO$. When pure, they are white, insoluble in water, soluble in alcohol, ether, benzine, etc., melt at 43°—44° C., but do not again solidify until cooled to 28°—29° C. Heated to 100° C. it volatilizes without decomposition, but at 150° C. decomposition takes place. This body is mono-iodated camphor.

Cyanated camphor was prepared by very gradually adding to a solution of 100 grams of camphor in 100 grams boiling benzol (temperature between 100° and 110° C.) 8 grams of sodium, and then passing a stream of well-dried gaseous cyanogen through the liquid, until the latter commenced to assume a red colour. The liquid is then transferred to a separating funnel, where it is washed with water, which removes sodium cyanide; the remaining hydrocarbon compound is then treated with caustic soda and allowed to remain at rest, so as to separate the latter. This is several times repeated, the alkaline solutions united, acetic acid is added to faint acid reaction, the resulting white precipitate dried and then dissolved in ether. On evaporating this solution, cyanated camphor, $C_{10}H_{15}CNO$, is obtained in white prismatic crystals, soluble in alcohol, ether, chloroform, glacial acetic acid, and fixed alkalies. It melts at 127—128° C. and boils at 250° C.

Cyanobromated comphor is obtained by treating, at a gentle heat, a solution of cyanated camphor in carbon disulphide with bromine:

$$C_{10}H_{15}.CN.O + Br_2 = C_{10}H_{14}.Br.CN.O + H\,Br.$$

As soon as no more hydrobromic acid escapes, the carbon disulphide is distilled off, the residue is dissolved in alcohol and crystallized. It forms handsome crystals, soluble in the same solvents as the cyanated camphor, but with greater facility.

INK FOR WRITING ON SHEET-TIN.

1. Sulphate of copper (1 gram) is dissolved in 20 grams of water, 2 drops of hydrochloric acid are added, and sufficient solution of gum-arabic to make the ink adhesive. This ink writes intensely black, and is very durable. It must be written with copper pens. The addition of a little pyrogallic acid is advantageous, because the writing appears at once, which is not the case with the simple copper-solution.—C. Bernbeck, in *Pharm. Zeit.*

2. A jet-black, lustreless ink, or rather varnish, for writing on sheet-tin, which is absolutely insoluble in water, and dries instantly, may be prepared by dissolving shellac in alcohol (2 oz. in 1 pint), filtering with the aid of chalk, and mixing with finest lamp-black.

Incidentally, it may be remarked that a turpentine solution of shellac with lamp-black produces, on drying, a *glossy* black. On the other hand, an alcoholic solution produces a perfect *dead* black, without a trace of lustre. —Ed. *New Remedies*.

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* *Journ. de Ph. et Chim.*, and *Arch. Ph.*, August, 1879. Reprinted from *New Remedies*, November, 1879.

† According to Baubigny, sodium (or natrium) borneol is obtained by carefully adding to a saturated solution of camphor in a pure hydrocarbon, f. i. toluol, heated to 80° C., small pieces of sodium. On cooling the compound, $C_{10}H_{15}NaO$ crystallizes out.

The Pharmaceutical Journal.

SATURDAY, DECEMBER 20, 1879.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

ACCIDENTAL POISONING BY MEDICINE.

Three weeks ago in mentioning an article in the *Medical Press and Circular* propounding opinions which, to say the least, seemed to us as eccentric as they were uncalled for, we suggested that the writer of the article might have been under the influence which in the dead season of the year brings back to our notice fresh accounts of prodigious gooseberries, of interviews with the sea serpent, and of other occult phenomena which seem conveniently to present themselves at that period. At any rate we gave him the benefit of the doubt, and, abstaining from any serious comment on the statements and suggestions made, we thought, a free quotation of the writer's own words would amply suffice to demonstrate their absurdity.

We have reason for saying that this has been the result in some cases, if not generally, and therefore the unfounded statements and insinuations contained in the article referred to might well have been consigned to oblivion, without further notice, if it had not been that in the following number of the journal in question we were charged in an editorial note with having "been unwise enough to make a virulent attack" upon that journal "for bringing to light the great evils that are the natural consequence of the existing law relating to sales of poison."

This editorial endorsement of the views against which we had entered a mild protest, together with some other circumstances to be mentioned presently, induce us to refer again to the subject, and in the first place we take exception to the assertion that the *Medical Press and Circular* has "brought to light great evils that are the natural consequence of the existing law relating to sales of poison." That journal denounced chemists and druggists as being irresponsible purveyors of poison and has brought against them the charge of carrying on their business so that the claims of society and of humanity are subordinated to the sordid desire of gain; but it has done so without furnishing any evidence to justify the charge. It claims, however, to have so forcibly exposed the evil which it assumes the existence of, that it is asserted the quotations we took from its article on "Poison Vending" must be destructive to ourselves. But we fail to recognize in those quotations anything of such a nature. On the contrary, as regards both the statements and the imputations conveyed by them, we consider that so far from their exposing any evil for which chemists and druggists are to blame, they are in reality either silly or malignant, besides being at variance with well-known facts and with the opinion of the medical profession as a body.

Our contemporary affects to be glad we did not attempt to justify the retention by the Pharmaceutical Society of the authority it possesses, and with patronizing presumption cautions us against weakening the cause we "must defend," by what it pleases to call "silly ebullitions of splenetic virulence."

When the power held by the Pharmaceutical Society is objected to upon grounds more valid than the lucubrations of the *Medical Press and Circular* upon "poison vending," it will be time enough to attempt its defence, and whenever our obligations constrain us to take up the defence of chemists and druggists it shall not be with such "men in buckram" as our contemporary has led out against them with true Falstaffian rant.

But is there really, as the *Medical Press and Circular* assumes, any question to discuss? and if so, what is the question? We take it for granted that so long as poisonous medicinal agents are used as remedies they will continue to be misapplied by the general public, and that consequently accidental poisoning will occur. We also assume that it is impossible to restrict the use of such poisonous medicines so exclusively that they can only be obtained on the order of a medical man. It would be as reasonable to expect the use of razors to be restricted to the order of barbers. The business of selling poisonous medicinal agents as carried on by the chemist and druggist is by law subject to restrictions that are directed towards limiting the facilities of obtaining dangerous articles. There can be no doubt the provisions of the Pharmacy Act do operate in that way and not, as the *Medical Press and Circular* alleges, by empowering the chemist and druggist to deal wholesale destruction in the vicinity of his shop.

Who then is responsible for that misuse of poisonous drugs and medicinal agents which impels our contemporary to insist upon the urgent necessity of reform? Taking, for example, the case of chloral. Is it not to the laudation of this article by medical men when it was a novelty, that we must ascribe much of its popularity? Is it not to the direct recommendation of it by the physician that we must ascribe much of the improper or ignorant use of this dangerous article? Have not those who used it to alleviate the consequences of intemperance helped to subject many of the public to the danger of accidental poisoning, and thus while endeavouring to drive out one devil opened the door to others worse than the first?

But while stating this which we believe to be the true view of the case it must not be inferred that we charge medical men individually or as a body with having acted regardless of the claims of society and of humanity, however much the consequences of their action may have proved pernicious. It is only because we are driven by false accusations of chemists and druggists to show where the source of accidental poisoning is really to be found, that we comply with this necessity of the obligation to defend them. We will for the present leave out of consideration the wholesome interference by which the chemist and druggist often prevents accidental poisoning, and still more often seeks to deter persons from the misuse of dangerous medicines. The service thus rendered is sufficiently well known to medical practitioners not to need more particular mention here. But as our correspondent, "A Village Chemist," shows in his letter at page 500, the tender of this service is not unfrequently productive of disadvantage to the chemist and druggist. If he is not told that his business is simply to supply the demands of his customers, he is left to find out from the withdrawal of their custom that this was the idea they entertained.

It so happens that a case just reported in the *Medical Times and Gazette* throws a strikingly illustrative light upon the subject of accidental poisoning and upon the question who is responsible for such occurrences. An American lady, resident in London, consulted a well-known West-End physician, who gave her two prescriptions—one for six pills containing one grain of opium each, the other for a mixture containing six moderate doses of chloral. By the aid of these prescriptions she appears to have obtained large quantities of these potent and dangerous medicines, and one day last October she was found in a dying condition, after having apparently swallowed in the night the whole six doses of mixture and a dozen of the pills. Perhaps the *Medical Press and Circular* would regard this case as illustrating the way in which it alleges the chemist and druggist deals wholesale destruction in the vicinity of his shop; but the *Medical Times and Gazette* puts another construction upon it and in these plain words: "Once, apparently, procure a prescription "for any noxious or poisonous drug, for whatever "purpose, and ever after this same drug is at the "command of anyone who may be able to lay "hands on the prescription!" If this means anything, it means that it is the physician's prescription, and not the facility of purchase offered by the chemist and druggist, which is the master key by which the public obtains possession of poison and of dangerous medicines; that document is the *passe-partout* which enables the holder to override the provisions of the law and to defy the caution of the pharmacist.

But, says our contemporary, the *Medical Times and Gazette*, in reference to the possible consequences of such power being placed in the hands of incautious or rash persons, "it is grossly unfair to hold a physician answerable for what may happen." And why is this held to be so surely the case? Why, because prescriptions that have been found serviceable are circulated from one to another and among the members of a family, or friends in the neighbourhood, and because being once out of the physician's hands they are at the will of the world. True these are the facts, and it appears to us that while they constitute an effectual stultification of the poison regulations of the Pharmacy Act, the logic which offers them as the exculpation of the prescriber is very remarkable. Might not the giving of prescriptions ordering poisonous drugs be more justly held to excuse the chemist and druggist for supplying these articles and simply complying with the demands of his customers? That is in fact his business and, as the successor of the apothecary he is, by tradition, if not by law, under obligation to supply what the physician orders.

There is a candour in the acknowledgment of the *Medical Times and Gazette* of the real source of the evil to which much accidental poisoning is due, and having recognized this we should have expected some suggestion of a remedy; but there is none offered, and, beyond the remark that if certain conditions existed which do not exist such things could not occur, the subject is left in *statu quo ante* with merely an expression of opinion that "the "mischief arises solely from the *hiatus* which now "exists between physicians and chemists, whose in"terests, taking this case for example, do not seem "to be identical. The physician would prefer to "give a fresh prescription, and receive a fresh fee; "the chemist undertakes so save the physician's "guinea to the patient by constantly dispensing the "same prescription."

This is, to say the least, disingenuous: inasmuch as it represents the chemist as voluntarily frustrating the desire and aim of the physician it is not true, and if the physician, knowing the way prescriptions are dealt with, knowing also their power to override the provisions of the Pharmacy Act as to the sale of poison, considers it desirable to prevent his prescription from becoming a facility for accidental poisoning, it is, we think, with him that the *onus* lies of adopting precautionary measures, either by giving his prescription conditionally and simply as an instruction to the dispenser for use on one occasion only, or in some other way. There may be difficulties in the adoption of such a plan; but it is not the business of the pharmacist to deal with or remove them, nor is he to be blamed for accidents which occur under the existing system. As to the *hiatus* supposed to exist between physicians and chemists, we are disbelievers; and if we are in this respect wrong, we would ask why should there be a *hiatus* between two classes so closely related in their avocations, and why should their interests if not identical be discordant or opposed when they are constantly called upon to act in concert and in reciprocal capacities as servants of the public?

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

December 10, 1879.

Present—Mr. Sandford, President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

MAJOR EXAMINATION.

Seven candidates were examined. *Two* failed. The following *five* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Bown, John Quinton ....Nottingham.
Carter, Francis ....London.
Crook, Herbert ....Gravesend.
Eaton, Edward Jarrett ....Diss.
Greig, James.........................Glasgow.

MINOR EXAMINATION.

Seventeen candidates were examined. *Twelve* failed. The following *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Allison, William Bellyard ......Retford.
Bancroft, James ....Halifax.
Banks, James ....York.
Bell, Robert ....Lancaster.
Browne, Frank Styant ....Norwich.

MODIFIED EXAMINATION.

Four candidates were examined. *Two* failed. The following *two* passed, and were declared qualified to be registered as Chemists and Druggists:—

Althorp, George ....Henley-on-Thames.
Rich, George B. O. ....Islington.

PRELIMINARY EXAMINATION.

The undermentioned certificate was received in lieu of the Society's examination:—

Certificate of the College of Preceptors.

Gelsthorpe, James ....London.

December 11, 1879.

Present—Mr. Sandford, President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

MAJOR EXAMINATION.

Six candidates were examined. *Three* failed. The following *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Gulliver, William Inchle.........London.
Harburn, Alfred ....London.
Williams, Thomas Henry ......Plymouth.

MINOR EXAMINATION.

Twenty-one candidates were examined. *Six* failed. The following *fifteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Chadwick, John ....Accrington.
Cock, James ....South Molton.
Cox, Frederick John ....Newark.
Crowther, William Fearne ......Beverley.
Davies, John.........................Haverfordwest.
Garrett, John Henry ....Notting Hill.
Gelsthorpe, James..................London.
George, John Irving...............Tunstall.
Grover, Frank ....Folkestone.
Henson, William John...........Maldon.
Hobbs, John Kingdon...........London.
Holdcroft, Francis Joseph ......Coventry.
Hooper, David ....Southwark.
Jackson, John Edward ....Maidstone.
Jones, Jonah.........................Aberdare.

December 17, 1879.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

Professor Greenhow was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

Six candidates were examined. *Two* failed. The following *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Hugill, Arthur Major ....Leeds.
Kirk, William Peele ....Retford.
Powell, William ....Swansea.
Richardson, William Henry ...Boston Spa.

MINOR EXAMINATION.

Twenty-one candidates were examined. *Thirteen* failed. The following *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Jacks, David Russell ....London.
Jones, Charles ....Ashton-under-Lyne.
Littlefield, James Clarence......Ventnor.
Lonnon, Frederick ....Plymouth.
Milne, Andrew .... London.
Newman, Alfred Pointon ......Crewe.
Parkes, Harry Charles............Fareham.
Playford, Frederick William ...Holt.

December 18, 1879.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

Professor Greenhow was also present on behalf of the Privy Council.

MINOR EXAMINATION.

Twenty-five candidates were examined. *Fifteen* failed. The following *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Jones, William Harris............Abergavenny.
Protheroe, John Godwin.........Christchurch.
Rees, Harding ....South Norwood.
Richards, Thomas ....St. Clears.
Richardson, William Clarke ...Nottingham.
Smith, John Ord ....Scarborough.
Tod, John ....Coventry.
Wale, George ....New Malden.
Wilkins, Robert Elliott ....Surbiton.
Winfrey, Richard ....Long Sutton.

PRELIMINARY EXAMINATION.

The undermentioned certificate was received in lieu of the Society's Examination:—

Certificate of the University of Cambridge.

Beringer, Heinrich Roland......Redruth.

MEETING OF THE NORTH BRITISH BRANCH.

The second meeting of the session was held in the Society's Rooms, 119A, George Street, on Thursday evening, December 11, 1879. Mr. J. B. Stephenson, President of the Branch, in the chair.

The minutes of former meeting having been read and confirmed, the following paper was read:—

Thoughts on Botany (*continued*).

BY H. B. BAILDON, B.A. CANTAB.

When I had the honour of addressing this Society last session the concluding portion of the paper which I then read was occupied with the consideration of the wonderful and interesting phenomena exhibited by climbing plants: and the reason that the subject was treated of at that time was that, according to the order of progress I have endeavoured to observe, we had come to speak of the ascending axis or stem of the plant. No doubt a great deal more might be said on this plant-spine, which appears in so great a variety of forms, from the crown of the daisy to the column of the pine. One thing may be remarked, as being an obvious generalization, viz., the symmetric manner in which plants of all kinds tend to grow about this axis. It is by no means hard to discern ample natural cause for this symmetric tendency, but still the immense effect of this simple fact on the appearance of the world, must not be ignored, and cannot, indeed, be overrated. At the same time, every plant might have been symmetrical, and yet not exhibited a tithe of the grace and charm which we behold in nature. The marvellous subtlety, complexity and (what one can only call) air of unconcern with which natural forms are wrought into subjection or rather coincidence with this law of symmetry, give rise to that æsthetic power whose operation we so often feel. Take any way-side plant and make an accurate drawing of it in its natural posture, and, if the drawing only be accurate, you will find in it a charm which is best defined by saying that there is a certain symmetry in the distribution of the mass, in the modelling of the form into response and counterpoise of curve and angle, which is, at the same time, secret and subtle in the mode of its execution. Or look in winter at a line of leafless trees, as seen inlaid on the horizon, and you will perceive that, although no two are alike, they have all a certain poise, an air of being delicately balanced, which forms no small part of the æsthetic pleasure they produce. (There are, of course, cases in which they are maimed or warped by injuries beyond complete repair or elemental forces too potent to be successfully resisted.) Plants have been well symbolized—I think by Mr. Ruskin —as vegetative fountains. They do, indeed, rise from the earth with a certain impulse like a spring of water; some like a little bubbling well, some with the aerial grace of a Roman fountain, some as with the strong rush of a geyser. And, as a matter of fact, branch-division, apparently so hap-hazard a proceeding, is governed by the same simple law as rules the division of a water-jet or pipe; viz., that the two branches at a fork have the sum of their transverse sections equal to that of the branch below the fork. But their symmetric development is not the only element in plant-form which goes to feed the spring of that beauty with which so many are endowed. While this symmetry with its air of unconsciousness produces an intense satisfaction in our beauty-perceiving faculties, there is also a pleasure even more subtile and moving created by that aspect of dumb volition and dim but delicate consciousness which so many of the higher plants possess. This is a more recondite charm than the other, and there may be many who hardly notice or realize it, but it is, none the less, actually existent, even as those rays of light, to which our faculty of sight gives no response, and which are only made perceptible by passing through a certain medium, are as really existent as those which the least sharp-sighted can perceive and distinguish. Every plant, over and above that structure which science describes with such laboured detail, has an individuality, a certain mien and air of purpose about it, which is a more prompt and intuitive and yet no less reliable test than the items of a botanical description. And when this individuality is perceived by a man of poetic faculty and power of literary expression, he can hit off in a line that which seems ever eluding the most painstaking scientist. Burns's "Wee, modest, crimson-tippèd flower" is a more clear and readily recognized description, one as sharply individual and incapable of confusion as the most elaborate statement and catalogic definition of Babington or Hooker. It is a description, too, not only general but special, for the three adjectives would not apply to the daisy of the meadow and the wayside, which is rather frank and fearless than "modest," but yet exactly depict the "mountain daisy," found only where it has had some "scanty bield," and therefore with a look of shyness and reserve, such as its congener of the fields never affects. And of this description the immense power arises from the poet's being able, unlike the scientist, to leave the plane of mere physical fact and travel into the moral and emotional; the reason that this is a power being, that there is in the plant just that individualism which we associate with character, and therefore with moral qualities. Nor is such the mere fancy of poetic and imaginative minds, because while such characterization can only be made originally by an imaginative mind, it is, when made, recognizable to many, if not to all. No one, of course, believes that a plant is consciously "modest" in the sense that a human being is, but it is none the less a true symbol of that quality—an unbreathed word formed on the silent, beautiful lips of Nature. And without these symbols how poor and bare language and literature would be! The loss of half-a dozen plants and their symbolism would, in Yankee parlance, "bankrupt" every ancient poet and many moderns. Deprive, for instance, Hebrew poetry of but four—the rose, the lily, the cedar, and the vine—and what is left? Literature so bereft would be like some glorious illuminated missal deprived of its gold, and azure, and scarlet.

Evolution, as I have here accepted it, is a doctrine of progress and of hope, and it would almost seem as though the intellectual current,—which is to the world of life what the electric is to the electro-magnet—grew stronger as the ages ripen. The phenomena, for example, of twining stems, which we lately considered, are more fraught, it would seem, with accurate calculation and foresight than any we have before encountered. But this class of plants must have been of late development, seeing their powers would only be required among a highly developed vegetation. And we shall see further on that a tribe of plants, the orchids—obviously also late-comers —show the most delicate system of adaptation that nature presents. It would thus seem as though external nature, as we know of it in this planet, were becoming more highly charged intellectually as we approach the period of man. Nor can there be any reasonable doubt that whatever were the strange splendours of primæval jungles and forests, the world of to-day is richer and more refined in its beauty. So that, although we have to abandon the conceited conviction, so long prevalent, that the earth, if not the world, was created solely for the delectation or edification of mankind, we may console ourselves with the knowledge that we dwell in so ripe an age of the planet, and are so beset with beauty and instruction.

But we must cease marking time at our very starting point, and make an advance, which advance brings us to what is perhaps most significant of all plant organs, the leaf. One cannot congratulate the botanist on the felicity of his definition of a leaf as "an expansion of the bark," a phrase conveying just as little information on the subject of the nature of a leaf as is well possible without its being an absolute contradiction of fact. It is, indeed, incorrect—as incorrect as to say that the hand is an expansion of the skin. A leaf is rather a sub-division and expansion of the stem, over which the bark is stretched—even as the skin over the human hand or over the webbed foot of a bird. The midrib, veins, and nerves of a leaf correspond to the bone, cartilage, and muscle of an animal's limb. This alteration renders the definition much more consistent with the other doctrine of modern botany, that a plant consists of an axis, stem, and leaves —its primary divisions. For, as soon as we get beyond the very simplest organisms, where the organs are undifferentiated, and the functions—afterwards performed by the various plant-organs—only exercised by the general surface of the vegetable mass, we come to the differentiation of leaf and stem, the one the central, the other the radial, the one representing generally the vertical impulse, the other the centrifugal. Structurally considered, then, the leaf might quite well be defined as an expansion of the stem—an expansion existing long before any bark, even in its broadest sense, is discoverable—but, functionally, it is better described as an aerial rootlet; for the stem itself, like the rootstock, the more distinctly it becomes a stem, the more completely discontinues any direct nutritive action, while the leaves always remain operative in that respect, although their function again becomes clearly differentiated from that of the rootlets. And, even in this reference, our analogy of a leaf to the hand is singularly appropriate. What are leaves but so many searching, suppliant palms, held out for the alms of the physical heaven, whereon its largess of rain, and dew, and sunshine is outpoured? But more instructively and accurately may we take the hand and arm as analogous to the leaf and its petiole—it is a vegetable limb in which we have all varieties of proportions between hand and arm—some all hand and no arm, some all arm and no hand.

There is certainly no theme in connection with our subject more embarrassing, by reason of its extreme fertility, than this of the leaf. Whether we regard it in view of its function in plant economy, in respect of its utility to the plant itself, or consider its variety and beauty as a source of refined and ennobling pleasure to man, the theme is alike capable of indefinite expansion. Though, with regard to the former, it may justly be said that any signal failure in utility in a plant-organ would mean the certain and speedy extinction of the plant; for, while nature often exhibits the dignity of repose, she has obviously no faith in the nobility of idleness, and adopts certain methods of exterminating the idler. Even when we find that portion of a plant, which we would botanically designate the leaf, failing to fulfil its usual offices, we will still find it told off to a specific duty, while its function is assumed by some other organ; for nature's inevitable condition of ultimate continuance is utility—is the discharge of some essential office. No doubt, in the course of evolutionary progress, certain organs may become unnecessary and rudimentary without being obliterated, but they bear in themselves the sentence of death, and must eventually disappear unless they can make themselves useful and necessary in some new manner. Nothing can be more thoroughly just than such a law—one pervading creation, not excepting the moral and spiritual nature of mankind. Activity tends to strength and development, inaction to weakness and loss. The principle is so universal, and apparently self-demonstrative and automatic, that we give nature no credit for this exact equity of hers, although the supposition that a world might have existed, in which a different law was operative, is by no means so wild a conception as is often seriously entertained by scientific men. But it is the fashion now to discount the virtues of nature, as though they were something inevitable, while it is considered quite allowable to stigmatize her as cruel, merciless, and so on, because the earth will not get out of the way of a falling body, which happens to be human, or water declines to support an organism heavier than itself, because that organism has a wife and family to mourn his loss. Nature is sublimely impartial, and therefore intensely just. Any confusion between moral and physical condition, any deviation from the rectitude of law in the direction of that spurious form of justice which we call poetical, and which is merely sentimental, would involve an unreason, a chaos, and a complete loss of those characteristics which convince us of the sanity and stability of the cosmos. We can, in this case at least, claim for nature a justice which, if often terrible, is always majestic.

What most compels our astonishment and admiration, in regard to the utile aspect of leaves, is the infinite variety of form, and even method, they exhibit, along with a perfect equality in point of fitness. It would be, I think, impossible to make corrections on nature, and say in any case that, from the plant's own point of view, its present form of leaf could be advantageously replaced by any other. This is doubtless accounted for by such a doctrine as the survival of the fittest, but it is certainly fortunate for us that the fittest should have included so great, so useful, and so delightful a variety. But the question is, how came the fitness? Whence this accommodating power of organisms? A hap-hazard variation it can hardly be, for the advantages of many forms can only have come into play when the change has been carried out to a pitch approaching perfection. Take such a case as the floating apparatus of the Urticularia.

"Small *ascidia* or sacs are connected with the leaves, which, about the time of flowering, are filled with air, and buoy the plant to the surface. The opening of each sac is surrounded by forked hairs composed of four cells, and is closed by a transverse cellular membrane, like the valve of a pump, capable of opening from without inwards, and which resists when it is pressed from within outwards. The physiological action of these ascidia is full of interest. At first they are filled with a somewhat gelatinous liquid, which by its weight assists in retaining the plant at the bottom of the water. Very soon the branching hairs already described, which project into the interior, secrete a gas, which accumulates as the gelatinous substance diminishes. By and by, when the vessels are full, the plant gets light and buoyant, and, disengaging its roots from the soil, rises to the surface of the water and flowers. The flowering over and the fruit mature, the air disappears from the ascidia, the valve allows the water to enter, and again the plant sinks to the bottom, to remain there until spring stimulates its ascidia again into activity." (Brown's 'Manual of Botany,' page 158.)

Unnecessary and almost irreverent does it seem to offer any comment or commendation of a system of contrivances so ingenious and so adequate. Had such a system been suspected to be of human origin, we could not praise too highly the inventive genius and scientific acquirements therein displayed. But being only a piece of nature's handicraft, we are now taught that there can be no ingenuity or wisdom or foresight involved in its construction, but that it has somehow been blindly sculptured into its present form, through the influence of its varying environment. That this interaction of organism and environment is and has been a most important creative factor, operative and potent to an extent which at one time would not have appeared credible, it is not my wish to deny. None the less distinctly do I maintain, that, so far as my imagination and reason can carry me, I quite fail to see how this agent could, apart from some pervasive intelligence in nature, give rise to an organism whose structure, seems to involve, not only an accurate knowledge of hydrostatic and mechanical science, but the inventive and executive powers to bring that knowledge to practical effect. For this is what I fail to see, how a slight accidental variation in the direction of this system could be of the least use to the plant. Anything short of a perfect adjustment of the apparatus would be useless or worse. Of what use, for example, would the ascidia be, if the gas were not evolved in the necessary amount to buoy up the plant?—they would be mere ballast to keep it down. Or if, on the other hand, the ascidia began as mere air-bags, the plant must be continuously at the surface and could not in this way acquire its extraordinary habit for leaving go with its roots. The only explanation, then, that we pretend to give of such an elaborate phenomenon is, that it is apparently the work of intelligence of a very high order, and that apart from such intelligence we fail to understand its origin. In employing this argument, we certainly rely somewhat on the analogy between the works of man and those of nature. We know that the construction of a machine and the creation of a work of art involve certain pre-existent powers and qualities in the man who produces them. So in like manner we argue that we can infer the existence of an intelligent Power from the existence of intelligence-involving structures in nature. There is only one method of escaping this conclusion, and this method is adopted by Professor Clifford and others antitheistic writers, and is to deny point-blank the validity of the analogue, and to maintain that although there may appear to be the same or greater amount of thought involved in the construction of some natural objects as there is in some human work, still the former is not necessarily the work of intelligence although the latter is. But there is no attempt, so far as I know, to disprove the validity of the analogue; it is simply and brusquely denied. Yet it appears to me, being one at once so obvious and so conclusive to the majority of human minds, that it cannot be thus peremptorily dismissed, without some reason given. For to deny it, is entirely to block the way of any progress in the philosophy of nature, unless we are to dignify a purely materialist science, quite devoid of any intellectual, moral or spiritual significance, with that name. It is to land us in a complete ignorance of nature, except from the strictly physical side; it is to abolish at once the religion, the philosophy and the poetry of nature. That such denial hamstrings at once the argument in favour of the action of intelligence or any moral quality in nature is no more proof, however, that there is truth in the denial, than the fact that it is open to any one to deny the postulates on which the whole of a science, such as Euclid's geometry, depends, disproves the truth of the postulate and the dependent science. One necessary geometric postulate is that two straight lines cannot enclose a space. Anyone who choses to deny this at once deprives you of the power of convincing him of the truth of the first book of Euclid. Or to take a still simpler instance, a man might say he did not see why two and two always make four; and he would put it out of your power to prove to him the simplest proposition in arithmetic. Similarly to assert that the nice adaptation and ingenious contrivance observable in nature, is no sign of intellectual design, renders it impossible to prove to the assertor anything whatever as to any moral or intellectual qualities otherwise deducible from the facts of the cosmos.

In the decoration of this our beauty-abounding planet, the leaf is certainly nature's most effective instrument. Whether it be the pleasant verdure of field and lane, the soft reposeful masses of blending woods, or the solemn majesty of pathless forest that we regard, we cannot but attribute much of their beauty to the foliage in which they are clad. And if natural landscape owe so much to the leaf yet much more does each individual plant.

The green colour prevailing in leavage is an oft-acknowledged and a real source of satisfaction to the eye, and that although this same colour is the most difficult for a painter to reproduce successfully—that is to say, in such a manner as to cause a repetition of the same satisfaction. The older masters, whose colour is the wonder and despair of modern artists, banished it from their landscape-distances, and the daring Turner constantly evaded its use. Nature seems to possess some still undiscovered art, some secret principle which enables her to use that colour with an effect the ablest artist has not yet acquired. No one ever saw a complexion spoiled by the proximity of a green leaf, however many have fallen victims to a green ribbon.

Then in texture how various, coarse and homely in the dock and nettle, harsh though handsome in the elm, silken in the beech, lacquered in the oak, and burnished in the laurel; like leather, like paper, like velvet, like wax, like metal, like cloth, and unlike all these things: and in form still more diverse, and nearly all beautiful either by reason of individual design, or by virtue of combined effect, and through the union of these. In beauty of individual form we must, as before, accord the first place to some of the more elaborate and lovely fern fronds, but of charm of combined effect almost any branch or plant will afford us illustration. No matter how simple the original form, nature can elicit from it shapes of grandeur and of grace, as the pine and the larch may witness. Many a wayside weed, too, as we call them, displays when we study its form an elegance, a daintiness of outline, produced from leaves of humble and simple form. The sources of this charm are obedience—firstly, to the well-known law of phyllotaxis or leaf-order; and, secondly, to the less known of leaf-proportion; the former governing the position of leaves on the stem, the latter the variation in size and shape that they exhibit in their upward course. As to the former, not only is the general mode of growth spiral but each plant, and frequently whole orders, adopt one particular pattern of leaf-order. If we liken a plant to an ascending jet of water, giving off drops from the central column, we must, to complete the resemblance, suppose this column to have had a rotatory motion about its axis, so that the drops, instead of being given off in rings, would be given off in a continuous spiral. In a pine-cone the scales come off in close succession, just as drops would from a revolving fountain, but in other plants a rhythmic pause is observed, so that the leaves stand at distinct and definite intervals along the stem. Some are like rhymed couplets, two and two at measured intervals, some as the notes in a chime of bells or the endings in a stanza respond after a longer space and in a more complex order. And through this suggested simile we can understand how a plant-form may give an ever fresh pleasure to the eyes, even as a familiar verse or well-remembered cadence may give unpalling pleasure to the ear

What I have called the law of leaf-proportion is more clearly exemplified in the subtle, gradual diminution in size, accompanied often by even more subtly managed modification in shape, which leaves show in their ascent of the stem; that delicate fining off of the foliage preparatory for the final transition into flower. It is not difficult to understand that this is perfectly natural, that is in perfect accord with other mechanical forces and phenomena in nature, but this only argues toward the praise and admiration of natural law, not toward a contempt for its fruit. The mechanical laws of nature are never contravened, the apparent contravention being always obtained by a real obedience. Man, for instance, can produce the apparent contradiction of making water pump itself to a height greater than its original source, and that on the simple fact that two pounds of water falling one foot will raise one pound two feet. So can nature make the lower mechanic force available in support of the higher vital action without any violation of the laws of the former. And the wonder is not how, being constructed as they are, plants ascend into the air and take such a course, but where did they learn the art of so accommodating themselves to surrounding forces—forces which gave no promise or prophecy of such a development of nature?

There must, doubtless, have been a time in the history of the planet, when foliage was even a more prevailing element in nature's adornment than it is now; for we shall see, when we come to treat of the flower, that the more conspicuous and brightly-coloured blossoms have been evolved through the instrumentality of insect fertilization. Time was ere nature seems to have dreamed of the violet or the primrose, still less of the rose, the lily or the orchid, when vast green-waving savannahs rolled for leagues without a star of blossom, and sombre, pathless forests stretched their stately aisles and solemn verdant vistas unlit by the sweet face of any floret—ere snowdrop, on her pensive bells, rang in the spring-tide, or rose blushed in the summer, or the faint autumn crocus lent its timid beauty to the fading autumn fields. Fair enough, then, doubtless—too fair for the rude sense of the behemoth and his huge companions, but not yet fair enough for that strange prodigy of the ages, man—nature had yet to deck herself as with bridal raiment for the coming of her first mate and conqueror and monarch.

"The flower," say the men of science, "is a modification of the leaves;" and this truth, though it be partial, is instructive. If it be held merely to mean that the original elements of the two are similar—that, in point of fact, in the earliest stages of their formation they are identical and indistinguishable, so that the embryos, as we may call them, have a possibility of becoming either the one or the other, it is true. But if it means, as it seems sometimes to be put, that the flower is made up of unsuccessful leaves, of leaves that have failed to become leaves, it is a misleading doctrine. Morphologically considered, as throwing light on the structure of the flower, it is valuable and illuminative, even as the anatomical doctrine that the skull is a mere folding-in and modification of the spinal cord, is a convenient and instructive hypothesis for the anatomist. But looked at from a more central and philosophic stand-point it is far more correct to say that the flower is the culmination of the plant, the apotheosis of the leaf, and the brain the culmination, the crown and capital of the animal organism. That the flower is not simply the result of the failing of the growth-current, as the foam is the produce of the breaking wave, is proved by the fact of flowering frequently preceding foliation, and is corroborated by the certain knowledge we have that flowering is a more exhaustive process—a process requiring greater energy than leafing. The assertion, then, that petals are degraded leaves is absolutely false—as false as to say a man is a degraded boy. The petal is rather a refined and sublimated leaf than one that is fallen from a higher estate. One might as well call a perfect lady a degraded peasant; what is persistently left out of sight being that what is lost in vigour and force is gained in delicacy and refinement. Even if we accept as flowers all that are scientifically so called from their functions, it may safely be asserted that they display a yet finer and more finished workmanship—a material more dainty, and pure, and rare than that of the foliage. Though it must be admitted that the decorative importance of the flower varies, so far as we estimate it by ordinary powers of vision, from a position of complete supremacy to one of comparative insignificance—from the splendid atonement of the bizarre cactus to the unobtrusive florets of the majestic oak. Yet many quite inconspicuous flowers contribute greatly, if not permanently, to the beauty of plant-form. The airy and tremulous catkins of the birch, that seem to shake with the same conscious charm as the trembling pendants in the ear of a beauty at her bath; the green rosettes of the elm, that render rich the broidery of its branches against the soft cloud or tender twilight of May; or the carmine tufts that gem the greening branches of the larch, may be brief in the cycle of their beauty, yet make no small part of nature's spring-tide witchery.

Of the means through which flowers have been evolved from the less conspicuous and attractive forms to those of the highest beauty and splendour, a flood of light has of late years been thrown by the original and interesting researches of Darwin, Wallace, and others. These have laid bare to us, at least in many places, what we may call the industrial system of nature. We see, for the first time as it were, the very movement of those shuttles and spindles that are continuously weaving the web on nature's unresting, unhastening loom. There is displayed to us that complex and efficient machinery, that blessed conspiracy of minute and obscure causes, that elaborate and delicately-adjusted correlation of divers agencies, through which all that is delightsome or wondrous, strong, strange, or potent in nature has been evolved, is sustained, cherished, and perfected.

The aim of nature is progress, and her method competition—every organism is on its mettle to sustain itself and its successors against foes and rivals. But it is a competition, not blind and mechanical, but organized, complex, and intelligent. The function of every organism is dual—to sustain, improve, and increase itself, and to provide for its successor. In the first it is purely self-seeking, in the second it is rather self-sacrificing; and it is instructive to note that it is to this latter and renunciative act that the energy, effort, and contrivance of plants are the most intensely directed. No doubt many plants survive the act of reproduction, though by no means all; at the same time, the flowering and fruiting of a plant is the most exhaustive and perilous of its actions. To many the act is necessarily and invariably fatal. Through these two forms of activity, the productive and the reproductive, the energy of the organism is directed towards the development of its species. The power of advance in each individual is very limited, but the power of a long successive series is indefinitely great. Each organism has a certain latitude of change—a certain range of variation, through which it is at liberty to move; its successor has a latitude no greater, but measured from a new point, and that this new point may not tend to coincide with the old, and so the organism relapses again to its old condition, the edict of inter-marriage or cross-fertilization has been pronounced, and in the execution of this law no pains and no means are spared, from those comparatively primitive and simple to those most elaborate and exact.

At first sight the proximity in which the organs of sex are usually found to each other seems to point to self-fertilization as the object of this arrangement; but a closer and more intelligent examination has led to the establishment of the dogma that nature abhors self-fertilization, or, if that be too strong a manner of expressing the fact, that nature aims at and prefers cross-fertilization. It has further been established, through the unwearying and sagacious investigations of Dr. Charles Darwin, that cross-fertilization contributes, not only to introduce variety, but also tends to the invigoration and what we may call improvement of the species by which it is practised. As a rule self-fertilization is but a last resort in the event of the stigma failing to receive or come in contact with pollen from another plant.

To enumerate and describe even the most striking instances of the means which nature takes of carrying this her edict of intermarriage into execution would itself be work enough for one evening, so that I must be content with a few illustrations. There are, as most of you know, three agencies through which this process is accomplished, viz. the wind, insects and birds. A very large class of plants, such as the grasses and many forest-trees, depend on the wind for the distribution of their pollen, and it might seem that with so comparatively rude an agent it would be difficult to secure crossing with any certitude. By several very simple expedients the desired end is aimed at and accomplished. In all the grasses, for example, the stamens when ripe dangle outside the floret, so that, when their light dry pollen is carried away by the breeze, little or none can reach its own stigma which is sheltered by the glumes; and in many cases a yet more certain provision is made in the ripening of the stigma before the stamens, so that by the time its own pollen is mature the stigma is already pre-occupied and fertilized by other pollen or is effete and no longer capable of being affected by its own. Again in many plants, notably in the willow and other trees, crossing is rendered imperative by the individual plant producing flowers of one sex. But this method of wind-distribution is rude and clumsy compared with the subtler and more refined methods that occur in nature. In the first place it is extravagant, involving the production of an immense amount of pollen, the majority of which necessarily misses its mark; and secondly, while it obviously tends to produce and encourage that elegance and refinement of form which gives their charm to so many of the grasses, and the grace and shapeliness of catkin and cone, it does not tend to elicit and foster those so delightsome qualities which we all associate with the popular idea of what a flower is, viz. colour and odour. There may have been, and probably has been, a period of the earth's history in which the wind was the only go-between in the vegetable world, and if we can conceive of a human intelligence existing at that epoch and entering into the spirit of the creative method, and at the same time having discovered that the means of developing colour and odour lay latent in the plant-world, we can believe that such an intelligence with such data could have prognosticated that nature would develop some new method by which these latent qualities would be elicited. What such method and agency was to be it might have been beyond his power to predict, but this much might have been foretold, that the new agency must be of a more discriminative character than the old. To fulfil this office, or at least with the capacity for fulfilling this office, a great number of the insect world have come into existence.

Now, while it is easy to understand the action of this system of insect-crossing and to note its necessary effects on the colour, odour and shape of flowers, *now that it is in full working order*, it is by no means easy to understand or imagine how it took its rise. How did the first dawnings of colour-sense in the insect operate to produce the faint beginnings of coloration in the flower? They seem to have grown up side by side. Whence came the initial impulse that started them on their mutually involved orbits of progress? That same onward and upward tendency which characterizes nature, and without which its progress is not to be accounted for. But, before we grapple with such a problem, let us see the working of the system in some few instances.

It is surmised, not without strong probability of truth, that the first method adopted by plants to encourage the visits of insects was merely the production of an abundant supply of pollen upon which many insects—especially the Diptera—feed; but this comparatively rude and extravagant plan has been superseded in the more highly developed flowers by that of honey-secretion. That honey was ever a "waste product" of the vegetable world, I am certainly inclined to doubt, as being a fact inconsistent with the economic reasonableness of nature. Certain it is that in nearly, if not in all instances, in which this delicious product is found, it clearly performs a service to the plant that secrets it; and in most cases the nectaries and honey-hollows are so accurately and wisely placed that they seem absolutely to ensure the execution of that service for which it is meant, to attract and to reward its insect visitors. But that a plant should offer a *douceur* to its visitants is not enough, it must also make its presence notable to them at some distance; and this is effected by two means, colour and odour. Brightness and purity of hue are, no doubt, the most advantageous qualities for a flower to possess; but diversity is also necessary that insects may recognize those plants to which they are specially adapted. That some insects, at least, have a decided sense of colour has been proved by Sir John Lubbock. This being so, there is no difficulty in seeing that the development of bright and pure colour is encouraged by this relation, and that certain flowers would have an advantage through being distinctive, in which reference it is worthy of remark that the orchids and other highly specialized flowers have a tendency to extreme individuality of form and marking. Even those delicate pencillings of colour such as we find so markedly in the pelargoniums are not without their utility, and are believed to act as honey-guides in pointing the way to the nectaries; and perhaps nowhere is the union of utility and beauty more wonderfully instanced than here. But nature is too industrious to strike work with failing light, when colours are no longer easily perceived or distinguished, and in order to utilize the dusk and even the dark, she has gifted flowers with the power of manufacturing perfumes by which to communicate with and attract night-flying moths, which are absolutely necessary to the fertilization of some flowers. The following description by Sir John Lubbock of the behaviour of *Silene nutans*, is an excellent example of the manner in which a flower utilizes the visits of moths:—

"The upper part of its flowering stem is viscid, from which it has derived its local name, the Nottingham Catchfly. This prevents the access of ants and other small creeping insects. Each flower lasts three days or rather three nights. The stamens are ten in number, arranged in two sets, the one set standing in front of the sepals, the other in front of the petals. Like other night flowers, it is white and open towards evening, when it also becomes extremely fragrant. The first evening, towards dusk, the stamens in front of the sepals grow very rapidly for about two hours, so that they emerge from the flower; the pollen ripens and is exposed by the bursting of the anthers, so the flower remains through the night, very attractive to and much visited by moths. Towards three in the morning the scent ceases, the anthers begin to shrivel up and drop off, the filaments turn themselves outwards so as to be out of the way, while the petals, on the contrary, begin to roll themselves up, so that by daylight they close the aperture of the flower, and present only their brownish green outsides to view, which, moreover, are thrown into numerous wrinkles. Thus, by the morning's light the flower has all the appearance of being faded. It has no smell, and the honey is covered over by the petals. So it remains all day. Towards evening, however, everything is changed. The petals unfold themselves, by eight o'clock the flower is as fragrant as before, the second set of stamens have rapidly grown, their anthers are open and the pollen again exposed. By morning the plant is again asleep, the anthers are shrivelled, the scent has ceased and the petals roll up as before. The third evening again the same process, but this time it is the pistil which grows, and the long spiral stigma on the third evening takes the position which on the previous two has been occupied by the anthers, and can hardly fail to be dusted by the moths with pollen brought from another flower."

This one instance exemplifies, in addition to its beautiful correlation of plant and insect life exhibited in the arrangements for moth-fertilization, the defensive contrivances of nature and the rationale of plant-sleep. While there are certain insects which it is beneficial for the plant to attract, there are others whose visits would, if not injurious, be at least unprofitable, and against these plants are protected in a variety of ways by hairs, hooks, prickles, viscidity, and other defences. This fact is very significant and extremely difficult to account for without assuming consciousness in the plant or an intelligent power directing its development. There is something, too, touching and poetic, while eminently reasonable and in harmony with cosmic custom, that the plant, like the animal, should take its diurnal or nocturnal period of repose; nor is there any doubt that the plant opens at the time most advantageous for itself, and closes when it would be unnecessary or injurious to remain open. Then the whole arrangement is so complex, as well as complete, that any series of tentative variations, however numerous and extended over how-long-soever a period, does not seem capable of accounting for the perfect adjustment of the action and structure of the plant to an agency so diverse and independent. But I must be allowed to give an instance, if possible more startling in its ingenuity of contrivance. It refers to the fertilization of a tropical orchid, one of the Coryanthes, as observed by Dr. Crüger. He found that the labellum of this orchid is hollowed into a great bucket, in which drops of almost pure water continually fall from two secreting horns which stand above it, and when the bucket is half full the water overflows by a spout on one side. The bare part of the labellum stands in the bucket, and is itself hollowed out into a sort of chamber with two lateral entrances; within this chamber are curious fleshy ridges. The most ingenious man, if he had not witnessed what takes place, could never have imagined what purpose all these parts serve. But Crüger saw crowds of large humble bees visiting the gigantic flowers of this orchid, not in order to suck nectar, but to gnaw off the ridges within the chamber above the bucket. In doing this they frequently pushed each other into the bucket, and, their wings being thus wetted, they could not fly away, but were compelled to crawl through the passage formed by the spout or overflow. Dr. Crüger saw a "continual procession" of bees thus crawling out of their involuntary bath. The passage is narrow, and is roofed in by the column; so that a bee, in forcing its way out, first rubs its back against the viscid stigma, then against the viscid glands of the pollen masses. The pollen masses are thus glued to the back of the bees which first happen to crawl out through the passage of a lately-expanded flower, and are thus carried away. When the bee, thus provided, flies to another flower, or to the same flower a second time, and is pushed by his comrades into the bucket and then crawls out by the passage, the pollen-masses necessarily come first in contact with the viscid stigma and adhere to it, and so the flower is fertilized. Had any human being invented such an arrangement we could not fail to credit him, not only with an exquisite inventive faculty and power of precise adaptation of *means* to an end, but also that form of practical imagination that could foresee the "crush at the door," and the consequence of the ducking on the conduct of the bee. Almost a sense of humour seems to be involved in the structure, since the whole proceeding is just an excellent and innocent practical joke at the expense, without the injury, of the insects, who seem in no wise deterred or offended, but ever ready to renew the fun. Now, the case of this orchid, if very striking, is by no means exceptional; it is rather the general rule, in such genera as the orchids, to possess some equally ingenious contrivance. But one more illustration on this topic, and I must desist. In Mr. Belt's 'Naturalist in Nicaragua' he gives this account of the manner in which small birds, such as humming-birds, are employed in fertilization. "A climbing plant (*Marcgravia nepenthoides*) expands its flowers in a circle, and these hang down like an inverted candelabrum. From the centre of the floral circle and underneath the flowers there is suspended a number of pitchers, which are full of nectar when the flowers are ripe. The honey attracts insects and the latter attract birds, especially humming-birds. Before the latter can get at the honey-bearing pitchers, their backs must brush the open flowers out of which the pollen is ready to be shed, and in this manner they convey it from plant to plant and cross the flowers." Such a proceeding on the part of an animal would cause us to assign to it a rational mind, with the power of correct inference; for the secrction of honey is not for the prior purpose of attracting insects, in themselves not useful, but for the ulterior purpose of securing the visits of the birds which are necessary to the crossing of the flowers.

If such things can be produced by the mere incessant jostling of atoms as in a lucky-bag, if the work of consciousness can be more perfectly accomplished by that which is unconscious, and the part of intelligence better played by the unintelligent, then must we admit that consciousness is but a cloud, and intelligence a thick veil, and thought a diseased and mistaken evolute of divine imperturbable matter! Not that I mean in any way to gainsay the fact that the creative process is not historically graduated, or, as it is named, evolutionary. That, I think, no enlightened and well-informed person can seriously doubt. What I do deny is, that this process is to be accounted for on any hypothesis which undertakes to dispense with the necessity for previsive and controlling intellect. To deny the existence of such intellect is like denying the fact of atmospheric pressure, because we do not feel it; for the reason that the working of creative intellect does not obtrude itself upon us, is just the same as that which makes us unconscious of the miles of atmosphere piled on us, viz., that it acts equally in all directions and at every point successfully combats itself. Thus in nature ingenuity of attack is met by ingenuity of defence, elaborate needs are responded to by equally elaborate machinery and contrivance. The impartial thoughtfulness of nature puzzles us. We are offended to find the existence of a noxious weed, insect and parasite cared for as tenderly as man's. But everything in nature, man not excepted, is to be put on its mettle, the great meaning and moral of nature is activity and progress, and one of her greatest functions is to stimulate man even by what seem hardships and cruelties to yet intenser and more divine activity. Where nature is lavish and indulgent, man becomes indolent and often degraded. Nature pronounces thus for industry, but not for industry alone. She endorses, yea, rather anticipates the dictum of Mr. Ruskin, "Life without industry is crime; industry without art is brutality." While no organism can survive without the full exertion of its powers, and even the effort after advancement, neither is there any that does not tend to some beauty, that does not obey, in measure, however humble, the laws of grace as well as that of gain. The coarse and vagrant Colt's-foot that bastes together with straggling rootlets the loose soil of the embankment or the fallow, the slovenly and trampish Dock and its shrewish consort the Nettle, have their aspects and moments of fitness, and seem often, like Wordsworth's gypsy, "Weeds of glorious feature." Yet these are the mere idlers and runagates of the plant-world, outlawed from the civility of the park and lawn, where the Buttercup, and Daisy, and Cowslip are as invited guests.

But time presses, and however unfinished be my theme, it must now be left as it stands, and I must rather leave you to expand the line of thought for yourselves, and to draw from the significant facts I have mentioned their inevitable deductions. The researches and results of modern science, instead of in any wise detracting, to my mind, from the wonder and beauty of the cosmos, and the reverence we feel for its imposing and still, in a great measure, mysterious order, rather increase the wonder, emphasize and illuminate the beauty, and deepen into awe that reverence. So let science go on unafraid to the darkest and furthest recesses of nature, strong in the assurance, fearless in the faith, that nowhere can she miss the footprints of a supreme pervasive intelligence, nowhere find herself in a region alien and unresponsive to reason, nowhere fail, though she alight on the furthest star, brood over the strife of primæval atoms, or read the riddle of life's beginning, to perceive and devoutly acknowledge, "Thou art there also!"

Apothecaries' Weights and Measures.

Mr. Mackay then made a statement regarding the new weights and measures. After referring to the discussion which had recently occupied an entire evening in Bloomsbury Square, he proceeded to describe the standards, which by the kindness of Mr. Chaney had been sent along for the purpose of being exhibited and explained by Dr. Paul. He specially referred to the mistaken idea which many seemed to have regarding the standards, and explained very fully that the standards as devised and prepared at the Standards Office were meant to be really, as the name implied, standards proper, and not standards to be carried round by the various inspectors when they made their visitations with a view to examine and verify glass measures. He also stated that he had seen the inspector of weights and measures for the city of Edinburgh, who up to the present had not received the standards from London. The authorities had, however, adopted the mark proposed, and instead of the "City Arms" being now used in Edinburgh as the verifying mark, the local authority had given instructions to have prepared what the Standards Office had already suggested for general use—namely, the outline of a crown with V.R. underneath surrounded by an oval line and with a number immediately below. The number allotted to, and adopted by, Edinburgh was 3, each figure having a direct reference to the district using it. The verifying mark may probably, therefore, in future be alike in all places, the difference being in the numbers only. The fees in this locality will be exactly as prescribed in the schedule of the Act, the inspector having no interest whatever either in the fines for erroneous measures, or the charges made for comparing and verifying. This he thought a much better plan than to allow officials to supplement their salaries in what appeared to him (Mr. Mackay) a most objectionable manner. It would appear that while local authorities are the parties to work out details under the Act, and appoint their own inspectors, they have no power to alter the specified charges unless by a distinct resolution brought under the notice of the

Board of Trade and agreed to by it. Mr. Mackay further mentioned that since the meeting in London he had ascertained that even in Guildhall there were no standards yet ready for use, and saw a considerable number of graduated measures sent there to be marked returned with a message that they were not yet prepared to verify dispensing measures. He also had seen an extensive maker and dealer in glass measures who had just come from the Standards Office with the information that it would be some time before the inspectors would be in a position to verify, and probably a year or two before every district would be able to do what was required. From the same source he received undoubted information that while a compound measure, that is a 16 drachm graduated glass, verified as such, and marked on the opposite side with ounces and half-ounces, might not necessarily be considered in the terms of the Act a *legal* measure, it would certainly in all cases be *allowed* wherever the graduation was found to be correct and marked as such by the inspector of the district. He further intimated that he had received a promise from the inspector of the City of Edinburgh, that whenever he had received his standards from London, and was in a position to verify the weights and measures under the new Act, he would communicate with him as Local Secretary of the Society, and on receiving such information Mr. Mackay promised that he would, without delay, make the same known to the chemists and druggists in the city.

Mr. Gilmour rose for the purpose of complimenting Mr. Mackay on his lucid and exhaustive exposition, and took occasion to vindicate the inspector in Edinburgh and himself from the remarks made in the leader of the Journal, November 29, and also at the Evening Meeting in Bloomsbury Square. He still thought there might be an uncertainty about the legalizing of the different denominations on one measure, but still as Mr. Mackay put it he hoped that the present style of measure would be at least allowed. He felt assured that in a short time the question would assume a definite form, but meantime every view of the subject should be tolerated and examined, considering how much uncertainty still prevailed as to the exact scope and requirements of the enactment in its relation to the business.

Some discussion then took place, in which Mr. Stephenson and Mr. Young took part, at the close of which the meeting seemed satisfied that nothing could be done for the present, and that existing apothecaries' weights and measures, might be safely used until the arrival of the standards.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The fifth general meeting of the thirty-first session was held at St. George's Hall, on Wednesday evening, December 10, together with the Literary, Scientific and Art Societies of Liverpool, as an associated *soirée*, under the presidency of Mr. A. B. Forward, who occupied the chair, in the unavoidable absence of the Mayor. This was the third annual *soirée* of the learned societies of Liverpool, and nothing could have exceeded the brilliancy of the scene when the handsome and spacious suite of halls was thronged with between three and four thousand people. The proceedings were somewhat similar in character to those of the two preceding *soirées;* consisting of concerts, lectures on scientific and other subjects, and the exhibition of microscopical objects, antiquities, curiosities and works of art.

On behalf of the Liverpool Chemists' Association, the President, Dr. Symes, delivered a popular lecture in the Sheriff's Court, entitled "The Philosophy of a Tea-kettle;" and the Vice-President, Mr. A. H. Mason, F.C.S., delivered one in the Crown Court, entitled "The Chemistry of a Candle." The lectures were liberally illustrated with experiments and diagrams, and were highly appreciated by the respective audiences.

The Association exhibited a fine collection of alkaloids and rare inorganic salts, from its own museum, and the following firms kindly lent collections for the occasion, which were also exhibited:—

Mr. Thomas Whiffen, London: A very fine collection of the various cinchona barks; and a series of alkaloids and salts, representing the chemical principles of the bark.

Messrs. Hopkin and Williams, London: A selection of rare chemicals, etc.

Messrs. Coghill and Son, Liverpool: Specimens of boracic acid and gigantic borax crystals.

Messrs. Howard and Son, Stratford: A large album, containing a drawing of Count Lardarel's famous boracic acid springs and works, in Tuscany.

Messrs. Symes and Co., Liverpool: Pure metallic bismuth in fine crystals, and a variety of bismuth compounds; chemical and physical apparatus; the latest kinds of blast furnaces, blow-pipes, etc.

Messrs. Hallawell and Co., Liverpool: A variety of coal tar colours, arranged so as to illustrate the marked difference between the dry colours and their solutions.

Messrs. May and Baker, London: A series of mercurial products, illustrating the chemical combinations of mercury.

Messrs. Johnson, Matthey and Co., London: A very valuable selection of rare metals; platinum vessels; and extra fine metallic wires 0·001 inch diameter, showing weight of each per mile.

Messrs. P. Harris and Co., Birmingham: Hughes's audiometer; electric induction balance; cycloscope; and fine models of crystals in glass.

Messrs. J. C. and J. Field, London: Specimens of the various crude materials used in the manufacture of candles.

The gathering broke up at about 11 o'clock, evidently well pleased with the evening's entertainment.

LEEDS CHEMISTS' ASSOCIATION.

The second lecture of the session was given on Wednesday night to the members and associates of the Leeds Chemists' Association (the President, Mr. Councillor Stead, in the chair) by Mr. T. Fairley, F.R.S.E., on "Glass: Its Manufacture and Mode of Working."

The lecturer gave a short history of the manufacture of glass, showing that it was well known in ancient times. He explained its formation by the action of sand or any kind of silica on bases, such as soda, lime, potash, etc., at high temperatures, forming silicates, but that at least two bases of different kinds are required to form a true glass. Thus silicate of soda is soluble in water and in common with other simple silicates is easily decomposed. He stated that there were four well-known varieties of glass, viz.:—Bohemian glass—a silicate of potash and lime, crown or plate glass—a silicate of soda and lime, crystal glass—a silicate of potash and oxide of lead, made only from pure materials; and one other, ordinary bottle glass, resembling crown glass but made from the commonest materials. He referred to the sources of the materials, and the influence of the development of modern chemical manufactures on that of glass. The lecturer then passed to the relations between the composition of glass and the properties possessed by it, especially as regards fusibility, brilliancy, and the durability of the glass obtained, and showed how the latter is also affected by various substances and reagents, and illustrated his remarks with specimens showing the action of water, of alkaline solutions, and of hydrofluoric acid (as in the process of etching) on glass. The irridescence shown on certain glass was due to a surface decomposition either by long continued action of moisture, as in glass buried in the earth, or of moisture and ammonia, as in some old windows; or irridescent glass might be made artificially, as was now done, by the action of a hot atmosphere of hydrochloric acid gas. The lecturer also described the changes produced in glass by heat at various temperatures and the application of these in the manufacture and working of glass. He explained the tendency shown by glass to become in some degree crystalline when kept long at the softening point. The same change took place very slowly at ordinary temperatures, so that old glass could not be worked with the same facility as that recently manufactured. He also described the process of annealing, and showed that it was required to remove the state of strain due to unequal contraction and was therefore more necessary in proportion to the thickness of the glass and the complexity of the form into which it was made. He described and illustrated the manufacture of De la Bastie's toughened glass by heating glass to redness and suddenly plunging it into a mixture of hot oil and wax. Mr. Fairley explained the structure of this toughened glass, and said its remarkable strength resided only in the outer layers, which by quick cooling contract and compress the whole mass. He showed specimens of toughened glass from which the outer layer had been removed by hydrofluoric acid, and which then behaved like ordinary glass. He also stated that a bath of mercury or fusible metal could be used in the process, though with less perfect results than the oleaginous mixture. In conclusion the lecturer explained and demonstrated the details to be observed in the working of glass for laboratory purposes.

A cordial vote of thanks was accorded to Mr. Fairley on the motion of Mr. R. Reynolds.

ABERDEEN SOCIETY OF CHEMISTS AND DRUGGISTS.

The inaugural address in connection with the Aberdeen School of Pharmacy was delivered on the 9th inst. in the hall, St. Nicholas Street, by Mr. John Gordon (Messrs. J. and J. Urquhart), teacher of the chemistry class.

Mr. R. D. Presslie presided, and there was a large attendance. The subject of the lecture was "Chemical Force." The lecturer discussed the forms of matter of which the universe is composed, and proceeded to show, by a series of beautiful and instructive experiments, the manner in which all matter is affected by the natural forces which surround it, dwelling particularly on chemical force.

The experiments were eminently successful and the lecturer closed with an eloquent appeal to the students to devote their energy and industry to the work of the coming session. The usual votes of thanks were accorded at the close. The school now enters upon its second session, having hitherto been conducted successfully and gratuitously by Messrs. Gordon and Strachan.

The class for instruction in materia medica will be resumed on Thursday, 11th inst., and will be conducted by Mr. Strachan.

A class for the study of botany will be formed early in the ensuing summer under the charge of Mr. Presslie.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

Assistants' Section.

A meeting of this society was held in Anderson's College, on Wednesday evening, 10th inst., at which the office bearers were elected and general arrangements made for the session.

The gentlemen chosen to take office were:—Mr. Lees, President; Mr. William Simpson, Vice-President; Mr. John Adams, Secretary; Mr. James Finlay, Librarian; and four others as members of Committee.

The coming session promises to be a very successful one, papers being promised for all the evenings. The next meeting will be held about the beginning of January, 1880, when a paper will be read by Mr. Lees, President. Members will receive due notice of the exact date of meeting.

Proceedings of Scientific Societies.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting was held at 32a, George Street, Hanover Square, on Wednesday evening, December 10, Mr. F. W. Branson in the chair, when a paper on "Sugar" was read by Mr. C. B. Miller, who gave a short account of the history, culture and manufacture of both cane and beet, together with their chemistry, including also that of dextrose, levulose and lactose. The paper was illustrated by specimens (kindly lent by Mr. Wigner), consisting of raw sugars from different parts of the world, as well as some samples of crystallized refined, made by various manufacturers.

In the discussion which followed, Mr. Robinson took the opportunity of asking the opinion of the meeting with regard to the manner in which mel boracis should be made and dispensed. Unanimous approval, however, was given to the method yielding a clear and bright result.

A vote of thanks having been proposed by Mr. Bull, seconded by Mr. Hardwick, and carried, the meeting terminated.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, December 11, Mr. R. H. Parker, Vice-President, in the chair, when a paper on "The Manufacture of Sodium Carbonate," was read by Dr. J. F. Elliott. The author, who had had considerable practical experience of the working of Leblanc's process, gave a detailed account of it, including the different kinds of plants used both in this country and in Germany. In describing the second part of the process where the salt cake is treated with coal and limestone, the author stated the evidence in favour of the assumption that carbonic anhydride is produced and not carbonic oxide; that is, that it takes place according to the following equations:—

$$(1)\ Na_2SO_4 + 2C = Na_2S + 2CO_2$$

$$(2)\ Na_2S + CaCO_3 = CaS + Na_2CO_3$$

The principal evidence being that the blue flame characteristic of carbonic oxide is not observed until the decomposition is complete; in fact the workmen know when the reaction has completely taken place by the occurrence of the blue flame, due to a further decomposition of the limestone. The different kinds of plant used in the lixiviation of the black ash and in the evaporation of the solution of sodium carbonate were then described.

After the reading of this paper a discussion took place, and a hearty vote of thanks was passed by the meeting to Dr. Elliott.

After the transaction of some miscellaneous business the meeting adjourned.

Parliamentary and Law Proceedings.

Poisoning by a Liniment.

An inquest was held at the White Horse Inn, Leiston, on Monday last, before Mr. A. F. Vulliamy, county coroner, on the body of William Moore, aged 59, lately a goods porter, in the employment of the Great Eastern Railway Company, who met with his death on Saturday under singular circumstances. He had been suffering from sciatica, and was attended by Mr. M. E. Ling, surgeon, of Saxmundham, as professional attendant of the Railway Provident Society, of which body the deceased was a member. On Friday last his wife administered to him a dose of medicine, which she supposed was a draught, but which turned out to be a liniment. Everything was done to assist his recovery, but he died early on Saturday morning. The first witness called was—

Naomi Moore, widow of the deceased, who said that her husband had been unwell since last Friday week. He suffered from sciatica, and was attended by Mr. Morris Ling, of Saxmundham, who sent him some medicine, which he took. The same bottle was filled twice with a draught which was to be taken the first thing in the morning. He took the first dose on Tuesday morning last. Witness gave it to him. There was printed on the bottle, "This aperient draught to be taken first thing in the morning." Witness sent the bottle back to Mr. Ling, and he returned it filled and with the same label on on Thursday night. The bottle was sent to Mr. Ling by the train, and was carried to the Leiston station by witness's daughter Elizabeth. When it was returned it was brought from the station to witness's house by Burrell, a railway clerk. Her daughter Elizabeth took it from him. There was another bottle with it. It was a large one, which had on it a label with the words, "Two tablespoonfuls to be taken every four hours to one of water." She gave her husband on the Friday morning the contents of the smaller bottle and none from the larger one. After he had taken the contents of the smaller bottle he said he thought it was poison, for it burnt his throat. She gave him some hot water, and then she sent her daughter with the bottle to Mr. Gooch's, the chemist. Her daughter came home and was followed in about half an hour by Mr. Cullen. When she came home witness gave her husband salt and water. It made him a little sick, but not enough to do him good. She got some mustard and water, but he could not swallow it. When Mr. Cullen came he ordered a mustard plaster to be put on the back of deceased's neck, and witness telegraphed for Mr. Ling to go over. Mr. Morris Ling reached there about 11 o'clock, her husband having taken the dose about 8.30. Mr. Cullen and Mr. Ling remained with him all day until six or seven at night, when the latter left. Deceased died about 4 o'clock on Saturday morning.

By the Foreman: He said as soon as he took it that he thought it was poison. He did not speak after the daughter came back, which was about 9 o'clock.

By a Juror: He did not speak until after Mr. Ling came and used the stomach pump.

By the Coroner: He never spoke to her.

By a Juror: Mr. Ling sent two bottles of medicine on the first occasion, and they were the same bottles as came the second time.

In answer to questions by Mr. Pollard, the witness said that her husband had suffered from sciatica before, but his general health was good, and he was a temperate man. On Saturday week her husband commenced to suffer from sciatica, and she sent for Mr. Ling, who attended on Monday morning, and in the afternoon sent her some medicine. When the medicine bottles were returned on Thursday she did not notice what the colour of the physic was. She did not notice the smell, but it seemed darker. Mr. Ling had said he would send some embrocation for her husband to be rubbed with, but she could not recollect if he said he would send some embrocation, and the mixture "as before." She expected some embrocation to be sent, and returned the bottles for that purpose. The bottles came to her on Thursday night by train, and were delivered at the house, when her daughter took them in. She thought it was the embrocation in the small bottle until she read the label, and when she smelt it she remarked that she thought it had hartshorn in it. She expected that the small bottle might have contained the embrocation, but it did not occur to her when she saw the label that it was the embrocation. She did not send for Mr. Morris Ling the first thing after she found she had given the embrocation to her husband, because she thought it would take too long for him to get there. He did all that he could for her husband after he came.

Elizabeth Moore, daughter of the deceased, stated that she remembered some medicine coming for her father last Tuesday afternoon. There were two bottles. She took the bottles to the station on Thursday morning, and gave them to William Burrell, the clerk, for him to send to Saxmundham. She took them in on Thursday night, from William Burrell, who brought them up from the station. She did not open the basket, but saw the bottles taken out. There were two, which were left standing downstairs on the table in the sitting-room. On the Friday morning, December 12, about 8.30 a.m., her mother brought the smaller bottle to her and asked her to read the label, which had on it "The aperient draught, to be taken in the morning." The bottle was full, and her mother took it away. About half an hour or so afterwards her mother sent her to Mr. Gooch's, and she took with her the bottle with a little of the medicine remaining in it. In consequence of what Mr. Gooch said to her she went for Mr. Cullen, who arrived at her father's soon after. She went up to her father when she got back, and he looked at her and said "I am poisoned." She saw him again in the evening, when he seemed better.

By Mr. Pollard: She did not know what the first medicine was like. She did not notice that the little bottle had differently coloured medicine in it to what it had at first. When her mother went to her in her bedroom on Friday morning, asking her to read the label on the bottle, she (Mrs. Moore) said it smelt very funny. Witness saw deceased after Mr. Ling left, and he then seemed like a madman. That was some time after, but she saw him just before Mr. Ling left, and he seemed much better.

Peter William Cullen, surgeon, Leiston, said that on Friday morning, about 9.20, he was summoned to visit the deceased. Witness was dressing at the time, and a bottle was sent up to him to look at. It smelt to him of camphorated liniment. He went to the deceased, who was half sitting up in bed, with a red and swollen face and widely dilated pupils. His extremities were cold, and the pulse scarcely perceptible, with a tumultous action of the heart. He ordered mustard and water, and deceased swallowed a little of it, and then sank back in bed in a sort of comatose condition, and commenced to breathe very heavily. In consequence of what Mrs. Thorne told him he advised that Mr. Ling should be telegraphed for. He administered nothing to deceased besides the mustard and water in the meantime. When Mr. Morris Ling came they applied the stomach pump, but scarcely anything was obtained from it. After that they galvanized deceased, and he appeared to revive for a time, but he sank back again. Witness remained with him until 4 o'clock, and saw him again at 9 the same evening, when he was delirious. Witness did nothing for him, but said he should be watched. From the symptoms it appeared to witness that he was suffering from belladonnic poisoning. Witness asked Mr. Ling what there was in the liniment, and he told him that it was belladonna and aconite.

By the Coroner: To make a liniment of the kind supplied there would be a couple of drachms of each ingredient. A quarter to half a drachm of belladonna would be sufficient to kill a man.

By Mr. Pollard: Witness thought that anyone smelling at the bottle would know that it was for outward application. Directly Mr. Ling got to deceased's house, he asked witness to help him apply the stomach pump. They then used the battery, and gave him ammonia, and he appeared to revive. Every time subsequently that the battery was used he got better, and his pulse increased. In the evening deceased took some brandy and water and egg and brandy, and then aromatic ammonia, which appeared to further revive him. Witness left at 4, and at that time thought there might be a little hope. About 5 o'clock witness saw Mr. Ling again, and he said he thought deceased was much better. At 9 o'clock witness went again, and was surprised to see deceased in the state he was. He had a full pulse, and was in the state of a man with *delirium tremens*, which he attributed to the belladonna. He agreed to the advice of Mr. Ling as to the subsequent treatment. He had, at 9 o'clock, some hope of his recovery. Belladonna got into the system immediately it was taken into the stomach, but it did not always act for some hours afterwards. That depended on the constitution of the patient and the state of the stomach at the time. If the stomach pump had been applied immediately after the liniment was taken it would not have made any difference to the man's state. Even if the belladonna had got immediately into the system he should say that the deceased would have survived as long as he did. Witness could not have applied the stomach pump first thing in the morning, because stertorous breathing and coma came on, and when witness saw deceased again with Mr. Ling, those symptoms had gone off. He could not say if galvanism would have been of use if immediately applied.

Edward West, engineer, of Leiston, said he was sent for just before 10 o'clock on Friday morning, and telegraphed for Mr. Ling at once. He then went to the house of the deceased and remained with him till he died. Deceased began to be delirious between 5 or 6 o'clock, and it continued till about 3 next morning, when he had a little sleep. Witness went downstairs, but had not been gone ten minutes when he was called back and told that deceased was dying. Directly after witness got upstairs deceased died.

By Mr. Pollard: Witness was the first to see Mr. Morris Ling, and told him that "They had given him poison." Mr. Ling replied, "Why did they not apply the stomach pump?" When the pump was applied by Mr. Ling it brought up a large quantity of matter of a brownish colour, and deceased revived very much towards 4 o'clock. Witness asked Mr. Ling several times if there was any hope, and he replied, "While there's life in his body I have hope." When Mr. Ling left he instructed witness what food to give him, and said that when he came round he would be like a drunken man. Witness was of opinion that Mr. Ling did all he could for the deceased.

William Burrell, booking clerk at the station, gave evidence as to the delivery of the basket containing the medicine at Mr. Moore's house.

Several more witnesses remained to be examined, and the Coroner adjourned the inquiry until Monday next. He gave instructions to Mr. E. D. Wallis, surgeon, of Leiston, to make a *post mortem* examination of the body in the meantime.—*East Anglian Daily Times.*

Prosecution for the Sale of "Unfermented Wine."

At the Salford Borough Police Court, on Friday, December 12, before Mr. Makinson (stipendiary), William Pilling, chemist, New Bailey Street, Salford, appeared in answer to a summons taken out against him under the Food and Drugs Act, 1875, for selling to Mr. C. H. Thompstone, inspector appointed under the Act, two bottles of what purported to be "unfermented port and sherry wine, manufactured from the juice of the grape, and used for family and sacramental purposes," which wine, on being submitted to the borough analyst, was found to be not of the substance, nature, and quality demanded by the purchaser. Mr. Walker (assistant town clerk) appeared in support of the summons, and Mr. W. S. Sebright Green appeared on behalf of the manufacturers of the wine, Messrs. Bell and Co., Upper Milk Street, Liverpool.

In opening, Mr. Walker said the case was one of considerably importance to the public. On the 22nd ult., Mr. Thompstone went to the defendant's shop and purchased two bottles of wine—one of port and one of sherry—which was said to be "unfermented, and manufactured from the juice of the grape." He divided the samples in the usual way, and submitted half of the quantities purchased to the public analyst, Mr. Carter Bell. The result of the analysis was that Mr. Bell found absent all the constituent parts which constituted the pure juice of the grape, and the liquid contained in the bottles was practically nothing more than coloured water. The so-called "unfermented wine" was sold in considerable quantities among total abstainers, and was said to be used largely for sacramental purposes. What the defence would be he could not conceive, unless the defendant confined himself to contending that he sold the liquid as he purchased it from the manufacturer. He reminded the bench, however, that the 25th section of the Food and Drugs Act provided that a person selling any adulterated article was liable to be fined unless he produced a written guarantee to prove that it had not been tampered with since the purchase took place. If the stipendiary, after hearing the evidence, should think it desirable he (Mr. Walker) would submit the samples obtained for analysis at Somerset House, and ask for the case to be adjourned, but if he were satisfied with the evidence of the borough analyst such a penalty would be asked for as would be commensurate with the importance of the case as it affected the public.

Charles E. Thompstone, inspector under the Food and Drugs Act, was the first witness. He deposed to purchasing a bottle of port and a bottle of sherry from the defendant's shop on November 22. The label on each bottle set forth that they were "unfermented wine, manufactured from the juice of the grape." The price was 2*s.* 6*d.* per bottle, and having paid for them witness submitted half the quantities to the borough analyst and left the remainder with the defendant in sealed bottles.

Cross-examined: witness said he did not actually ask the defendant to supply him with "the juice of the grape," but he expected when he made the purchase to get what was stated on the bottle, namely, "unfermented wine, manufactured from the juice of the grape."

Mr. Carter Bell, public analyst for the borough of Salford, said he received the two samples referred to by the last witness on the 22nd November. He analysed them, and found that they were not composed of the pure juice of the grape. He would not swear that there was not an infinitesimal quantity of the juice of the grape, but the proportion was certainly not equal to 10 per cent.

In cross-examination, witness admitted that several of the constituents which went to form the liquid purchased might have been contained in the juice of the grape.

Mr. Green submitted, in defence, that the liquid purchased by the inspector was really what it purported to be, namely, "unfermented wine," manufactured from the juice of the grape. It was not sold, or intended to be sold as pure juice of the vine, and therefore, the prosecution, he held, must fall to the ground.

Mr. G. B. Bell, one of the firm of manufacturers in Liverpool, said the wine was manufactured principally from grapes, and had a very large sale, there being no fewer than 3284 wholesale customers for it. Fifteen Nonconformist churches in Bradford were supplied with the wine, and there was one chapel where a dozen bottles were drunk every Sunday.

Mr. Hewson, manager of Messrs. Bell's works, said he manufactured the wine and it contained one-sixth part of pure grape juice, and five parts of sugar and water, with a small quantity of burnt sugar for colouring purposes.

Mr. L. Siebold, analytical chemist, deposed to analysing specimens of the wine purchased by the inspector. He found that the predominant constituents of the wine were such as were contained in the juice of the grape.

The Stipendiary, after hearing the evidence, said he was of opinion that the summons must be dismissed, inasmuch as it was not proved that the wine did not contain some portion of pure grape juice, and no standard was fixed by the law by which he could decide whether the proportion was sufficiently large or not to justify the sale.—The defendant was allowed costs.—*Manchester Courier.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Patent Medicines.

Sir,—To those of your readers who have for a long time past been giving considerable attention to the various phases of the patent medicine question, the editorial, which appears in your last issue, affords another opportunity for further discussion. It is obvious that the intention implied therein is merely to give a summary of various communications which have appeared in your columns from time to time, without in any way attempting to suggest a course for further and more decided action.

That a certain amount of ambiguity should be very plainly perceptible in this article is therefore not to be wondered at, nor are you to be held responsible for it, seeing that many of the proposed schemes are of a widely opposite nature, and most of them relate entirely to what may be termed the trade aspect alone.

Whether, in the fulness of time, the chemist is to be either the proprietor or retailer of patent medicines, in conjunction with surgeons, drapers, storekeepers, grocers, stationers, working cobblers, or oilmen, or whether he is to get 10*d.*, 10½*d.*, 1*s.* or that *acme* of commercial joy and prospective fortune known as full price, for his thirteen pence halfpennyworth of stock, I am not prepared to say, as it is altogether outside my argument, but whether he is to sell them—even under the latter happy condition—without protest, and a strong determination to give challenge to the existing state of affairs is quite another thing.

To suppose that it will ever be possible to purge our pharmacies of these nostrums would be folly indeed; to refuse to sell them—absolute mania; but, at the same time, I should hope that it is no symptom of incipient insanity to suppose that the nostrums themselves can be purged to such an extent as to render their sale, by a man with an ordinary amount of intelligence, a matter of satisfaction, rather than humiliation, whether he be pharmacist or grocer.

Why this scandal in modern medical science has not long ago been an object for the combative instinct of higher bodies than ours, it is impossible to imagine, but, for the sake of our honour, as a society, let us no longer tarry.

If we have not yet arrived at that socially scientific degree of importance which will admit of our being legally represented in the compilation of our national pharmacopœia, let us, at least, show that we have no desire to patch up a system of charlatanism which aims at nothing less than its entire annihilation; it will scarcely be denied that we have qualifications sufficient for this.

I have neither experience nor ability enough to sketch out a way of doing it, but my mind is full of an earnest aspiration to see it done, and to give a helping hand in the struggle. Surely there must be many more who are just as eagerly awaiting the heralding of the campaign, and the time cannot be far distant when the literature of quackery, the wonderful panacea for the miraculous cure of every ill that flesh is heir to, will be made to feel the march of progressive civilization, and the patent violation of our poison schedule be in itself so dangerous an absurdity as to seal its own death warrant.

Kilburn, N.W. CHARLES B. ALLEN.

Poison Vending.

Sir,—The remarks under the above heading quoted by you from the *Medical Press and Circular* are most surprising. I should have thought the evidence would nearly all tend the other way, viz., that it is through the medical profession that the public generally become acquainted with the property of hypnotics, etc. I believe the habitual use of opiates has its origin more often than not in the doctor's prescription. I know many cases in which it has done so. Only lately I made up a prescription for a draught containing chloral. It was several times repeated, then two at a time were had, afterwards four, then six; at last I was asked to make up a large bottle instead of separate draughts. There having a short time since been a case of fatal poisoning in this neighbourhood by chloral supplied in a 6 oz. bottle by a surgeon to a patient suffering from delirium tremens, I demurred and advised the draughts not to be continued without further consulting the doctor who prescribed them. Whether the advice was acted on, or whether it gave offence, I do not know, but I have not since been favoured with a prescription from the family, who were previously frequent customers in that way. While not agreeing with those who go so far as to think that a prescription should never be repeated unless with the authority of the prescriber, I do think it cannot be right to entrust patients with prescriptions for medicines of a dangerous character without any limitation as to the time the medicine is to be continued.

A VILLAGE CHEMIST.

Sunday Trading and Earlier Closing.

Sir,—The above two subjects have been discussed for a few weeks in the Journal and as I have much more leisure than I like, through ill health, perhaps if I state my personal experience on both of these matters some of our members may be helped to a right decision, or at any rate to an improvement in the state of things as described by Mr. Woodward in last week's Journal. It is nearly fifty years since I was apprenticed in Norwich, and at that time, 1831, most chemists' shops in that good old city were open on Sunday till 10.30 a.m., this being the only part of the day of rest encroached upon, and before I left in 1837 to come to London I believe nearly all were entirely closed on Sunday, with very little if any inconvenience to the public and with great advantage and much comfort both to principals and employees. On coming to this great metropolis I found there was much more Sunday trading of all kinds than I had been accustomed to.

Public houses were open till 11 a.m., and as I occupied a situation not far from a large gin palace, and had to attend in an open shop all day, I saw enough to make me rejoice with many others when a regulation was introduced preventing their opening till after 1 p.m. On commencing business on my own account in 1841, I closed on Sundays from 11 a.m. till 6 p.m. and on week days was at business till 11 p.m. and on Saturday till 12, and at that time I was not singular in doing so. Some few years since there was much agitation both about late hours and Sunday opening and by slow degrees the present plan has been reached by me, of entirely closing on Sunday, and on other days, except Saturday, closing at 9 p.m. I sincerely believe that this has been accomplished without any loss of business, and my experience has convinced me that if the sales are confined to medicines the returns are very small indeed on Sundays. If I could persuade any doubting one to take the leap, I feel sure his loss will be scarcely perceptible, and the extra comfort and rest would fully compensate him, helping him to improve health and enabling him to rejoice in the feeling that the Sabbath was made for man and being a free man he intends to make a good use of it.

JAMES SLIPPER.

W. Hickman.—There is, perhaps, nothing in the Act to prevent a grocer whose name is not on the Register of Chemists and Druggists from charging for the making up of a prescription, but any such person selling or keeping an open shop for the dispensing or compounding of poisons, or exhibiting the name or title of chemist and druggist, or chemist or druggist, would be liable to a penalty under the 15th section of the Pharmacy Act, 1868.

T. Robinson.—A recipe for incense will be found in vol. viii., p. 519.

W. Murray should consult a work on veterinary medicine.

"*Devon.*"—(1) The preparation is, we believe, a proprietary one, of which the formula has not been published; but a few experiments would probably furnish you with what you want. (2) Dr. Dobell's formula for tincture of podophyllin will be found in the *Pharmaceutical Journal* for June 28 last, p. 1056. (3) No authoritative formula has been published; you would therefore be justified in using such a preparation as is usually kept in pharmacies.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Robinson, Reynolds, Key, Storey, Gostling, C. E. W., Spes, Wiltshire.

"THE MONTH."

Ordinarily, December is not a very promising month for a botanical gossip, and more especially is this the case in this unusually severe close to a most inclement year. Except in a few favoured localities there are but few flowers to be seen, the Christmas rose (*Helleborus niger*) being almost the only medicinal plant in blossom. *Petasites fragrans* and *Matricaria inodora* may be found here and there on hedgebanks in the south in blossom to illustrate the Compositæ. In hothouses the pretty poinsettia, with its brilliant scarlet bracts and insignificant flowers, represents the Euphorbiaceæ, while the lily of the valley and the hyacinth worthily represent the Liliaceæ. There are spots, however, in England where flowers still survive, even after Paris has been rendered impassable by snow, and, still further south, Algeria has been covered in several places with a carpet of white six inches thick. For, according to a letter in the *Western Morning News*, of the 16th inst., there were then in full bloom in the gardens of Ilfracombe, geraniums, heliotropes, mignonette, convolvulus minor, roses (various), fuchsias, red salvias, carnations, calceolarias, stocks, myrtles, magnolias, and many others.

During the last few days the metropolis has been visited by one of those fogs for which it is famous, and if there be any relief in a scientific explanation of a disagreeable infliction, it may be found in one by Professor Frankland. Noting that the persistent and irritating fogs which affect large towns frequently occur in comparatively dry air, he explains this persistency in a dry medium as due to the formation of a coating of coal oil, derived from coal smoke, upon the surface of the minute particles of water which compose fog, and which coating effectually prevents the evaporation of water. The remedy would therefore appear to lie in the use of a smokeless coal or of gas for heating purposes.

The season of mistletoe and holly is now approaching with rapid strides, and it is so familiar to see the mistletoe bough hung up, that the idea of having mistletoe "all a-growing" takes one rather by surprise. Nevertheless, Mr. R. Smith, of Worcester, has hit upon the novel plan of selling apple trees with mistletoe upon them. Such trees, although possibly admirable for ornamental purposes, even if dwarfed as the Japanese dwarf their trees, would scarcely do for the usual purpose to which mistletoe is applied at this festive season of the year. The mistletoe grows remarkably well, however, on a much more ornamental tree—the mountain ash. It is merely necessary to rub the berries on the bark of a young tree, and the germinating seed soon attaches itself.

Just now, when there is scarcely a green leaf to be seen, it seems somewhat anomalous to consider the subject of chlorophyll. This substance has, however, attracted considerable attention recently. M. Gautier, in *Comptes Rendus*, p. 862, describes the preparation of the crystalline form of chlorophyll, which is obtained by pounding spinach, or other leaves, in a mortar, neutralizing the pulp with carbonate of soda, expressing strongly, diluting the marc with 55° alcohol, and again expressing. The matter thus exhausted in the cold is treated with 83° alcohol. The liquor is filtered, and allowed to digest for four or five days with animal charcoal, which absorbs the chlorophyll, leaving a yellowish-green or brownish solution

that contains the impurities, wax, fat, colouring matters, etc. The animal charcoal, separated by cotton wool in a funnel, is washed with 65° alcohol, which removes a yellow crystallizable substance, that generally accompanies the chlorophyll, and seems to bear a close relation to it in composition. The charcoal is then treated with ether or light petroleum oil, which does not dissolve the yellow matter, but only the chlorophyll, and this crystallizes out in flattened needles when the petroleum solution is allowed to evaporate.

M. Gautier, who made the discovery of the crystalline state of chlorophyll first in 1877, was apparently anticipated by M. Trécul, who observed, in 1865, natural crystals in the cortical portion of *Lactuca altissima*; but his discovery was at that date received with incredulity. M. Gautier, in his remarks in *Comptes Rendus*, p. 863, states that he considers chlorophyll to be nearly allied to bilirubine in its reactions and elementary composition. It dissolves in the same solvents, like it plays the part of a feeble acid, gives unstable soluble salts with alkalies, and insoluble salts with all other bases, and agrees with it in the alkaline solutions being very easily altered and oxidized under the stimulus of light. Like bilirubine it can pass successively from green to yellow, red, or brown, by the subtraction or addition of oxygen. The preliminary analysis indicates the formula $C_{19}H_{22}N_2O_3$; that of bilirubine being $C_{16}H_{18}N_2O_3$. The paper is too long to give here further details; but sufficient has been said to show that M. Gautier is on a most interesting and important track. It may be hoped that he will continue his valuable researches and that they may lead to the solution of the mystery as to the means by which the change from the green colouring matter of leaves to the bright colours of petals is effected in nature, a discovery which would be of exceeding value to the horticulturist. The study of this subject is further of interest on account of the relation of chlorophyll to bilirubine, and consequently with the hæmatine derived from blood.

According to a notice in the *Journal of Botany*, Pringsheim has also recently published the results of his researches on the function of chlorophyll (*Monatsber. der Konig. Akad. der Wiss. zu Berlin*, July, 1879). He considers that chlorophyll, so long as it exists in the cell, protects the protoplasm from the injurious effects of sunlight, and suggests that it may serve as a regulator of respiration by reason of its strong absorption of light, especially of the chemical rays.

The author has also discovered in the ground substance of all chlorophyll grains, and of all amorphous chlorophyll, a new body very sensitive to light and easily destroyed by it. This substance he calls hypochlorin or hypochromyl. It may be obtained by placing any green tissue in weak hydrochloric acid for from twelve to twenty-four hours. This body he considers to be the true primary product of assimilation of green plants, from which are derived by oxidation under the influence of light the starchy and oily contents of chlorophyll grains. Accumulation and growth of the starchy contents of the chlorophyll grains proceed in proportion with a decrease of the hypochlorin in it. In darkness starch is less stable than hypochlorin, showing that the conversion of the latter into more highly organized bodies in the cell is favoured by the increased respiration occurring in light.

Some interesting experiments by Professor Hoffmann, of Giessen, have been reported in the *Berlin Monatsschrift* on the influence of thick sowing on the sex of diœcious plants. In his view sex does not reside in the seed, but is the result of the conditions of germination. In spinach he found that one hundred seeds crowded in a pot yielded two males to every female plant, but an equal number of each sex when seeds from the same sample were planted in the open ground. Unripe seeds also in the case of *Lychnis vespertina* gave more males than females, and the seed of *Mercurialis annua*, artificially impregnated in early summer, gave a larger proportion of males than seed ripened at the usual time. Similar results are said by Professor Prantl, of Aschaffenburg, to obtain in the prothallia of ferns, when crowded, and Professor Pfeffer, of Tubingen, has observed the same hold good with equisetum, in which more antheridia than archegonia are produced. In the case of hemp, the nutmeg tree and some other plants, this fact, if generally applicable, is of considerable importance.

Another interesting botanical fact has been discovered by M. Lemoine, of Nancy, who finds that the stigmas of double flowers are capable of fertilization by the pollen of single flowers, with the result of yielding seeds of which the majority produce double flowers.

Another important chapter in the history of nitrification has been contributed by Messrs. Schloesing and Muntz (*Comptes Rendus*, vol. lxxxix., p. 891). These experimenters claim to have identified the organized ferment by which nitrification is effected as consisting of small rounded or slightly elongated corpuscles, already noticed by Pasteur under the name of "*corpuscles brillants*," and looked upon by him as germs of bacteria. This organism, which has many analogies with the acetic ferment, multiplies by gemmation, but very slowly, which accounts for the progressive rate at which nitrification goes on. A temperature of 100° C. is fatal to it, and its activity is arrested by one of 90°; neither can it resist prolonged deprivation of oxygen, at least in liquids. Desiccation, even at ordinary temperatures, is also unfavourable. The ferment is widely diffused, the most favourable place for its development being earth containing vegetable *dêbris;* but drainage waters and waters containing organic matters are also rich in this organism. In the soil its greatest enemy is mucor, the development of which arrests the formation of saltpetre; but after the death of the mould it generally resumes its activity. The nitrification ferment does not appear to occur suspended in the atmosphere, possibly from its inability to resist desiccation.

In the *Gardeners' Chronicle* it is authoritatively stated that during the ensuing summer a students' garden will be thrown open in the Royal Gardens, Kew, where students will be permitted under certain regulations, which will be drawn up hereafter, to procure botanical specimens for scientific study and observation. This will be good news for botanical students and will, it may be hoped, lead to the greater development of a practical instead of a theoretical knowledge of botany, which it is to be feared is too often the result of a course of "botanical study."

In *Science Gossip*, for this month, under the title of "Friends in Council," is published a list of names of gentlemen willing to assist gratuitously amateurs in botany and other branches of natural history, in various localities. The list is to be further extended and it is hoped may prove very useful to those who in country districts are often somewhat hindered in their botanical studies for want of a little practical information.

M. Ed. Morren's 'Correspondance Botanique' or 'Botanical Directory,' giving a lists of botanists and botanical societies, etc., all over the world, has just reached a seventh edition, which contains numerous additions and improvements. This list is understood to be kept in stock by Mr. Quarritch, of Piccadilly.

Some confusion still seems to exist as to the kind of quebracho used medicinally. In the *Berichte d. Deutsch. Chem. Ges.*, 1879, p. 1560, G. Fraude states that his aspidospermine was obtained from *Aspidosperma Quebracho blanco*, Schl., according to Pedro Ardata's report in the 'Anales de la Sociedad Cientifica Argentina," and that explains why it has a different composition and properties from the "aspidospermine isolated from *Quebracho colorado*." Any alkaloid obtained from *Quebracho colorado* (*Loxopterygium Lorentzii*) should no longer be called aspidospermine, but loxopterygine, since it would be obtained from a totally different tree belonging to a different natural order. For a similar reason the name quebrachine, which is used in the 'Revista Farmaceutica' as an equivalent for aspidospermine, should not be used, lest it lead to a similar confusion. It is the bark of the white quebracho (*Aspidosperma Quebracho*) which has been used in medicine, and the alkaloid obtained from this bark should alone be called aspidospermine.

In *New Remedies* for this month an account of the barks of *Alstonia constricta* and *A. scholaris* is given, but by a curious oversight, while the characters of the flowers, etc., are described, there is no mention of the characters by which the barks may be distinguished. Woodcuts of sections of the two barks are, however, given, but that of *Alstonia constricta* can scarcely be looked upon as typical, being figured from a piece of old bark. Much of that which arrives in this country is only half or one-third the thickness represented, and is of course more powerful than the older and corky bark.

In the *Journal de Pharmacie* for November, Professor Planchon describes a bark, called "palomabi," which has been found mixed with pale cinchona supplied to the hospitals. It came into commerce apparently under the name of "ecorce de Porto Rico," and is said to be used in the Antilles in the manufacture of beer. He refers it to *Colubrina reclinata*, Rich., a rhamnaceous plant. It contains no alkaloid, but resin, a free acid of undetermined composition, tannin, extractive matter and salts of lime.

The *Medical Times and Gazette* for December 6, calls attention to the researches of Nikitin on the physiological action of sclerotic acid, and remarks that sclerotic acid "seems likely before long to partially replace ergot as a drug." Nikitin states as the results of his experiments that both sclerotic acid and its sodium salt possess the physiological and therapeutical properties of ergot itself, but the salt is a weaker drug than the acid. The acid remains indefinitely without loss of strength if kept in a dry place and undissolved. He considers, however, the sodium salt to be the best preparation for internal use. Whether from the mode of preparation, or from whatever cause, sclerotic acid does not seem to have been received with much favour in this country as yet, its use having, it is believed, decreased rather than increased of late.

In *Le Moniteur Thérap.* for October, M. H. Bergeron is stated to have obtained very favourable results in diphtheria from the inhalation of an atmosphere containing a definite small proportion of hydrofluoric acid gas. This is somewhat interesting, since the action of hydrofluoric acid or fluorides is believed to have an influence in producing another disease (goître) in the same part of the body.

The *American Journal of Pharmacy* for December gives an account of experiments on the action of artificial vanilla by Mr. L. Wolff, who has found that in one grain doses taken for three weeks it produces no bad results whatever. The vanillin experimented with was Dr. J. M. Haarmann's. He therefore concludes that it is not to artificial vanillin that the reported poisonous effects of vanilla ice cream must be attributed, but rather to the other ingredients. He recommends vanillin for disguising the taste of chlorate of potash in lozenges and recommends it to be used in the following proportions:—Pot. chlor., lb. iv.; powdered sugar, lb. xvi; vanillin, gr. xv.; mucilage of gum acacia, q.s.; made into lozenges weighing twenty-five grains each.

In the *Berliner Klinische Woch.* for November 3, Dr. Koehler, of Kösten, recommends a salt prepared by dissolving boracite (borate of magnesium) in citric acid, as a remedy in cases of gravel, or probable uric acid calculus. The boracite used is that from Stassfurt, known as stassfurtite. The salt, which is known as boro-citrate of magnesium, is in the form of a white powder of a sour taste, and is given mixed with sugar in the proportion of one to two. The dose is a large teaspoonful in half a tumbler of water three times a day.

At this season of the year colds are of such common occurrence that any mode of preventing or curing them will doubtless be welcomed. The *Lancet*, Nov. 29, p. 808, makes the following remarks:—"The truth would seem to be that what we call cold-taking is the result of a sufficient impression of cold to reduce the vital energy of nerve centres presiding over the functions in special organs." After alluding to sneezing and shivering as efforts of nature "to rouse the dormant centres and enable them at once to resume work and avoid evil consequences," it goes on to say—"It follows from what we have said that the natural indication to ward off the effects of a chill is to restore the vital energy of the nerve centres, and there is no more potent influence by which to attain this object than a strong and sustained effort of the will. The man who resolves not to take cold seldom does." After this excellent advice, it is to be hoped that readers will all resolve not to take cold and will succeed.

Dr. Woodward, in the *British Medical Journal* (Nov. 29, p. 882), calls attention to the value of a cold water pillow in cases where headache, heat of head, and similar symptoms have prevailed. He says that anyone who has experienced the vain attempt to find any permanently cool place in a feather pillow will appreciate its value.

A note in Reimann's *Farber Zeitung* (No. 43) states that the cochineal harvest in the Canary Islands has suffered greatly from unseasonable rains. In Mogador the almond crop, notwithstanding the droughts, has been up to the average; but the almond crop is said to have been devoured by the starving population before it reached maturity owing to the severity of the famine.

In the neighbourhood of Naples the cultivation of madder, which for some time past had been decreasing, has at last been completely abandoned, owing to the extended use of the aniline dyes in Europe. It is estimated that 3000 bales, of 8 cwt. each, are still to be had, the growth of former crops.

The distress which is always more or less associated with the present season of the year, even in the most prosperous times, has during the month again given rise to many suggestions as to the provision of cheap and nutritious food, and among others have been brought forward once more the claims of lentils, which the British poor so persistently ignore. But the overcoming of prejudices with respect to new articles of diet is not of more importance than the diffusion of correct information respecting the articles of food already in common use. In this direction such lectures as those on the "Chemistry of Bread and Bread Making," delivered during the present month as a Cantor course before the Society of Arts, by Dr. Charles Graham, cannot fail to have a beneficial influence. The teaching of such subjects in schools, too, as now practised, is a great gain, and for this and similar purposes a series of collections of specimens illustrating the composition of articles of food and drink, which have been prepared for the use of lecturers and schoolmasters by Messrs. Southall Brothers and Barclay, of Birmingham, promise to be of utility. These illustrate the chemical composition of the various classes of food by means of typical specimens. In the collection illustrating the alcoholic drinks the various amounts of water, alcohol, flesh-forming and heat-giving matters are shown.

A short paragraph in *The Month* for October (before, p. 324) relative to the appointment of "quiz-masters" in connection with the New York College of Pharmacy has provoked results strangely disproportionate to its superficial appearance. In the first place, it has excited the wonder of the editor of *New Remedies*; and next, it has drawn from Mr. Cassebeer, the Secretary of the college, a letter of sorrowful explanation as to the nature of this office which he describes as a "peculiar institution connected with most colleges in this country." Mr. Cassebeer says: "Experience has shown that students do not profit so much from didactic lectures alone, but that a more practical method is required to make them fully understand the subjects taught in the former. This may be done either by practical instruction, for instance, in a pharmaceutical or chemical laboratory (in chemical schools), or by clinical lectures at the bedside (in medical schools), or by oral recitations in form of questions and answers. This latter system is known in this country as 'quiz.' In some medical colleges the professors conduct this quizzing class themselves, in other colleges special instructors are appointed to conduct them." Such a practice, it may be remarked, is not unknown in this country, but so far as the name under which it is known in the United States is concerned Mr. Cassebeer speaks with authority from his official position, and is entitled to the thanks of the English readers of this Journal for his courtesy in affording this information, which will probably be new to most of them. It is evident that a mistake has been made, though why the suggestion that quiz is associated with banter should raise so much ire is not quite evident, since "*ridentem dicere verum*" has the respectability of antiquity at least. But when he proceeds to rebuke the levity of the paragraph, and to state that "we are charitable enough to believe that the author of the remark was unaware of the *true* meaning of the term," which is further defined by him as an Americanism, the tribunal becomes changed and others are as competent as himself to express an opinion upon this part of the subject. In fact, the "levity" that disturbs Mr. Cassebeer and his colleagues consists, in the eyes of the editor of *New Remedies*, of "grave remarks;" further, the writer was not unaware of the true meaning of the term "quiz," and it is not an Americanism. Few words have a better-known history, and in its definition lexicographers are all in accord. It would perhaps be looked upon as begging the question to quote an Englishman's definition, but that of Webster will suffice, namely: "Quiz, *v.t.* To puzzle; to run on; to make a fool of. A popular, but not an elegant word." Neither is any other meaning suggested under the other forms of the word. It would appear, therefore, that the mistake which has so excited our New York contemporary and the staff of the New York College was due primarily to the peculiar misapplication of a well-known term to a not very peculiar institution. Similar mistakes continually occur on both sides of the Atlantic, originating in mutual ignorance of local customs, an ignorance which it is hoped may gradually be dispelled by the very work that is marred by such errors.

The opinion expressed last month that some explanation would be forthcoming as to Professor Meyer's disclaimer to Dr. Endemann with respect to the notices of his researches on chlorine that have appeared in the English journals, has been justified by a letter to Mr. Watson Smith published in the *Chemical News* (Nov. 28, p. 263). In this letter, Professor Meyer states that he was not referring to the communication of Mr. Watson Smith to the *Chemical News* (quoted before p. 164), which has his entire approval, but to an article in the *Chemical News*, August 15, on "The Decomposition of Chlorine," and the paper of Sir B. C. Brodie in the *Journal of the Chemical Society* for September.

In a paper recently read before the Royal Society (*Nature*, Nov. 27, p. 82), Messrs. Hannay and Hogarth record some interesting results obtained while pursuing an investigation into the conditions of liquid matter up to the "critical" point with a view to determine under what conditions liquids are dynamically comparable. It was thought that some clue might be obtained by dissolving in a liquid some solid substance the fusing point of which was much above the critical point of the liquid, and noticing whether, on the latter assuming the gaseous condition, the solid was precipitated or remained in solution. It was found that the solid was not deposited, but remained in solution, or rather in diffusion, in the atmosphere of vapour, even when the temperature was raised 130° above the critical point, and the gas was considerably expanded. But when a local disturbance in temperature was caused, as by bringing a red hot iron near a tube containing a strong gaseous solution of a solid, the side of the tube nearest the source of heat became coated with a crystalline deposit, which slowly disappeared on the disturbing influence being removed. When the pressure of the gas was suddenly reduced, also, the solid was deposited in a crystalline form, but was easily redissolved by the gas on increasing the pressure. The experiments were made with such solvents as methyl and ethyl alcohols, ether, carbon bisulphide and tetrachloride, paraffins and olefines, and such solids as sulphur, the chlorides, bromides and iodides of the metals, chlorophyll and the aniline dyes.

Once more the news comes from the United States that Mr. Edison has solved the problem of a cheap burner for the electric light, and this time, although only in the form of a telegram to the *Daily News* (December 22), some slight information is given as to the ground for the assertion. This burner is said to consist of a coil, or horseshoe, of charred paper, enclosed in an exhausted glass globe, where it can be rendered incandescent without being consumed. It is claimed that carbonized paper is not open to the objections which have rendered former experiments with other substances *in vacuo* unsatisfactory. The new burner is to be tested on a large scale in Mr. Edison's village of Menlo Park on New Year's Eve. It is also stated that Mr. Edison has invented a means of measuring the electricity delivered to consumers.

In the closing days of the year France has lost another of her most eminent pharmaciens in Jean Baptiste Alphonse Chevallier, who died on the first instant, in his eighty-seventh year. Born in Lorraine he commenced business as a pharmacien in Paris, where he soon attracted attention by his ability. In 1825, when the *Journal de Chimie Médicale* was started, M. Chevallier was appointed principal editor, and contributed to the first number an article on the detection of the adulteration of iodine by means of alcohol, and in this work he was supported by such well-known men as Guibourt, Fée, Orfila, Payen, Vauquelin, Thénard, Péligot, Pélouze and Serullas. He was the author and joint author of a large number of treatises on subjects more or less closely associated with pharmacy and hygiene, whilst of his larger works may be mentioned as one of the most important his 'Dictionnaire des Altérations et Falsifications des Substances alimentaires, médicamenteuses et commerciales,' first published in 1850, and a new edition of which —we believe the fourth—has not long been issued. In 1823 he was elected to the Académie de Médecine, of which he lived to be the oldest member, and a few years afterwards he relinquished his business as a pharmacien, upon his appointment by the Government to the chair of chemistry in the Paris School of Pharmacy, an appointment he still retained at the time of his death.

On a previous occasion the necessity of fully and clearly labelling the bottles in which medicines are dispensed was fully commented on, and the use of the coloured and fluted bottles strongly recommended for all external applications; the labels also for these should be different in colour and distinct in character, so that the eye of the public may, in due course, be educated to recognize at once an external application before even the specific directions on the label are read.

A circumstance recorded in the last issue of this Journal should bring this subject before dispensers with greater force, and tend to impress on them a due sense of their responsibilities as dispensers of medicine for the public, some of whom are extremely careless in the administration of the same in the sick room.

The mixture, No. 377, may be dispensed by dissolving the salicylate of soda and the bromide of ammonium in 4 ounces of the water, to which the sp. chlorof. should be added; then having diluted the ext. cinch. liq. with the remaining water, mix them together. A copious flocculent separation takes place, which will gradually subside. The mixture is not inelegant, the precipitate being readily diffusible on agitation. Of course the patient should be directed to shakes the bottle before each dose.

No. 378 contains vaseline in a lotion, for which vaseline is not adapted. Probably the writer may not be aware of this, and the sooner he is made aware of it the better for the dispenser. It has been stated in these columns before that the pharmacy of vaseline is little understood, and many members of the medical profession seem to consider that in its properties it resembles glycerine, and that like glycerine it is miscible with either spirit or water or a mixture of the two. It is otherwise difficult to understand why a substitute for, and a representative of lard, without its tendency to oxidation, should form an ingredient in a lotion, and take the place which has hitherto been occupied by glycerine. Vaseline is not adapted for use in lotions, it is not miscible with any aqueous vehicle, and is only suited as a substitute for lard. A "London Dispenser" has given a theoretical method of making an emulsion by melting the vaseline and pouring it into 3 ounces of lime water. "Adolescens" would, there is no doubt, be very glad to see a specimen of the emulsion thus made; it would solve a difficulty and advance a step the pharmacy of the subject. If it has been dispensed to the "entire satisfaction" of the prescriber, "Adolescens" is recommended to procure a sample of the emulsion, neutralize the lime water with a little dilute acid, and thus ascertain how much vaseline the mixture contains. In a paper read at an Evening Meeting by Mr. J. Moss (*Pharm. Journ.* [3], vol. vi., p. 624), it is stated, as the result of experiment, that "vaseline does not saponify with alkalies."

The pills, No. 379, contain ol. absinth. q. s. An essential oil is not a suitable excipient to make a pill mass of pepsine. Mucilage is well adapted for the purpose, and a few drops of ol. absinth. may be added to the mass; or the glycerine of tragacanth may be used, and would probably be better adapted for the admixture of ol. absinth. or any other essential oil.

REMACERATION.*

BY R. ROTHER.

Since the process of percolation has become so generalized, even to the extent of its authorized application where there is a positive disadvantage in its use, it sounds rather surprising, if not altogether doubtful, to speak of the superiority of the nearly antiquated method of extracting drugs by maceration. There is in all things a tendency to extremes, but the observation had not escaped even the remote past that a middle course is best in everything. The process of percolation, when practically viewed, has an entirely different aspect than when looked at from its theoretical side. In theory, percolation consists in the displacement of one layer of liquid by another, on the assumption that there is no intermingling, but on the principle that the successive layers displace one another like so many solid disks. In practice, however, this result is by no means realized; in fact, the theory of its operation in practice is founded on quite a different principle. Percolation signifies that an interposed solid is being permeated by a liquid. The definition here alone already bars the principle of displacement as above stated. A layer of liquid whilst penetrating a mass of solid particles, as any ordinary powdered drug not of a compact, resinous or gummy nature, is at the very outset of its descent broken up into numerous distinct and independent currents of different velocities, varied according to the width of the interstices passed through. This action, therefore, results in a retardation of portions of the layer, and thus, in the very incipiency of the process, vitiating the principle of displacement. But, superadded to this, now comes the effect of capillarity, a force of remarkable power, whose obstructive action, varied according to the nature of the drug and the menstruum employed, causes a further disarrangement of the liquid, by its absorption within the solid as well as by adhesion to the surfaces of the particles. Whilst thus a large proportion of the liquid is greatly retarded by capillary action, the freer portions escape more rapidly. To this effect is now added the result of diffusion, which is even of a retrogressive character, although closely allied to capillarity. Finally, the chemical nature of the drug, in conjunction with the power of the solvent, exerts the most momentous influence over the ultimate result of the operation. In substances containing a large proportion of soluble material, especially of a viscid kind, the greatest amount of retardation, and consequent interference, occurs in many cases, so much so that a perfect bar is set to all further progress in that direction. Such an obstruction naturally throws the course of the currents towards those places offering the least resistance. The higher the column to be permeated is, the more defective becomes the process, in many cases even to the extent of entirely vitiating the final result. From this it will be seen that the process of percolation can in no sense be harmonized with the theory of displacement. In practice it is a maze of intermingling currents of the greatest complexity in volume, direction, velocity, etc., dependent upon the struggling forces of gravity, capillarity, diffusion, solution, chemism, etc. Therefore, the theoretical process of displacement compares with percolation in practice as the regular descent of the ideal solid disk compares with its shattered fragments projected down pell-mell.

There are numerous substances which, although readily permeated by certain menstrua, still contain their active matters in such a condition and possessed of such other properties that the extraction is but slowly and difficultly effected. Such drugs, whilst having the disturbing features but moderately intensified, yet, for the reason just stated, require a relatively large volume of menstruum for their complete exhaustion. There is, however, a very small class of substances in which the deranging tendency is at a minimum and the extractability of the active parts at a maximum. Of these, ginger and capsicum are the best known. Ginger, with a properly low column and the use of $\frac{7}{8}$ alcohol, will yield, by the exercise of moderate care, its total activity from 16 troy ounces, in the ordinary powdered form, to 16 fluid ounces of the menstruum. Common powdered capsicum, somewhat more carefully treated and in low column, with a properly regulated flow, can be satisfactorily extracted with strong alcohol, so that 16 fluid ounces of percolate represent 16 troy ounces. Opposed to these are others, again, that permit but a small measure of success by percolation. These are cantharides, Calabar bean, calumba, seneka, squill, taraxacum, vanilla, and a host of others. If, in the treatment of these, moderately alcoholic or preponderatingly aqueous menstrua are used obstructions and erratic currents will certainly form, which then require comparatively large volumes of liquid to wash down the impeded portions. But if a pretty strongly alcoholic

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mixture is employed, then the extraction is defective, from lack of solvent power upon the enveloping tissues of the active matters. Then, finally, there is another class that cannot be treated by percolation at all. These are the resins, gum resins and gums.

In the method of extraction of these various drugs the United States Pharmacopœia makes no distinction, however, but submits them all to percolation. Some slight discrimination is made in the use of menstrua, and considerable regard given to the degree of comminution, both of which latter are considerations of great importance bearing upon the success of the operation. But no manner of preliminaries will render the process available in the exceptions above cited. In the manner of preparing fluid extracts the Pharmacopœia has made a new departure, by partially abandoning the idea of displacement and adopting coarser powders in connection with a modified method of maceration combined with percolation. The results of this process are believed to be very satisfactory in affording a higher degree of concentration in the percolate, and thus requiring less liquid to be subsequently evaporated. With the exception of the large, and in most cases superfluous, use of glycerin, the process is evidently an improvement.

The method of repercolation, owing to its very plausible appearance, seemed to recommend itself especially for the preparation of fluid extracts. But this method also has of late undergone considerable revolution, or rather evolution, in borrowing the improved features of the officinal method, namely, the coarser powders in connection with maceration. Repercolation, however, is too intricate to become generally popular, and particularly in its original form, in conjunction with fine powders, it was altogether too precarious and tedious for general use. With the latest improvements, as above noted, and by reducing the repetitions to two percolations, and then applying it only to adaptable cases, it will certainly find more frequent use. However, no amount of skill in manipulation or ingenious accessories will ever make percolation an art. The inherent uncertainties are beyond the control of mechanical means.

Among the strong points of percolation, its great convenience is often cited, when compared with the method of extracting drugs by maceration and expression. It is true, for the multifarious small operations in the pharmacal laboratory the press is a decidedly objectionable apparatus, for more reasons than one. But when all the necessary preparatory operations attaching to percolation are considered, there remains but little choice. Now, the method of remaceration which the writer here proposes for the preparation of certain tinctures, syrups, etc., but not fluid extracts, dispenses with the press as a necessary adjunct, although its application in connection with it is not by any means precluded.

When a root, bark, wood or other pervious drug in small fragments is immersed in the menstruum by which it is to be extracted, a certain volume of the latter is absorbed, the amount depending upon the affinity of the solid for the liquid employed. This pretty definite quantity peculiar to each drug, and a corresponding menstruum, the writer will designate as the normal of absorption of that particular drug. For instance, if one troy ounce of a certain root, bark, etc., should saturate itself with one, two, two and a half, or any number of fluid ounces of menstruum, then its normal of absorption would be indicated by the respective number. Now, if in any formula, for a certain tincture for example, a definite number of ounces of the drug are to yield a specified measure of the finished preparation, the given volume must be increased by the amount of liquid that is finally retained in the drug after decantation. The portion of menstruum lost in the marc will of course contain a relative proportion of the original drug, and with but one maceration this loss would be altogether too great unless partly recovered by the press. Now, in order to avoid the use of the press, the writer divides the menstruum into three parts and macerates the material in these separate portions successively. The prescribed measure of the final product is assumed to be divided into three equal parts, since a division into equal parts extracts in greater ratio than when in any other proportion. The whole menstruum used is, therefore, made up of the three equal parts as just stated, plus the matter absorbed by the material, which latter is the product of the normal of absorption into the quantity of drug employed. The first portion of the menstruum to be applied consequently represents one-third of the final measure, plus the absorbed volume. For instance, if 6 troy ounces of a drug is to be extracted with a specified menstruum whose final volume after three macerations shall be 48 fluid ounces, the normal of absorption being ·75, then the absorbed volume will be 4·5 fluid ounces and the measure of the first macerate consequently will be $16+4·5=20·5$ fluid ounces. Now, after due maceration and decantation of 16 fluid ounces, the residual menstruum must retain 4·5 parts of the 20·5 into which the activity of the drug is assumed to be divided. This ratio, when reduced to a vulgar fraction whose numerator is 1 and denominator 4·55+, shows that in the first maceration one part out of every 4·55+ of the whole material is lost. The denominator of this fraction the writer terms the subnormal of absorption. But in the second maceration 16 fluid ounces of fresh menstruum is poured upon the first residue, thereby restoring the original measure of 20·5 A second decantation now again leaves 4·5 parts of the first loss unextracted, and the third or final maceration sustains again a permanent loss of 4·5 parts of the second. The ratio of the total loss in the whole operation will therefore be represented by the product of the fraction whose denominator is termed the subnormal of absorption multiplied into itself three times. The denominator 94·5 of this new fraction, which, as will be seen, is the cube of the subnormal of absorption, the writer styles the subnormal of loss. Hence it becomes evident that if the normal of absorption is small the subnormal of absorption must be correspondingly great, and the cube of this, or the subnormal of loss, must be great in proportion, and so inversely small will be the actual loss. This calculation shows that in this formula 1 part out of every 94·5 of the drug remains unextracted, and hence, in order to prepare an extraction representing a given quantity of any substance, this must be used in such increased proportion as to cover the anticipated waste. To ascertain this required addition the above calculation becomes necessary; but in such cases where the normal of absorption is large the extra addition of absorptive matter decreases the subnormals to such an extent that several trial estimates will have to be made in order to adjust the formula to these conditions. Now, if we assume a case in which the subnormal of loss is 8, for instance, that is, one-eighth of the drug as above explained, then it is not sufficient to add simply one-eighth as much more as a correction for loss, because, as will be easily seen, one eighth of this addition will also be lost; and if, again, one-eighth of this is added, still there remains a deficiency of one-eighth of each amount added. This process is naturally endless in extent, and the finding of the true correction involves the summation of an infinite decreasing geometrical series in which both the first term and the ratio is one-eighth. The result is found by dividing the first term by the difference between unity and ratio, and is therefore in this instance one-seventh. The writer designates the denominator of this fraction the subnormal of correction, and which is in every instance one less than the subnormal of loss. If the latter is eight, the former becomes seven. Hence the true correction is eight divided by seven, or one and one-seventh, that is, the subnormal of loss divided by the subnormal of correction. Yet, in cases where the normal is large and the subnormals small, the addition of the true correction augments the solid material to such an extent that the consequent decrease of the subnormal of absorption becomes very perceptible and necessitates the increase of the correction beyond the indication of the calculated subnormals. Several trial estimates, as above already noted, will readily point out the proper amount of the required increase. Since, however, remaceration is not intended for universal application, the case can always be selected to meet the process. In several instances, where it is desirable to employ this method, but where the material is inexpensive, a large proportionate direct loss of crude drug is not to be considered when indirect disadvantages are incurred by the employment of other methods. Such is the case in calumba and squill, whose normals of absorption are very high. A modification of the method which the writer designates as double remaceration can also be advantageously applied in similar cases, as, for instance, in the preparation of syrup of rhubarb, as will be seen farther on. It is not, however, necessary to sustain any great amount of loss in any formula by remaceration, as by means of the press or a further maceration the most part may be saved for the next batch.

In the following formulæ the expressions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{4}$, etc., alcohol, mean mixtures of strong alcohol and water containing the strong alcohol in the proportion thus indicated. This renders the preparations one-eighth more alcoholic than officinally directed. The antiquated term "alcohol," as employed by the Pharmacopœia, is long since obsolete and decidedly cumbersome, in fact, almost entirely disregarded by the great majority of pharmacists, who, having become accustomed to modern usage, make no discrimination, but use only the one article which the market affords. Hence, in this instance, the officinal authority is properly ignored in favour of that which long established custom has sanctioned.

Cantharides.—Cantharides often contains its activity in a form not easily extracted by ordinary menstrua. Alkalies, however, by generating very soluble cantharidates, become excellent means for this purpose, especially since they also recover that portion that is usually retained in combination with a peculiar fixed oil. In using an alkaline menstruum, percolation of the powder is nearly impossible; but for the purpose of remaceration, even in conjunction with a weaker alcohol than the officinal, the whole flies are most effectively treated. The normal of absorption for cantharides is rather high, but since the proportion in the tincture is but small, the subnormals are correspondingly great, being 5· and 125· respectively, so that the loss in 3 troy ounces is only about 12 grains. Six pints of the tincture is prepared by macerating with occasional agitation 3 troy ounces and 15 grains of whole cantharides, and 90 grains of potassium hydrate, in 40 fluid ounces of $\frac{1}{3}$ alcohol, for four days, decanting 32 fluid ounces and pouring on the residue 32 fluid ounces more of the menstruum; macerating again as before for three days, decanting 32 fluid ounces a second time; and again macerating the residue with 32 fluid ounces of menstruum for three days, then decanting 32 fluid ounces as before, mixing the three decantates thus obtained and filtering. Should the filtration not proceed with sufficient rapidity the addition of a little powdered chalk will greatly hasten it.

Capsicum.—For similar reasons as those obtaining in the case of cantharides, capsicum cannot be exhausted with the officinal menstruum; but since alkalies form very soluble capsicates, and also free the capsicin from its combination with fixed oil, they are excellent adjuvants to the process. The normal of absorption of capsicum in the pod is 1·25; its subnormals, 9·53 + and 865·5 +. This shows that, as the loss is so small, even one maceration with equal subnormals of 26·5 would suffice for its extraction, since to prepare one gallon of the tincture in that manner requires but an extra addition of 1·22 drachms to compensate the loss. With so large a volume as one gallon it is, however, more convenient to perform two macerations in which the subnormals are 13·8 and 150·44. Hence the formula. Take of capsicum in pod 4 troy ounces and 15 grains; potassium hydrate, 2 drachms; $\frac{1}{2}$ alcohol, 133 fluid ounces. Upon the capsicum pods and potassium hydrate pour 69 fluid ounces of the menstruum, and after four days' maceration, the mixture being occasionally stirred or shaken, decant 64 fluid ounces; upon the residue pour the remaining 64 fluid ounces of menstruum, and after three days of maceration, as before, decant 64 fluid ounces. Mix the two decantates and filter. The tincture filters very rapidly and remains permanently bright. It is much deeper tinted than the officinal tincture, and can be mixed with water in all proportions, remaining perfectly clear.

Catechu.—Catechu is one of that class of substances that cannot be extracted by percolation. Remaceration, however, effects its total exhaustion without loss. Tincture of catechu, however, contains cinnamon, whose normal of absorption is 1. Four pints of the tincture is prepared as follows:—Take of catechu, dry and coarsely powdered, 6 troy ounces and 1 drachm; cinnamon, coarsely bruised, 4 troy ounces and 1 drachm; $\frac{1}{2}$ alcohol, 71 fluid ounces. Upon the mixed solids pour 29 fluid ounces of the menstruum. After macerating the mixture with frequent agitation for three days, decant 22 fluid ounces; on the residue pour 21 fluid ounces of menstruum, and after two or three days decant 21 fluid ounces. Finally, macerate the residue once more for two or three days with 21 fluid ounces of menstruum, decant 21 fluid ounces, mix the several decantates and filter. The tincture can, however, be more conveniently made by two macerations, using $6\frac{1}{4}$ troy ounces of catechu and $4\frac{1}{4}$ troy ounces of cinnamon, macerating these with 39 fluid ounces of menstruum, decanting 32 fluid ounces, macerating the residue again with 32 fluid ounces of menstruum, decanting, mixing and filtering.

Cinchona.—The normal (n) of cinchona is ·75, and its subnormal of absorption ($s\ a$) in the simple tincture 3·37, and the subnormal of loss ($s\ l$) 38·28. One gallon of the tincture is prepared by macerating $24\frac{3}{4}$ troy ounces of cinchona, coarsely bruised and freed from dust by sifting, in 62 fluid ounces of $\frac{3}{4}$ alcohol for four or five days, decanting 43 fluid ounces, pouring on the residue 42 fluid ounces of the alcohol, decanting after three days, macerating the residue again with 42 fluid ounces of the menstruum, decanting after three days, mixing and filtering.

The compound tincture of cinchona contains, in addition to the bark, orange peel and serpentaria. The n of orange peel is 1·2, which of course increases the n of the mixed drugs. Ten pints of this tincture is prepared as follows:—$16\frac{3}{4}$ troy ounces of red cinchona, coarsely bruised, 13 troy ounces of orange peel, coarsely bruised or cut in slices, 3 troy ounces of serpentaria, in coarse powder, are mixed and macerated for four or five days in 84 fluid ounces of $\frac{3}{4}$ alcohol; 54 fluid ounces of the liquid is then decanted. On the residue 53 fluid ounces of the alcohol is now poured, and after three days the same measure is again decanted. Lastly, 53 fluid ounces more of the menstruum is poured on the residue, and after three days again decanted. The three decantates are then mixed and filtered.

Cinnamon.—One gallon of tincture of cinnamon is prepared by macerating, for three days, 12 troy ounces and 1 drachm of cinnamon, coarsely bruised, with 55 fluid ounces of $\frac{2}{3}$ alcohol, then decanting 43 fluid ounces, again macerating the residue, as before, with 43 fluid ounces of menstruum, decanting 43 fluid ounces, macerating the residue once more with 42 fluid ounces of the alcohol, decanting, mixing and filtering.

Calumba.—This root cannot be properly treated by percolation. Remaceration, however, extracts it admirably. To prepare four pints of the tincture $8\frac{1}{2}$ troy ounces of the root, in small fragments free from dust, is macerated for three or four days with 35 fluid ounces of $\frac{1}{2}$ alcohol; 22 fluid ounces are then decanted, and on the residue 21 fluid ounces more of the alcohol is poured; after three days 21 fluid ounces are decanted, and the residue once more macerated for three days with 21 fluid ounces of the alcohol; this is then decanted, the decantates mixed, set away to clear by deposition, and the tincture decanted from the dregs.

Gentian.—The *n* of gentian in 1·75; but since the compound tincture of gentian contains also orange peel and cardamom these additions reduce it for the mixture to 1·43. The *s a* then becomes 3, and the *s l* 27. One gallon of the tincture is prepared by macerating for three days a mixture of 8 troy ounces and 3 drachms of gentian, cut in small fragments, 4 troy ounces and 1½ drachms of orange peel, cut in thin slices, 2 troy ounces and ¾ drachm of cardamom, in coarse powder, in 64 fluid ounces of ½ alcohol; then decanting 43 fluid ounces, pouring on the residue 43 fluid ounces of the menstruum, macerating for three days, again decanting 43 fluid ounces; macerating the residue once more for three days with 42 fluid ounces of the menstruum, decanting, mixing the decantates, setting the mixture aside for repose and pouring the clear tincture from the dregs.

Ipecac.—The officinal syrup of ipecac is prepared from the fluid extract and becomes cloudy from deposition of resinous matter. In an earlier volume of the *Pharmacist* the writer proposed a process for preparing a clear syrup, by first diluting the fluid extract with water, after repose filtering, and then converting the clear filtrate into syrup by adding the required amount of sugar. Remaceration is, however, a much more satisfactory method for obtaining a clear and permanent syrup. The writer had on previous occasions recommended the addition of alcohol to fermentable syrups, to insure their permanency. The new formula contains one fluid ounce of this in the pint of syrup. The *n* of ipecac with ⅛ alcohol is 1·125, the *s a* 3·32, and the *s l* 36·6. One gallon of syrup of ipecac is made by taking 8¼ troy ounces of ipecac, coarsely bruised, acetic acid, ½ fluid ounce, and ⅙ alcohol, 20½ fluid ounces, mixing these and macerating with occasional stirring for three or four days, then decanting 21 fluid ounces; macerating the residue again with 21 fluid ounces of ⅛ alcohol, decanting after three days; pouring 20½ fluid ounces more of the menstruum upon the residue, decanting after three days, mixing the several decantates and filtering, through starch if necessary. Upon 98 troy ounces of granulated sugar then pour 56 fluid ounces of the filtrate, shake the mixture frequently during three or four hours and decant the syrup from the undissolved sugar. On the residue pour the remainder of the filtrate, shake until all the sugar has dissolved, mix the solution with the first decantate and strain through muslin.

Rhubarb.—Rhubarb cannot always be practically treated by percolation. By remaceration, however, it is most easily extracted. The normal of rhubarb in ½ alcohol is very high, being 2·083, its *s a* is 2·7 and *s l* 19·68. One gallon of the tincture is prepared by macerating 12¾ troy ounces of rhubarb, in small fragments, free from dust, and 2 troy ounces and 1 drachm of cardamom, in coarse powder, in 70 fluid ounces of ½ alcohol for three or four days, decanting 43 fluid ounces; macerating the residue again with 43 fluid ounces of the menstruum for three days, decanting 43 fluid ounces; pouring 42 fluid ounces more of menstruum on the residue, decanting 42 fluid ounces after three days, mixing and filtering. The accuracy of this method of extraction was verified in the case of rhubarb, more than twenty experiments having shown that the yield of extract on evaporation accords closely with the calculation.

Owing to the high *n* of rhubarb with ⅛ alcohol, this being 2·57, it is impossible to obtain a sufficient concentration in the decantates by the ordinary method to answer for the preparation of the simple syrup of rhubarb. But by a modification which the writer terms double remaceration it is very convenient, by a slight augmentation of loss, to obtain an extraction of the requisite strength.

The following is the formula for two gallons of syrup of rhubarb made without heat:—On 14 troy ounces of rhubarb, in small pieces free from dust, pour 91 fluid ounces of ⅛ alcohol and macerate for four days, then decant 55 fluid ounces, and on the residue pour 55 fluid ounces more of the mixture; after three days again decant 55 fluid ounces, and on the residue pour 54 fluid ounces of the menstruum, decanting this after three days. Then on 13 troy ounces more of rhubarb pour 77 fluid ounces of the first two decantates and macerate for four days; then decant 44 fluid ounces, and on the residue pour 43 fluid ounces of the second and third decantates; after three days' maceration decant 43 fluid ounces, and on the residue pour the remaining 43 fluid ounces of the third decantate, decanting this after three days. Mix all the last decantates, amounting to 130 fluid ounces, and set the mixture aside for repose, and then decant the clear liquid from the dregs and filter the remainder. On 192 troy ounces of granulated sugar pour 114 fluid ounces of the liquid, and shake the mixture frequently during five or six hours, then pour the syrup from the undissolved sugar and dissolve this in the remaining liquid; mix the two solutions, strain through muslin, add half a fluid ounce of ammonia water and mix.

Aromatic syrup of rhubarb is prepared as follows:—Take of rhubarb in small pieces 2¾ troy ounces, cloves in coarse powder, ½ troy ounce, cinnamon in coarse powder, ½ troy ounce, nutmeg in coarse powder, 2 drachms, ⅛ alcohol, 38 fluid ounces. Macerate the solids in the alcohol for three days and then decant 30 fluid ounces. On the residue pour 30 fluid ounces more of the alcohol, and after three days decant it again. Mix the two decantates, and after a sufficient repose pour 3 pints of the cleared liquid upon 78 troy ounces of granulated sugar; decant after five or six hours and on the sugar residue pour the remainder of the liquid. When all the sugar has been dissolved, mix the solutions, strain through muslin and add 1 fluid drachm of ammonia water.

This syrup may also be prepared by making an extraction of the unexhausted marc remaining after the preparation of the simple syrup. By using the press more than a sufficiency of liquid may be obtained for the purpose. But it is far more convenient to pour 61 fluid ounces of ⅛ alcohol upon the first residue, and decanting after three days, then pouring 31 fluid ounces of this decantate upon the second residue, decanting after three days, continuing the maceration with the remaining 30 fluid ounces, decanting again after three days, mixing, macerating the aromatics in this for several days, decanting and completing as above.

Squill.—Squill is another of those substances that cannot be properly treated by percolation. Ordinary maceration, in conjunction with the press, is also comparatively inefficient and very inconvenient. The *n* of squill is exceedingly high, being 2·53, and the subnormals low in proportion; but since squill is a very cheap drug, a larger proportionate waste is of no consequence, if the ratio of exhaustion can be accurately determined. One gallon of vinegar of squill is prepared as follows:—On 19 troy ounces of squill pour 19 fluid ounces of acetic acid and 72 fluid ounces of water; after a maceration of four or five days decant 43 fluid ounces, and on the residue pour 43 fluid ounces of water; after three days decant 43 fluid ounces, and on the residue pour 42 fluid ounces of water; decant this, mix the several decantates and filter.

In making the syrup from a fresh vinegar of squill a voluminous, unsightly precipitate of pectous matter is always thrown out by the sugar. This precipitate does not occur when using a vinegar less recent, owing to action of the acetic acid in transforming the pectin. This syrup is readily prepared by using granulated sugar without heat, as described in the processes for the syrups of rhubarb, noted above.

The method of remaceration will probably also apply to the preparation of compound syrup of squill, by using the menstruum in such increased volume as to admit of a concentration requiring the least amount of evaporation consistent with the smallest possible waste of drug.

Vanilla.—Vanilla cannot be properly extracted by percolation. Remaceration, however, effects this most admirably and conveniently. With ½ alcohol the *n* of vanilla is about ·75, and in a tincture containing 1 troy ounce in 8 fluid ounces the *s a* is 4·55 and *s l* 94·5. To prepare one half gallon of this tincture 8 troy ounces and 40 grains of vanilla cut very obliquely into thin slices is macerated with 28 fluid ounces of ½ alcohol for four days. Twenty-two fluid ounces is then decanted and 21 fluid ounces of the alcohol is again poured on the residue; after three days this is decanted and 21 fluid ounces of the menstruum is once more poured on the residue; after three days this is decanted. The three decantates are then mixed and filtered after a sufficient repose.

There are numerous other cases in which the method of remaceration can be very advantageously employed, but it is thought that the above enumerated are among the most important.

ANALYSIS OF ERIODICTYON CALIFORNICUM.*

BY CHARLES MOHR.

Eriodictyon Californicum is receiving attention for its action in lung diseases and bronchial affections. What is its therapeutical value, and to what is its activity due? Make a chemical examination of it.

In reply to this query it was found necessary to subject the plant to the regular course of analysis followed in the separation of the organic constituents of plants.

Ten grams of the air-dried herb, of good quality, successively exhausted by pure ether, alcohol of 95 per cent., and distilled water, yielded the following results:—

1. The ethereal percolate, evaporated spontaneously and finally by application of gentle heat, was mixed with water. A copious precipitate of resinous matter occurred; the supernatant aqueous liquid, after having been freed from suspended resin, was of a very pale straw colour, slight taste and faint acid reaction.

A. *Examination of Resinous Precipitate.*—By treating with boiling alcohol of 70 per cent. for an hour, and subsequent maceration at a low temperature for twenty-four hours, filtering and washing the undissolved portion with alcohol of 70 per cent., and digesting the concentrated filtrates with animal charcoal, evaporating and exsiccating over sulphuric acid, a brittle resin was separated having a yellow-greenish colour, slight acid reaction, aromatic, acrid slightly bitter taste, faint odour, and fusing at about the temperature of boiling water. The portion left undissolved by alcohol of 70 per cent. was treated with hot alcohol of 95 per cent., as long as this dissolved any of the material.

A greyish soft and tenacious substance was left, not volatile, on stronger heating fusing and burning with a smoky flame, destitute of taste and odour, insoluble in alcohol, partially soluble in petroleum naphtha, ether and benzole, readily soluble in chloroform and in a mixture of carbon disulphide and absolute alcohol, which facts prove its identity with caoutchouc. From the hot alcoholic solution, on cooling, a soft waxy substance separated, forming a pellicle; this substance, freed from adhering resin by continued washing with cold alcohol, possesses a greenish-white colour proven to be a vegetable wax. The quantity obtained was too small to permit a closer study of its properties. The remaining alcoholic liquid was of a dark green colour, possessing no peculiar taste or odour, and was completely decolorized by animal charcoal, and could not be regarded as a resin proper but as inert colouring matter.

B. *Examination of the Aqueous Liquid.*—No crystallizable substance was obtained, and on application of the proper tests no indication of an alkaloid or nitrogenous compound was obtained. The acid found present in small quantity proved to be a tannic acid precipitated by ferric chloride, almost black in colour.

2. The alcoholic percolate was evaporated to a small bulk and mixed with water.

The insoluble resinous portion obtained consisted entirely of colouring matter, its alcoholic solution being without taste or odour, was entirely decolorized by animal charcoal.

A portion of the aqueous liquid, after being entirely freed from resinous colouring matter, was concentrated by slow evaporation and left on ice for several days. It yielded no crystals, and the application of alkaloid tests led to no results. To be firmly convinced on this point a portion of the liquid was digested with oxide of lead to remove tannic acid, the filtrate evaporated to dryness and extracted with hot alcohol of 95 per cent.; the solution on spontaneous evaporation left no residue. Another part of the same liquid was examined for organic acids; a tannic acid was found, which precipitated ferric salts green.

To separate the organic acids lead acetate in solution was added until further addition produced no precipitate; filtered; the filtrate was treated with ammonium hydrate to a still feeble acid reaction, and on addition of acetate of lead no turbidity was produced, thus showing all organic acids present were obtained in the lead precipitate, which is absolutely insoluble in boiling water.

The lead precipitate was dissolved in acetic acid, reprecipitated by ammonia, carefully washed and, whilst still moist, mixed with absolute alcohol and decomposed by means of sulphuretted hydrogen, filtered, and the filtrate evaporated to dryness, at a low temperature; the tannic acid was obtained as an amorphous brittle substance, of a clear yellowish-brown colour, having an astringent acidulous taste. It was perfectly soluble in alcohol, yielding a turbid solution in water, which on addition of solution of the alkalies turned to deep reddish-brown colour, and became perfectly clear.

Ferric chloride gives a green precipitate, turning to a dirty grey on standing; it is dissolved by ammonia, yielding a solution of a dingy purple colour, and is decolorized by oxalic acid.

Sulphate of cinchonia gives a copious white precipitate.

Plumbic acetate yields a golden yellow precipitate, not dissolved by potassic hydrate.

Plumbic subacetate yields a dingy-yellow precipitate, soluble in potassic hydrate.

Tartar emetic, no precipitate.

Glue, no precipitate.

Hydric sulphate dissolves it with a deep crimson, somewhat purplish colour.

Argentic nitrate—on heating the metal is partly reduced in the specular form.

Diluted hydric sulphate, when added to either alcoholic or aqueous solutions, shows a peculiar behaviour by rendering the solution at first milky white, and on short standing, a viscous brownish mass separates. Fehling's solution then added, copper is reduced.

This decomposition, effected by diluted sulphuric acid, takes place very rapidly at ordinary temperature, and this fact and the general behaviour to other reagents proves it to be a glucoside of the tannic acid series, of decided peculiarities, closely allied if not identical with that found by the writer existing in *Pycnanthemum linifolium* and perhaps to exist in *Ballota vulgaris* and *Leonurus cardiaca* (Rochleder).

To obtain the acid in sufficient quantity, so as to be able to study its properties more closely, and particularly to satisfy myself that it is not associated with any other solid organic or volatile acids, such as benzoic or cinnamic acid, a fresh quantity of dried herb was extracted by alcohol of 75 per cent. The alcoholic extract, freed from resin by addition of water, was treated with plumbic

* Read at the twenty-seventh annual meeting of the American Pharmaceutical Association.

acetate, the precipitate dissolved in acetic acid, reprecipitated by ammonia, decomposed by sulphuretted hydrogen under absolute alcohol. The acid as obtained, tightly enclosed between two well-fitting watch-glasses, was exposed to a temperature of 220° to 240° C. for some time. As no sublimation took place, the absence of all solid volatile acids of the aromatic series was proven.

3. *Treatment of the Herb with Water.*—The aqueous percolate of the herb previously exhausted by ether and alcohol successively was of a brown colour, showed acid reaction, and possessed an astringent bitterish taste. The examination was conducted the same as in the case with the liquid under No. 2; the same tannic acid was alone found. A portion of the percolate concentrated by evaporation gave on addition of absolute alcohol, a copious precipitate readily soluble in water, and proved to be gum associated with a brown inert matter; sugar in small quantities was detected. No alkaloids or nitrogenous body could be detected.

Ten pounds of the leaves subjected to distillation with water yielded a distillate containing very small quantities of a volatile oil, adhering to the sides of the receiver and forming a very thin layer upon its surface, too minute to allow of a separation and subsequent nearer investigation. It imparts to the distilled water an aromatic odour and taste but slightly resembling that of the dried plant. Tested immediately after distillation, it was found entirely neutral towards test papers, and not the slightest reaction was obtained with any of the alkaloid tests, so that it may be safely asserted that the plant does not contain any volatile alkaloid.

By these results it was ascertained that *Eriodictyon californicum* contains—

Volatile oil in small quantities, not further examined.	
Moisture	12·50
Matter extracted by ether	14·98
(Consisting of a bitter, acrid, brittle resin, 8 per cent.; inert green colouring matter, caoutchouc, wax in small quantity, tannic acid in small quantity.)	
Matter extracted by alcohol	10·79
(Consisting of inert resinous matter decolorized by animal charcoal, a peculiar glucoside of the tannic acid series predominating in the mass.)	
Matter extracted by water	18·42
(Consisting of same tannic acid above mentioned, gum, brown extractive inert substance, trace of sugar.)	
Wood fibre and ash	43·31
	100·00

From the above analytical results it is evident that the therapeutical value of the plant rests solely upon its stimulating and astringent effects upon the mucous membrane of the respiratory apparatus, especially the bronchial tubes, due to the action of the brittle acrid resin exciting secretion and promoting expectoration, the astringent tannic acid imparting tone and solidity to the membranes in a state of relaxation. How far in this respect the drug will prove to be equal or superior to the numerous remedies of like therapeutic effect, and how far its reputation amongst the people of the country where yerba santa is found indigenous is sustained when employed by the profession, must be decided by the practitioner.

In this locality the fluid extract of the herb has been used by some physicians quite extensively. A medical friend who has used it on the strength of its repute, and given it what he considers a fair and searching trial in lung and bronchial affections, did not find his expectations realized, and has since dropped the use of it, as possessing no advantages over the remedies to which he heretofore had recourse.

The results of my experience show that a menstruum of alcohol of 70 to 75 per cent. yields the best preparation.

LIP-SALVE.*

Spermaceti	40 parts
Lard, perfectly pure and fresh	80 „
White Wax	20 „
Oil of Sweet Almonds	5 to 10 „

according to the season of the year, are melted together, the mixture coloured with a sufficient quantity of alkanet, by digesting the root with the melted mass, and the latter then suitably perfumed, for instance, with

Oil Bergamot	2 parts
Oil Orange	3 „

The mass is then poured out into moulds. It is customary to pour it into tin-tubes, from which it is removed when cold, and then covered with tin foil.

Cold Cream (Crême celeste).

1. Spermaceti	30 parts
White Wax	24 „
Oil of Sweet Almonds	168 „

are melted together at a gentle heat, the melted mass poured into a warmed porcelain or wedgewood mortar, stirred until it begins to solidify, and then intimately mixed with

Rosewater	70 parts.

After stirring until cold, there may be added, for every 10 ounces of the mixture,

Oil of Rose	2 drops
Oil of Bitter Almonds	3-4 „

This cream is white. The following formula yields a cheaper, slightly yellow, but still very good product:

2. White Wax	166 parts
Olive Oil, finest	500 „
Rosewater	100 „
Oil of Bergamot	15 „
Oil of Bitter Almonds	q.s.

To be prepared as the preceding.

Glycerin-Cream (Crême de Glycerine).

Spermaceti	60 parts
White Wax	30 „
Oil of Sweet Almonds	250 „
Rosewater	10 „
Glycerin	20 „

To be prepared like cold cream, and to be perfumed with oil of rose and oil of bitter almonds.

Almond Cream (Crême d'Amandes).

Lard, perfectly pure and fresh	220 parts
Solution of Potassa, containing 26 per cent. of caustic potash	120 „
Alcohol, 60 per cent.	10 „
Oil of Bitter Almonds	q.s.

Triturate, in a porcelain or wedgewood mortar, the lard and potassa solution, and let it stand a few hours. Then add the alcohol and sufficient oil of bitter almonds to give it the proper flavour. Finally triturate until the mass is uniform, and resembles mother-of-pearl.

This cream has a handsome look, but is not so bland as the first-mentioned varieties.

CEMENT WHICH RESISTS ACIDS.*

Melt together carefully 1 part of caoutchouc (India-rubber) with 2 parts of linseed oil, and gradually incorporate with it 3 parts of white bole, so as to form a plastic mass.

This cement is not at all attacked by hydrochloric, and but very little by nitric acid. When heated it softens but very little. It does not easily dry upon the surface. If this cement is mixed with $\frac{1}{2}$ of its weight of litharge, or minium, it dries up in the course of time, and becomes hard. This is known as "Benicke's Cement."

* From *New Remedies.*

The Pharmaceutical Journal.

SATURDAY, DECEMBER 27, 1879.

ANOTHER "CREAM OF TARTAR" PROSECUTION.

A CASE was heard before the magistrates at Fareham last Tuesday which may not improbably be of service in moderating the officious zeal of public analysts in instigating prosecutions under the Sale of Food and Drugs Act upon frivolous or insufficient grounds, and by illustrating the vexatious hardship to which tradesmen can be subjected by such ill-advised and unwarrantable proceedings as we have already too often had occasion to comment upon.

It appears that the question what is "cream of tartar" had presented itself to the mind of one of the officers of the Hants Constabulary as being one that was of importance as regards the interests of the public, and thereupon he instructed one of his subordinates to go to the shop of Mr. W. O. SMITH, of Titchfield, and purchase a quarter of a pound of this article. After the purchase was completed Mr. SMITH was informed that the sample was intended for analysis, and the usual offer was made to give him a portion of it under seal to be retained in his possession. Mr. SMITH very wisely accepted this offer, and the sample was thereupon divided into three portions, each being sealed in his presence. One of these samples was forwarded to the county analyst for examination, and the results, as stated on his certificate, showed that it contained 9·26 of tartrate of lime and 0·29 of sulphate of baryta.

This statement of the results of analysis appears to have inspired the officer of the Hants Constabulary with dismay, as indicating that the article sold by Mr. SMITH as "cream of tartar" was not really commercial bitartrate of potash, but a preparation of lime that was not of the nature, substance and quality of the article asked for. Thereupon Mr. SMITH received an undeniable invitation to appear before the county magistrates and answer for the offence he was supposed to have committed. He, unconscious of being guilty of any infringement of the Food and Drugs Act, at once communicated with the wholesale house from which he purchased his "cream of tartar," stating what had happened and asking what he was to do for his defence.

In order to determine first what was the composition of the "cream of tartar" he had sold, the sealed sample was submitted to analysis, the result showing that it contained upwards of 92 per cent. of bitartrate of potash, 6·95 per cent. of dry tartrate of lime, and 0·30 per cent. of insoluble material consisting of sulphate of baryta. These results sufficiently established the good character of the article sold and showed that it was a good sample of "cream of tartar." The amount of tartrate of lime in it was far from being the maximum amount of that ingredient there may be and necessarily always is present in "cream of tartar," as incidental to its preparation, and the amount of insoluble impurity present in the form of sulphate of baryta was so small that the idea of its having been put into the "cream of tartar" to that extent for fraudulent purposes could not be entertained. This view was consistent with the well-established reputation of the wholesale firm from which Mr. SMITH purchased the "cream of tartar," and it was consistent with his own declared practice of always purchasing the best drugs obtainable in the market.

Upon the basis of these facts the President of the Pharmaceutical Society instructed Mr. FLUX to attend at the hearing of the case, as the Solicitor of the Society, in order to take such steps as might be desirable for protecting the interests of the trade in a general way. The evidence given for the defence consisted mainly of a statement of the facts above indicated, together with an explanation that tartrate of lime being a constituent of grape juice, it naturally formed part of the material known as "argol" or "tartar" deposited during fermentation in making wine, and that this tartrate of lime being to some extent soluble in a solution of bitartrate of potash it inevitably became also a constituent of the "cream of tartar" prepared in the usual way from argol or tartar; showing, in short, that no offence had been committed by the sale of the article in question.

Upon this evidence the magistrates unanimously decided to dismiss the case, and the counsel acting for Mr. SMITH then applied to be allowed costs, inasmuch as the prosecution had been instituted on frivolous and insufficient grounds, and because the damage thus done to the reputation of a dealer in drugs by such proceedings was calculated to be of serious injury to him. This application was supported in the same spirit by Mr. FLUX, on behalf of the Pharmaceutical Society, and it was acceded to by the magistrates. By this recognition of the wrongful nature of the prosecution an important point has been gained, and it seems desirable that further action should now be taken with a view to rendering public analysts' certificates subject to some competent scrutiny, before they can be made use of as grounds for prosecutions and causing needless personal vexation, as well as interference with legitimate trade. We purpose next week giving a full report of the case.

PHARMACOPŒIA REVISION IN GERMANY.

THE revision of so important a work as the Pharmacopœa Germanica, which has to be appealed to by the pharmacists of one of the most important of European nations, and not unfrequently by many British pharmacists, would necessarily always present some points of interest to the readers of this Journal; but more peculiarly is this the case when the revision of the British Pharmacopœia and the position of the British pharmacist in regard to it has so recently formed a prominent topic of discussion in the Council of Pharmaceutical Society. We shall, therefore, take the opportunity of culling a few details from a report just published by the Pharmacopœia Committee of the German Association of Pharmacists.

The first Pharmacopœia of the German empire was issued in 1872, so that it had been in use six years when the German Association, during its meeting in Coblentz last year, appointed a Committee to consider propositions made for its improvement. The nomination was left to the executive of the Society, and after some difficulties had been overcome, a strong committee was formed, the professorial element being represented by Dr. Flückiger, the commercial and manufacturing by Messrs. Schering and Trommsdorff, whilst eleven apothecaries represented pharmacy. Of this committee Dr. Brunnengraber was chosen President and Dr. Wilms Vice-President.

Meanwhile, the Imperial Chancellary had invited the different governments to obtain, from those interested, information as to the deficiencies which during use might have become manifest in the Pharmacopœa Germanica, and as to any enrichment of the materia medica that experience showed to be desirable. Several members of the Pharmacopœia Committee were already engaged in the solving of this problem, while as yet no invitation to report had been sent by the Government to the German Association of Pharmacists. It appeared desirable, therefore, to the Committee to ascertain whether a participation by it in the work of revising the Pharmacopœia could be obtained, and if this question were answered in the affirmative, to settle in what way and manner the Committee could help in solving the problem raised.

For the consideration of both these points a meeting of the Committee was arranged to be held in Berlin last April, and at the commencement of the meeting the President was able to announce to his colleagues that a report of their work when completed would be welcomed by the Imperial Sanitary Department. The Committee was therefore in a position to proceed at once to the consideration of the second question. As a result it was arranged that Herr Biltz should send some work already published by him, as a report to the Sanitary Department. Herr Hirsch had also been requested to prepare a report, and had so far advanced with the work that it was ready to put into the printers' hands. It was decided, therefore, to print this as well, and when the other members of the Committee were in possession of copies they should be invited each to draw up a report, taking the work of Messrs. Biltz and Hirsch as a basis. In this way it was hoped that the useless repetition of the same work might be avoided and a better result obtained. In order to secure uniformity in the different articles a series of general principles upon which it was agreed that the German Pharmacopœia should be constructed were formulated. At the General Meeting of the German Association in Hanover, in September last, these general principles were brought forward and agreed to, but unfortunately the meeting was unable to occupy itself with the consideration of the second portion of the work, which has now been issued in the printed form. It is proposed to refer to some of the recommendations contained in this Report in a future article.

Transactions of the Pharmaceutical Society.

GENERAL MEETING—BENEVOLENT FUND.

ELECTION OF ANNUITANTS.

A General Meeting of the Members, Associates in Business, and Associates of the Pharmaceutical Society, and of the Subscribers and Donors to the Benevolent Fund, was held at the house of the Society, 17, Bloomsbury Square, on Friday, December 19, at 12 o'clock, for the Election of Three Annuitants.

Mr. G. W. Sandford, President, in the chair.

The notice convening the meeting was read.

Scrutineers were appointed, who examined the voting papers and brought up the following report:—

Scrutineers' Report.

We, the undersigned Scrutineers, appointed at the Fifteenth Election of Annuitants on the Benevolent Fund of the Pharmaceutical Society of Great Britain, do hereby certify that we have examined the voting papers committed to us, and report the following result:—

Barker, John	2057
Bowen, Margaret Sophia	664
Dutton, Sarah Ann	1137
Gason, Elizabeth Jane	3335
Hollinworth, Charles Foster	2738
Kennett, Louisa	1581
Watkins, Louisa	1492
Woods, Elizabeth	2672
Yates, Willam Lee	2964

3397 voting papers were received, of which number 56 were informal (44 unsigned) and were disallowed.

J. Robbins, Chairman.
Matthew Pound.
Edward L. Cleaver.
T. Edward Greenish.
Charles J. Mead.
Charles E. Turner.
E. N. Butt.
Walter Hills.

December 19, 1879.

The Chairman declared the following three duly elected Annuitants:—

Gason, Elizabeth Jane.
Hollinworth, Charles Foster.
Yates, William Lee.

A vote of thanks was given to the Scrutineers fo their long and arduous duties.

A vote of thanks was also given to the Chairman.

EXAMINATIONS IN EDINBURGH.

December 17 *and* 18, 1879.

Present—Messrs. Ainslie, Borland, Gilmour, Kemp, Kinninmont, Stephenson and Young.

Professor Maclagan was present on the 18th on behalf of the Privy Council.

MAJOR EXAMINATION.

17*th.—One* candidate was examined, but failed to pass.

MINOR EXAMINATION.

17*th.—Nine* candidates were examined. *One* failed. The following *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Bremner, James ....Aberdeen.
Carruthers, Robert ....Dumfries.
Couper, Frederick Thomas ......Edinburgh.
Ellis, John William ....Abergele.
Fidler, Thomas William ....Workington.
Hogg, Andrew ....Liverpool.
Laing, James ....Brechin.
Lubbock, John William ....London.

18*th.—Six* candidates were examined. *Three* failed. The following *three* passed, and were declared qualified to be registered as Chemists and Druggists:—

Moon, George William ....Malton.
Raffan, John.........................Portsoy.
Wright, George.....................Nairn.

MODIFIED EXAMINATION.

18*th.—Two* candidates were examined, but failed to pass.

Provincial Transactions.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The usual monthly meeting of this Association was held at Britannia Chambers on December 16, when there was a good attendance of members and associates. The chair was occupied by the Vice-President, Mr. Frank White, who, after the election of new members and transaction of some other preliminary business, called on Mr. Major, B.A., B.Sc., F.R.G.S. to give his promised lecture on "Earthquakes and Volcanoes."

The lecturer commenced by referring to the destruction of Herculaneum and Pompeii, just 1800 years ago, by an eruption of Vesuvius. He then went on to speak of Iceland and its volcanoes, saying that the entire island, which is as large as Ireland, was caused by volcanic eruptions. He afterwards referred to the belt of volcanoes which nearly surround the Pacific Ocean, pointing out that volcanoes are always situated near the sea. He then went on to speak of earthquakes, saying they really were unsuccessful volcanoes. When the hidden forces in the earth can find a vent they cause volcanoes, and when they are suppressed and cannot get out they cause earthquakes. He particularly referred to the great earthquake of Lisbon, when 60,000 persons perished, and concluded a most interesting lecture by pointing out the traces of volcanic eruptions which existed in all the mountains of the world.

The lecture was listened to with great attention and loudly applauded at the close.

After a few questions had been answered by the lecturer, the Chairman proposed a hearty vote of thanks to him, which was seconded by Mr. R. Jackson, and carried unanimously.

Mr. Major suitably responded, and the meeting was concluded.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on December 18, Mr. Warren De La Rue, President, in the chair.

A ballot for the election of Fellows was held. Dr. Messell and Mr. Neison being appointed scrutators. The following gentlemen were declared duly elected:—G. S. Allbright, J. R. Ashwell, T. Blackhouse, E. Buckney, J. Bemrose, W. J. F. Churchouse, M. Cochrane, E. J. Day, W. R. Dunstan, E. Francis, F. Hatton, J. Howard, J. J. Hummel, R. E. Holloway, W. R. Eaton-Hodgkinson, T. S. Humpidge, E. Hughes, R. Jones, J. Knowles, A. Leibius, H. F. Morley, E. F. Mondy, H. Newton, J. Parette, J. W. Smith, J. Steiner, J. Snodgrass, A. Scott, G. Stallard, J. M. Wilson. The following certificates were read for the first time:—W. Macnab, W. B. Roberts, G. Salet, T. Terrell.

The Secretary then read a paper—

On the Specific Volume of Water of Crystallization. By T. E. Thorpe and J. J. Watts.—Some years ago Playfair and Joule pointed out that the volumes of certain highly hydrated salts, as for example, sodium carbonate with 10 molecules of water, also the alkaline arsenates and phosphates with 12 molecules, are equal to that of the water considered as ice which they respectively contain. Thus the molecules of the salt seem to exist in the interstitial spaces of the ice. This law does not hold good for salts less highly hydrated; thus in borax, sodium pyrophosphate, and the normal aluminium sulphate the volume seems to be made up of the water considered as ice, together with that of the base as existing in the free state. Schiff has shown that members of certain classes of hydrated salts have the same specific volume. Thus all the alums have a specific volume of 277; double sulphates, $M_2M''(SO_4)_2$, 207, and the vitriols $M''SO_47H_2O$, 146. The authors have determined the precise relation between the specific volumes of various sulphates of copper, magnesium, zinc, nickel, cobalt, iron and manganese, and their respective degrees of hydration. They have incorporated in the present paper some results placed at their disposal by Dr. Playfair. Details of the preparation and analysis of the various hydrates employed are given. The specific gravity was determined by weighing in benzene at 15° C. The results are contained in the following table.—

Hydrates	0	1	2	3	4	5	6	7
$CuSO_4$	44·4	54·3	67·0	80·0	—	109·1	—	—
$MgSO_4$	44·8	55·6	67·0	—	—	112·4	130·8	146·8
$ZnSO_4$	45·6	54·7	66·6	—	—	113·7	130·2	146·8
$NiSO_4$	44·6	56·5	—	—	—	—	129·0	144·6
$CoSO_4$	44·7	55·2	70·9	—	97·4	114·6	130·1	146·0
$MnSO_4$	45·0	55·7	73·6	86·6	98·2	114·4	—	—
$FeSO_4$	44·5	56·2	67·7	—	100·5	—	—	146·7
Means	44·8	55·5	68·8	83·3	98·7	112·9	130·0	146·2

From these results it appears that in the case, at least, of the so-called magnesian sulphates, the volume occupied by the several molecules of water varies with the degree of hydration. The first molecule, the "constitutional water" of Graham, occupies less bulk than any other; its mean relative value is 10·7; the value of the second is 13·3; of the third, 14·5; of the fourth, 15·4; of the fifth (taking the mean of the most concordant numbers, $ZnSO_4$, $CoSO_4$, and $MnSO_4$) 15·6; of the sixth, 15·7; of the seventh, 16·2. These results accord with the fact that the different molecules of water in a hydrated salt are held with various degrees of tenacity, as shown by the different intensities of heat needed to expel them, the amount of energy required standing in some relation to the degree of condensation in the combined molecule. The authors point out the importance of estimating the amounts of heat resulting from the combination of successive molecules of water with the different sulphates. Graham has already shown that more heat was evolved in the combination of the first molecule than in that of any of the remaining molecules, in other words, that the amount of heat developed is related to the degree of condensation of the combined molecules. As the foregoing numbers express the volumes in cubic centimetres of the equivalent of the salts in grammes, it appears that equivalent quantities of these different sulphates occupy respectively the same volume in space, or in other words the unit volume contains the same number of molecules of the different salts.

Professor McLeod then read—

A Note on the Formation of Ozone during the Slow Oxidation of Phosphorus.—The active substance formed during the slow oxidation of phosphorus is probably either ozone or peroxide of hydrogen; the latter substance is readily destroyed by alkalies, a solution of chromic acid, or a solution of alkaline permanganate, whilst ozone is unaffected either by a solution of sodic carbonate, or by chromic acid, and appears to be only slightly attacked by alkaline permanganate. Air in which phosphorus was slowly oxidizing was drawn through a U tube, 9½ inches long (filled with fragments of glass containing in succession sodic carbonate, saturated with carbonic anhydride, a mixture of potassic dichromate and sulphuric acid, and potassic permanganate, previously saturated with carbonic anhydride), and then into a flask containing a solution of potassic iodide and starch; in all cases the latter solution became blue, both when the U tube was cold and when heated to 100°. Similar results were obtained when a U tube 12½ inches long was used, packed with small pieces of pumice, saturated with solution of sodic carbonate. The effect of heat on the gas was tried. The gas was aspirated through a narrow U tube, which was heated to 150° and 200°, beyond this U tube were placed first a weighed U tube, packed with pumice and sulphuric acid, and secondly, a flask with solution of potassic iodide and starch, acidified with sulphuric acid. The U tube was weighed before and after each experiment, and the blue solution titrated with decinormal sodic thiosulphate. The gas was aspirated at the rate of 1 litre per hour, the following results were obtained.

Gas aspirated.	T. of U tube.	Increase of sulphuric acid tube.	Thiosulphate used.
4600 cc.	cold	0·0026 grm.	2·55 cc.
2760 cc.	100°	0·0008 grm.	1·9 cc.
4600 cc.	150°	0·0026 grm.	3·2 cc.
2760 cc.	200°	0.0006 grm.	1·8 cc.

1 cc. of thiosulphate = 0·017 grm. of hydroxyl, which on decomposition forms 0·009 grm of water, and as at least one half of the hydroxyl might be assumed to be decomposed, an increase of the sulphuric acid tube in the last experiment should be 0·016 grm. instead of only 0·0006. Hydroxyl combines with acids, the gas from phosphorus was exposed to the action of strong sulphuric acid for four days without loosing its activity. It is extremely improbable that ozone and hydroxyl are both formed, as these substances destroy each other. The author therefore concludes that the gas obtained during the slow oxidation of phosphorus possesses the properties of ozone and not those of hydroxyl, the only known peroxide of hydrogen.

Mr. Kingzett had listened to the paper with great interest. Up to the present time no evidence had been put on record to prove that this gas from phosphorus contained ozone, and as he had shown that certain hydrocarbons which had been supposed to produce ozone really formed hydroxyl, he had assumed, in the absence of any evidence, that hydroxyl was formed in this case. After referring to the researches of Cornu, Mr. Kingzett said that he could confirm the observation of Professor McLeod that peroxide of hydrogen and ozone in the presence of an acid did not decompose each other.

After some remarks from the President,

Professor McLeod briefly replied.

Mr. W. H. Perkin then read a paper—

On the Analysis of Organic Bodies containing Nitrogen.—Some years since he wished to determine the halogens as well as the carbon and hydrogen in bodies containing nitrogen. The substance was burnt in oxygen, and the products of combustion passed over a weighed quantity of pure metallic silver. The difficulty arose as to how to get rid of the nitrous fumes. Plumbic peroxide was first tried between the water absorbing apparatus and potash bulbs. This succeeded as far as the carbon was concerned; but as nitrous fumes were absorbed by the sulphuric acid the hydrogen determinations were too high. Plumbic peroxide was then placed in the combustion tube; but great difficulty was experienced in heating it to just the proper temperature. Potassic chromate was then tried, and was found to succeed admirably. It absorbed the nitrous fumes completely, had no action on carbonic anhydride, and could be heated without fear. The author therefore recommends the use of about four to seven inches of potassic chromate in the combustion of all substances containing nitrogen, instead of freshly reduced copper, which is very hygroscopic, and occludes hydrogen, or of silver, which requires an inconveniently high temperature. The potassic chromate should be free from an excess of alkali; a trace of bichromate is not harmful, though bichromate does not work so well as chromate. The chromate should be roughly powdered or granulated by evaporating its solution to dryness with constant stirring, or still better, coarsely powdered pumice, saturated with solution of chromate, may be used. The chromate should be kept at a scarcely dull red heat. The author does not state how many times the chromate can be used. Chromate also absorbs sulphurous acid. It does not retain iodine vapour, but would be probably useful with substances containing chlorine or bromine.

After a few remarks from Mr. Warington, the Society adjourned to January 15.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The last meeting of the Association for the year took place on Wednesday evening, December 17, at 32A, George Street, Hanover Square, when Mr. Davidson read an interesting paper on "Coal." The author began by stating that his remarks would be classified under the heads of origin, formation, varieties, products of distillation, distribution and statistics. He then enlarged upon the geology of coal, calling attention to the great lapse of time since and prior to its formation, and stated that the conditions for the construction of coal were not now present. He then noticed the vegetable origin and differences between peat, lignite, cannel coal, and anthracite, illustrating his remarks by specimens kindly lent by the Pharmaceutical Society.

In the discussion which followed (Messrs. Branson, Jones, Miller, Parkinson, Picard, Piper, Wallis and Wren taking part) it was pointed out that the air was probably more loaded with CO_2 than it is at present and that the plants during the carboniferous period were of very quick growth.

After a vote of thanks had been proposed by Mr. Piper, seconded by Mr. Snow and carried, the meeting terminated.

The next will take place on January 1, 1880.

BRITISH ASSOCIATION.

Buffon.*

BY PROFESSOR ST. GEORGE MIVART, F.R.S., SEC.L.S., V.P.Z.S.

In responding to the honour which the authorities of the British Association have conferred in nominating me to fill this chair, I have deemed it best not to occupy your very valuable time with any matter of detail at which I may happen to have worked, but rather to offer to you a few remarks on questions which seem to me to have a general biological interest.

Last year my esteemed friend, Professor Flower, called your attention to the great name of Linnæus. I propose this year to refer to Linnæus's illustrious contemporary, Buffon—not, however, in the character of a rival of Linnæus. Each was a man of genius, each did good

* Presidential Address to the Biological Section of the British Association, Sheffield, August, 1879.

work in his own way—work still bringing forth fruit. It must be admitted, however, that they were men of a very different stamp, and if it is necessary to express a relative judgment with respect to them, I should myself feel inclined to say that Buffon's mind had the greater aptitude for sagacious speculation, with an inferior power of acquiring and arranging a knowledge of facts of structure.

Various circumstances have concurred to favour our recollection of the merits of the great Swede, and to obscure those of the French naturalist. The well-earned fame of Linnæus is kept ever fresh in our memories by the necessarily frequent references to him in matters of nomenclature. On the other hand, not only are Buffon's claims on our esteem in no similar way brought before us, but those very speculative opinions of his, which are a merit in our eyes, have gained him disfavour with our immediate predecessors, whose opinions and sentiments we more or less inherit.

No one, however, can dispute Buffon's title to our great respect on account of the very powerful effect his writings had in stimulating men's love of nature, an effect which I think is not sufficiently appreciated.

It is fitting that I should call attention to his (once generally recognized) claims in this respect; since my own love of natural history is probably due to the circumstance that his great work was always accessible to me in my childhood, and was one of the earliest books with the pictures of which I was familiar.

Buffon was indeed Linnæus's contemporary, for the same year (1707) saw the births of both. In 1733, he was elected a member of the Academy of Sciences, and six years later was appointed superintendent of the *Jardin du Roi*,* which was the occasion of that work to which he is indebted for his fame, and to perfect which he displayed so much zeal in collecting specimens and in obtaining information respecting the various kinds of animals with which he became acquainted. His *Histoire Naturelle générale et particulière* began to appear in 1749, and in 1767 was published the fifteenth volume, which closed his history of mammals. Herein are contained those numerous anatomical illustrations (due, with their accompanying descriptions, to Daubenton) which have been again and again copied down to the present time. Next came nine volumes on birds, then his history of minerals, and finally, seven supplementary volumes, the last of which appeared in 1789, the year after his death. His life was thus prolonged ten years beyond that of his illustrious contemporary, Linnæus.

Buffon can claim no merit as a classifier. With the exception of the Apes of the old and new worlds (which respectively fill the fourteenth and fifteenth volumes of his work), the beasts treated of are hardly arranged on any system, beyond that of beginning with the best known and most familiar—a system necessarily applicable to but a few forms.

But Buffon deliberately rejected the Linnæan classification—a grave error, certainly, yet one not altogether without excuse. Indeed, some of the objections he brought against that classification have considerable force. Such were his objections to the association of the hippopotamus, the shrew-mouse, and the horse in one order, and of the monkey and the manis in another.† What indeed could be more preposterous than the separation of the bat, *Noctilio leporinus*, from the other bats, and its association with the rodents, on the ground of its having (as supposed) only two incisor teeth above and two below?—an anomaly of arrangement of which you were reminded last year. It scarcely seems possible for the pedantry of classification to go further than this. Yet, perhaps, the association in one group of the walrus, the elephant, the ant-eater, the sloth, and the manatee, was hardly less unphilosophical. Moreover, zoologists should not forget, in blaming Buffon for his want of appreciation of the classification of Linnæus, that one great portion of that classification—the classification of plants—has been superseded by us. Had he lived to witness the publication of Jussieu's *Genera Plantarum*,* it might have given him a truer insight into biological classification, and have led him to endeavour to improve on Linnæus' system instead of only criticizing it.

* The Jardin du Roi was first instituted by Louis XIII. in 1628, and definitively established in 1635. It cannot be affirmed that Buffon enriched the incipient museum—the *Cabinet du Roi*—so much as might have been expected; although the skeletons which served for Daubenton's descriptions were, at least in many instances, preserved. It is to Geoffroy St.-Hilaire that the magnificent museum of the Jardin des Plantes, which now exists, is most indebted.

† 'Hist. Nat.,' tome i., p. 39.

But it is Buffon's speculative views which have most interest for us. Those views exercised a very wide-spread influence in their day, though the time was not ripe for them. Indeed, it is far from improbable that writers whose speculations have been made public at a more propitious season, owe much to their comparatively forgotten predecessor.

Amongst Buffon's various speculations we might glance at his *Théorie de la terre* (put forth in the very first volume of his work), and at his *Epoques de la Nature*, which fills the fifth volume of his supplement. We might consider his speculations concerning the formation of mountain and valley by water, and the evidence that there was present to the ear of his imagination:—

> "The sound of streams, which, swift or slow,
> Tear down Æolian hills and sow
> The dust of continents to be."

That he saw, in thought, the projection of the planets from the sun's mass; the primitive fluidity of the earth, and the secular refrigeration of the sun. Such considerations, however, are foreign to this Section. I will therefore select two which are of biological interest.

In the first place I may refer to Buffon's speculations concerning ANIMAL VARIATION. In this matter Isidore Geoffroy St.-Hilaire has affirmed that Buffon stands to the doctrine of animal variability in a position analogous to that in which Linnæus stands to the doctrine of the fixity of species.

Buffon, in his chapter on the animals of the Old and New World, remarks,† "It is not impossible that the whole‡ of the New World's animals are derived from the same source as those of the old, whence they have descended. . . . . Nature is in a state of perpetual flux." In his chapter on the Degeneration of Animals,§ he sums up saying, "After comparing all the animals, and arranging them each in their own group, we shall find that the two hundred kinds described here may be reduced to a small number of original forms, whence it may be all the rest have issued."

As to the modes and causes of the origin of new forms, he entertained four connected opinions:—

(1). He attributed much modifying efficacy to migrations;

(2). Also to the direct action of external conditions;

(3). He believed largely in the origin of new forms by degradation; and

(4). He regarded each animal as the manifestation of an individuating force, lying, as it were, at the root of the changes manifested by it.

The view that MIGRATION (with isolation) is a necessary antecedent to the origin of new species is one which has been advocated by a modern naturalist, Moritz

* This appeared in 1789.

† *Op. cit.*, vol. ix., p. 127.

‡ He thought that the American jaguars, ocelots, etc., and even the peccary, were positive degradations of Old World forms. He thought that the llama, the American apes, agoutis, and ant-eaters might be examples of such forms; but the opossum, sloths and tapirs he took to be original species. (See vol. xiv., pp. 272, 273.)

§ Vol. xiv., p. 358.

Wagner,* who does not hesitate to affirm† that the formation of a really new species "will only succeed when a few individuals, having crossed the barriers of their station, are able to separate themselves for a long time from the old stock."

In support of his view the author brings forward a multitude of interesting facts, one of the most significant of which appears to me to be the following. It concerns beetles of Tropical America of the genus *Tetracha.* In Venezuela, and in the western part of Central America, he tells us, rivers flow partly through savannahs, where they have undermined the light tufaceous soil, forming deep beds with high precipitous banks. According to Professor Wagner, individual beetles from the highlands have thus been isolated, and in no longer time than has been required by the rivers to undermine the loose soil of the savannah, have given rise to a distinct species markedly different in form and colour. It is to similar causes—migration and complete isolation—that he traces the formation of distinct races of men: a formation he deems no longer possible, while the wide diffusion of mankind renders more and more difficult the evolution of new species of animals of any kind.

Instances which appear to support this view will readily suggest themselves to the naturalist—instances, that is, of forms which are both peculiar in structure and remote and isolated as to their habitat.‡ Thus, for example, even in the group which structurally most resembles us, we have the orang confined to very limited tracts in Borneo and Sumatra, and the gorilla to a small portion of Western Africa. The proboscis monkey is found nowhere but in Borneo, while the singular ape named "Roxellana" (from its wonderfully "tip-tilted" nose) is confined to the lofty and isolated mountains of Monpin in Thibet. The very peculiar black ape (*Cynopithecus*) is limited to Celebes and Batchian, while the baboon, which has the baboon character of muzzle most developed, was found at the extreme south of the African continent.

Again, if we take the group of lemur-like animals (*Lemuroidea*) as having had their home and starting-point in or near their present head-quarters—Madagascar—then some of the most aberrant forms are those which must have migrated farthest. The character which is perhaps the most peculiar of any which the group presents, is the elongation of two of the ankle bones, as we find it in the Madagascar genus, *Cheirogaleus.* But this character is more exaggerated in migrants to Africa—the Galagos—and most so of all in the more isolated emigrant, the tarsier, now found in Celebes and Borneo.

The sub-family of slow-lemurs (*Nycticebinæ*) would, on this view, seem to have migrated in opposite directions, as we find the slender slow-lemur (*Loris*) in Madras, Malabar, and Ceylon; the typical slow-lemur (*Nycticebus*) in South China, Borneo and Java; the potto (*Perodicticus*) in Sierra Leone, and the angwantibo (*Arctocebus*) in Old Calabar. Of these, it is the African forms which have the index-finger most atrophied—a tendency to its atrophy existing in the whole sub-family.

It would, of course, be very easy to multiply instances of the kind; but it would be also easy to cite a number of cases which appear to conflict with the view in question. Thus familiar to us as it is, few animals are more peculiar in structure than the common mole, which gives no present evidence of isolated origin; and the most aberrant of all bats, the vampire (*Desmodus*), is rather widely distributed in South America. Again, with regard to the lemur group, the most absolutely exceptional is the aye-aye (*Cheiromys*), which, on the hypothesis supposed, has remained persistently at the head-quarters of the group, *i.e.*, in Madagascar.

Even, however, if no exception existed to the coexistence now of singularity of form and isolation and remoteness of situation, we could not safely draw any decided conclusion from such facts, because fossil remains show us that forms which have now a very limited distribution were either widely spread in earlier times, or existed in regions very remote from those they now inhabit. Thus, in Eocene times there existed in Europe true opossums (now confined to America), tapirs, and a form like the African potto before mentioned. In Miocene times we had in Europe long-armed apes (creatures now found only in Eastern Asia), with the now exclusively African secretary bird and Cape ant-eater (*Orycteropus*). In the same period the orang—or a nearly allied form—seems to have ranged over India. What are more emphatically old-world forms than the camel, horse and elephant, with the typical porcupine? Yet all these existed in America in Pliocene times. Did we know the tapir in only one of the two widely-separated stations in which it dwells to-day, we might well deem its evolution to be due to migration and isolation. But we know from palæontology that it existed in Europe from the Eocene to the Pliocene period.

Such facts as these do not, of course, disprove the doctrine that migration and isolation are necessary antecedent conditions to specific genesis, but they show how much caution must be used in drawing the conclusion that they are necessary, from the distribution of animals much less likely to be found fossil than mammals are.

But an argument in favour of the views of Buffon and of Wagner may be obtained from our own species, which exhibits some singular coincidences between peculiarity of form and isolation. Among such instances may be mentioned the Tasmanians, the Andaman Islanders, and the Aïnos or Aborigines of Japan. One of the most striking examples is that of the Eskimo—a people representing many peculiarities, some of which exaggerate the characters of the highest races of mankind. Thus, the pelvis differs from the European pelvis in an opposite direction to that by which the Negro pelvis differs from the European, and the same is the case with the proportions of the limbs, while the skulls of the Eskimo have the largest and narrowest nasal aperture of all races, being in this respect the very opposite to the Australians. The Eskimo have migrated eastwards, not reaching the south of Greenland till the fourteenth century, and the race characters are most marked in the most easterly tribes. These facts were brought forward by Professor Flower in his Hunterian lectures for the present year,* when he said that the characters of this peculiar race "must be attributed to those gradual modifications produced by causes at present little understood, by which most of the striking variations met with in the human species have been brought about—modifications more strongly expressed the more completely isolated the race has become, and the farther removed from its original centre of distribution." I think, then, that though we have not data for conclusively answering the question as to how far migration (together with isolation) may be necessary for specific genesis, it is certain that it is of very great efficacy and importance, and that credit is

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* In a paper read before the Royal Academy of Sciences at Munich, on March 2, 1868. This has been translated by Mr. James L. Laird, and published by Edward Stanford in 1873.

† *Op. cit.*, p. 29.

‡ Isolation, it ought to be remembered, may take place as the result not only of changes in inorganic nature (such as the formation of islands, and the excavation of river beds), but also by the presence of enemies in intermediate tracts, by the circumstance that the food of the species is found only in certain restricted localities, and by whatever other causes determine the extinction of a species in a given place.

* The lecturer also said: "The large size of the brain of all the hyperborean races, Lapps as well as Eskimo, seems not necessarily to be connected with intellectual development, but may have some other explanation not at present apparent." I would suggest that in this case—as in the large brains of Cetaceans—it may be due to the need in their climate of generating much heat to sustain the necessary temperature of the body.

justly due to Buffon for his early appreciation of its importance.

The next question to which I would advert is that concerning THE DIRECT ACTION UPON ORGANISMS, OF THE EXTERNAL CONDITIONS WHICH SURROUND THEM.

Buffon's belief was* that changes of specific form were brought about by change of temperature and climatic change generally, as well as by change of food.

The curious effects of stimulating food on colour—as of cayenne pepper with canaries, and hemp-seed with parrots—is notorious. The direct action of the environment on organisms has, I think, been of late somewhat undervalued. Amongst evidences in favour of its importance, I would refer to some of Mr. Alfred Wallace's observations.† He tells us that in the small island of Amboina, the butterflies (twelve species, of nine different genera) are larger than those of any of the more considerable islands about it, and that this is an effect plainly due to some local influence. In Celebes, a whole series of butterflies are not only of a larger size, but have the same peculiar form of wing. The Duke of York's island seems, he tells us, to have a tendency to make birds and insects white, or at least pale, and the Philippines to develop metallic colours, while the Moluccas and New Guinea seem to favour blackness and redness in parrots and pigeons. Species of butterflies which in India are provided with a tail to the wing, begin to lose that appendage in the islands, and retain no trace of it on the borders of the Pacific. The Æneas group of Papilios never have tails in the equatorial region of the Amazon Valley, but gradually acquire tails, in many cases, as they range towards the northern and southern tropics. Mr. Gould says that birds are more highly coloured under a clear atmosphere than in islands or on coasts—a condition which also seems to affect insects, while it is notorious that many shore plants have fleshy leaves. I need but refer to the English oysters mentioned by Costa, which, when transported to the Mediterranean, grew rapidily like the true Mediterranean oyster, and to the twenty different kinds of American trees, said by Meehan to differ in the *same manner* from their nearest European allies, as well as to the dogs, cats, and rabbits which have been proved to undergo modifications directly induced by climatic change.

It appears then that much may be said in favour of that direct effect of surrounding circumstances on Organisms in which Buffon believed.

Lastly, I would refer to Buffon's belief that new species have arisen by DEGRADATION. This again is an opinion which, after a period of disfavour, or at least of neglect, has been of late revived, and has acquired considerable influence. I may here refer to Anton Dohrn, who has recently advocated the very widely spread and effective action of degradation as a cause of specific change. It will, I think, be generally admitted that such exceptional Copepod crustaceans as *Trachelíastes* and *Lerneocera* are due to degradation, and the probability seems to me very strong that the Rhizocephala, at least many cirripeds, and the certoid worms, are also degraded organisms. Very interesting would it be to know whether existing Ascidians are also examples of degradation, as not a few zoologists now suppose; but most interesting of all is that parasite of cuttle fishes, *Dicyema*, the structure of which has been recently investigated by Professor Edward Van Beneden, and made the type of a new primary division of animals. Should this small worm-like organism hereafter turn out to be a degraded form, it will show what an extreme degree of retrograde metamorphosis may occasionally be brought about. I think then that we have considerable ground for suspecting that degradation has acted much and widely in the field of Biology, and if so, Buffon is fairly entitled to a certain amount of esteem on account of the views he entertained with regard to it in so early a day and in so undeveloped a condition of zoological science. For it must not be forgotten that migration, the influence of external conditions, and degradation, are connected points: parts of one view. Degradation is most conspicuous under violent changes of condition (such as parasitism), while migration only acts by bringing organisms under new conditions.

* *Op. cit.*, vol. xiv., p. 317.

† See 'Tropical Nature,' pp. 254-259.

These reflections lead me to urge upon such of my hearers as may have any unusual facilities for experimental investigation, a course of inquiry which seems to be very desirable.

What is needed in order to solve as far as possible the question of specific genesis, is a knowledge of the laws of variation, which must, I think, be deemed the true cause and origin of species.

We may, I think, accept as true two propositions:

(1). Animals may change in various ways, and amongst them, by degradation.

(2). Changes in the environment with isolation induce and favour changes in form.

I would urge then that inquiries should be pursued in two directions simultaneously.

(A). There might be undertaken one set of inquiries to investigate the effects on different species of the same variations of environment.

(B). Other inquiries might be undertaken with a view to ascertaining the effects of different changes of environment on one and the same species. By series of experiments contrived with these ends in view, and carried on with various selected animals and plants which reproduce with rapidity, we may possibly be able to determine what to attribute to external influences (shown by such influences having the same effects on all), and what to the peculiar nature and innate powers and tendencies of different organisms—shown by the diverging reactions of the latter under the same changes in their environment.

(*To be continued.*)

Parliamentary and Law Proceedings.

An Inquest at Devonport.

The Coroner for Devonport, Mr. J. Vaughan, held an inquest at the Rose and Crown Inn, public house, Pembroke Street, on Thursday afternoon, to investigate the circumstances under which a child, $2\frac{1}{2}$ years old, named Llewellen Frederick George Warren, had come to his death.

The Coroner, at the opening of the inquiry, explained that it had been rendered necessary in consequence of the medical man, who was not called in until the child was dying, refusing to give the requisite legal certificate of death.

The mother of the deceased child was then called, and she stated that the deceased was taken ill on the previous Monday week. Mr. Lamble gave her a bottle of medicine for the child, and told her to put its feet in warm water and salt and mustard, as, if it was a case of measles, that would bring them out. He also told her that if the deceased got worse she had better send for a medical man. She did as she was directed, but on the following Friday the child got worse, not having taken anything nourishing from the time she went to the chemist, except a little brandy and milk, and the next day (Saturday) it became so seriously ill that she then sent for Mr. Horton, surgeon. This was in the evening, but Mr. Horton was not home. She sent again at half-past seven, and he was still absent, but the person she sent was told he would return in ten minutes. When he again went to Mr. Horton's house, however, ten minutes afterwards, he was told that Mr. Horton was in bed. The person who came to the door said Mr. Horton was in bed, and that if he came "he would want his fee," and her husband said "his fee was there." Mr. Horton did not come that night, and she sent again for him between nine and ten o'clock on Sunday morning, and between twelve and one o'clock, in the dinner time, he visited her child, whom he pronounced very ill. It had had the measles very badly. They came out two days after she went to the chemist, and Mr. Horton now said that the child had inflammation of the lungs after measles. He sent it a bottle of medicine and ordered a mustard poultice to its chest. Mr. Horton called again the next day, at three o'clock in the afternoon, but the child was then dead.

The Coroner said the witness ought certainly to have called in a medical man before she did.

Mr. Horton said the witness was entirely wrong as to the time at which she sent for him, because he was in his surgery on the Saturday evening until half-past eight o'clock.

Edward Stacey (asked by the Coroner what time he went for the surgeon on Saturday): Said that from nine o'clock until eleven o'clock he went three times. First a few minutes past nine o'clock, and saw a man who said the doctor was not in, and who put his message down on a slate. He went again just after ten, and was again told that Mr. Horton was not in. At five minutes to eleven he went again, and was then told that Mr. Horton was in but was in bed. He told them the child was dying, and that the surgeon was wanted to come at once.

A Juror: What answer did you get to that?

Witness: The lady who came to the door said that if the doctor did come now he would charge double fee. I said "This is no place to ask about that here—for double fees," and the lady never said anything, but went away.

Mr. Horton: Did you say anything about going for another surgeon?

Witness: Yes.

Mr. Horton was afterwards sworn, and stated that at a few minutes past eight o'clock on Saturday evening he went from home to attend two cases of confinement. He returned about eleven o'clock, and inasmuch as he was suffering from bronchitis and sore throat himself and was particularly tired, having been on his feet all day, he determined to go to bed at once. As he was going upstairs his servant told him that Warren had sent twice, and that he was expecting the messenger there again in about twenty minutes, and he (Mr. Horton) told the servant to tell the person who called that he was gone to bed, and that they must get somebody else. He then went straight to bed, and shortly afterwards Mrs. Horton came to him and told him that Warren had sent again. He accordingly sent down to say that he was very unwell, and that he did not wish to go out again before the morning, but would come then if that would do, but if he did come his fee would be half-a-guinea, to be paid that night. He made those conditions intentionally—he put the charge as a prohibitory fee, because he had been so often called out when there was no danger, and because he did not wish, being ill himself, to go out again.

The Coroner: You did not do it for the sake of the money?

Mr. Horton: Certainly not; I didn't want to go, and I put a prohibitory fee on the case thinking they would decline my services and go elsewhere. Mrs. Horton afterwards brought me up a message that the friend of the father said they would go elsewhere, and I was very glad of it, and went to sleep. Just as I was finishing breakfast, however, the next morning, I had another message from the Warrens to come and see the child, and I sent back word that I would come as soon as I could. Immediately afterwards, however, I had a peremptory message to attend a pressing case of confinement. I went to this case first, and finding that I was not wanted immediately, came straight back to Warren's house. I found the child very ill with congestion of the lungs after measles, and I told the mother that it could not live, and that I could do nothing for it. The next day, not having heard from the mother in the meantime, I called again on going my rounds, and then found the child dead.

The Coroner: You have heard it said that when the child was first taken ill the mother took it to Mr. Lamble, chemist, who prescribed for it, and told the mother that if it grew worse she had better have a medical gentleman at once; do you find any fault with that?

Mr. Horton: I don't find any fault at all. I didn't see what medicine it had. I should like to have seen it in order to have satisfied my own mind.

The Coroner: Mr. Lamble said it was for measles.

Mr. Horton: I don't recognize his right to say so. Measles are a most difficult thing to carry through, even if in a mild sort of way.

The Coroner: But Mr. Lamble said if it grew worse the mother had better have a medical man.

Mr. Horton: Then he was so far right, but he was not right in giving medicine.

The Coroner: He did no more than any respectable chemist would have done, I suppose?

Mr. Horton: That is it; they do it, and they waste time.

The Coroner: Then you simply find fault with Mr. Lamble for prescribing as other chemists prescribe?

Mr. Horton: I don't find fault, but I do think valuable time was thrown away whilst the chemist was prescribing for it.

The Coroner then summed up, and in doing so said that there appeared to be a feud in the town between the medical men and the chemists, who were both a very useful class of men, and who both discharged very proper and important functions. There was no doubt that poor people, who could not well afford to pay a doctor, often took their children to a chemist, in whom they had perfect confidence, instead of going to a regularly licensed practitioner, and there was not a chemist in the town who would refuse to prescribe for them; but this did not appear to give satisfaction to the medical profession, who were naturally jealous of the rights of that profession. In the present case, Mr. Lamble evidently did not intend that the mother should go until Saturday evening without seeking medical help. The mother, however, seemed to have considered that the condition of the child was due to the natural incidence of measles, and went on hoping for a change until medical skill was too late to save its life. No aspersion had been cast upon Mr. Lamble in the matter, and as regarded Mr. Horton, he seemed to have understood from the witness Stacey that he would go elsewhere for medical aid.

The jury returned a verdict of "Death from natural causes."—*Devonport and Stonehouse Gazette.*

Alleged Acceleration of Death by a Soothing Powder.

An inquest was held at Devonport, on Friday, the 19th inst., by the Coroner, Mr J. Vaughan, to investigate the circumstances under which a child named Abraham Hill had come to its death. It appeared that the deceased's parents were in the town on a visit to their friends. On the previous day the child was unwell and the mother gave it a Steedman's powder. There was nothing unusual in her treating the child in this way. She had often done so before, and the powders had apparently invariably had a salutary effect on the child. The child was one year and seven months old, and had an inordinately large head, and its mother had fancied that it had water on the brain; and it also transpired that the mother had had two other children die in a similar manner—namely, in convulsions—though at a much younger age. The child had been a healthy one comparatively speaking, though its mother had many times given it Steedman's powders. The child became very relaxed the night prior to its death, and was more or less relaxed throughout the next day and up to the time of its death. It vomited, and was seized with convulsions, which continued to affect it at intervals up to the time of its death. Mr. Horton, surgeon, ordered the child to be put in a bath, but before this could be done it died. By the direction of the coroner, Mr. Horton made a *post mortem* examination of the body, from which he said he concluded that the child, having previously suffered from water on the brain, and having been much purged and weakened by the entire absence of food in the system, was particularly amenable to the influence of a narcotic, and he thought the convulsions spoken of might have been caused by the drug administered, which he judged contained a certain proportion of opium. From an analysis of one of these soothing powders recently made it was found to contain a certain proportion of narcotic. These powders were never prescribed by medical men. They were a proprietary medicine of which large quantities were sold. He was of opinion that the deceased child had died from the effects of a narcotic administered to it in some form.

The Coroner said the jury would have to specially consider whether the child died from a narcotic, and whether it was administered in the Steedman's powder.

In reply to questions from the jury, Mr. Horton said he could not say whether the powder administered contained opium or not. If it was a soothing powder and did not do so, the powder was simply a fraud in itself, because soothing powders must contain a narcotic. The jury ultimately found a verdict that the child died from natural causes, accelerated by a narcotic given with the best intentions and without the slightest blame to anyone.

Suicide of a Plympton Tradesman.

Mr. John Eastcott, grocer and patent medicine dealer, Fore Street, Ridgway, has committed suicide by taking strychnine. The deceased, who was only twenty-seven years old, had lately given way to intemperate habits. On Friday afternoon, December 12, about three o'clock, he went to bed, and rose about eight o'clock on Saturday morning and opened his shop. He served a customer, and then remarked that he would go upstairs as he was not feeling well. His wife heard groans proceeding from one of the bedrooms, and on asking her husband what was the matter he replied that he had taken a drop of strychnine on a lump of sugar, and that he had poisoned himself because he was ashamed to look people in the face in consequence of having been seen drunk. Medical assistance was immediately obtained, but death ensued about half-past nine o'clock. An inquest was held by Mr. Rodd, county coroner, in the evening, when the jury returned a verdict of "Temporary insanity."—*Western Morning News*.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[380].

℞ Sod. Salicyl.	. . . . . .	grs. 800.
Quin. Sulph.	. . . . . .	grs. 200.
Acid. Sulph. Dil.	. . . .	q.s. ut solv.
Sp. Æth. Nit..	. . . . . .	♏ 100.
Glycerin. Opt..	. . . . .	℥j.
Aq. Fl. Aurant.	. . . .	ad ℥x.

M.

The above is a copy of a prescription brought me to dispense. Would some of your readers please give me the best mode of dispensing the same?

R. W. H.

Notes and Queries.

[645]. EVANESCENT INK.—Can any reader kindly give me a recipe for making the above ink?

A. J. Hurn.

[646]. COD LIVER OIL JELLY.—A reliable formula for cod liver oil jelly is required, the one given in the 'Year-Book of Pharmacy' has not been found workable. It is cod liver oil, 85 parts, sugar, 8 parts, water, 4 parts, isinglass, 3 parts. It succeeded once by some modification, which has been forgotten, and cannot be hit on again.

"Nos."

[647]. BOISRAGON PILLS.—Will any obliging correspondent state the ingredients in "Boisragon Pills?" I understand they are in use about Suffolk."

St. Rule.

LIQUID GLUE.—The following yields a good product, provided the proper kind of glue is employed:—

500 parts of the best, white, transparent glue are broken into small pieces, covered with 670 parts of distilled water, and allowed to stand until the pieces have become soft, and nearly all the water has been absorbed. Any pieces which may from time to time project beyond the surface of the water are to be pushed under. The mass is now melted on a water- or steam-bath, and 75 to 83 parts of commercial nitric acid, specific gravity 1380, are added very slowly, and with constant stirring. Of course, the glue solution must be contained in a vessel which is not attacked by the acid.

When using a weaker acid than that above mentioned, it may happen that the mixture gelatinizes on cooling. In this case, the mass is to be remelted, and more acid to be added. But it is better to wait a few days before doing this, as the glue sometimes liquefies of its own accord. Too much acid makes the glue too thin, and destroys its adhesive properties.

Another formula yielding a very good product is this: Take of best white glue, or better, of best French transparent gelatine, 8 parts. Cut it fine, cover it with distilled water, and soak it until soft; then pour off any excess of water. Melt it on a water-bath, and add to it 1 part of glacial acetic acid. When thoroughly mixed, bottle it.—*New Remedies*.

BOOKS, PAMPHLETS, ETC., RECEIVED.

Pharmacographia: a History of the Principal Drugs of Vegetable Origin met with in Great Britain and British India. By Friedrich A. Flückiger, Ph.D., and Daniel Hanbury, F.R.S. Second Edition. London: Macmillan and Co. 1879.

Year-Book of Pharmacy for 1879 with the Transactions of the British Pharmaceutical Conference at the Sixteenth Annual Meeting, held in Sheffield. London: J. and A. Churchill. 1879.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Sunday Trading.

Sir,—I am pleased to see the subject of Sunday trading being ventilated in the Journal, and in the hopes that it may lead to some practical alteration of what is at present a thing greatly to be deplored, I am induced to offer a few remarks upon the subject.

That a chemist and druggist is bound, to a certain extent, to trade on Sunday, is one of the peculiarities of his particular branch of commerce. Illness, like time and tide, waits for no man; and it is, therefore, a public necessity that when disease in any form makes itself apparent, that the victim should be able to obtain the requisite remedies, successfully to wage battle against his enemy. But, that it is necessary for anyone to purchase pennyworths of hair oil, half ounces of lozenges, small-tooth combs or tooth brushes, on the Sabbath day, no reasonable man would admit; nevertheless, by opening his shop, by removing one or two shutters, placing the door open wide and by lighting the gas inside and outside, the chemist offers the necessary inducement for the public to purchase these necessary articles which could have as easily been obtained the day previous and would have undoubtedly been so procured had the public been aware of the impossibility of obtaining them on Sundays.

The public do not wish nor expect their butcher, baker, or draper to open his establishment on a Sunday to serve them with meat, bread, yards of ribbon or halfpennyworths of tape; and neither do they wish nor expect the chemist to do so either.

The public require educating into the new state of affairs, and the best way of doing it is by politely refusing to sell anything but *bonâ fide* medicaments required for a specific purpose for use at once. At first, doubtless this plan would meet with some opposition, people have been for so long accustomed to demand anything from a chemist, and at any time, that they have begun to look upon what is but a favour as a right, and I have often been told that we are by law compelled to open on Sunday.

My establishment is situated in a main thoroughfare of the S.W district, and on the confines of two parishes, one very poor, the other one of the richest in the whole metropolis; on either side there are chemists' shops, both within a stone's throw, who open on Sundays, and, save taking down all their shutters, court public patronage for anything which caprice may dictate as on week days. This shop for the past twelve years has been entirely closed all day on Sunday; anything of a necessitous description can always be obtained by ringing the bell, while all other demands are politely refused. Regular patrons knowing these rules do not ask for such things, while casual callers never take umbrage at what their own sense of justice commends as correct. The one great stumbling block to the removal of a great deal of the present amount of Sabbath trading is the low standpoint from which most proprietors view this subject, that of £ *s. d.*

Brown opens; Jones because of his neighbour's delinquency excuses himself, and does likewise, for fear that Brown should net a few stray fish to his (Jones's) detriment. Till this difficulty is removed and the financial is made subservient to the moral and physical, I am afraid that Sunday trading as at present conducted will remain. The few shillings taken on Sunday by openly asking for patronage is poor compensation for the mental and bodily strength expended to obtain them.

Let the chemist stand upon his own rights and, while the willing servant of the public, resolutely but politely decline to be the slave of a captious few who think they are legally entitled to have all their demands satisfied at any time. Chemists as a rule are a class of men who bear a great deal for the sake of their cloth and the moral obligations which it imposes upon them, but one of these is not, that they should keep open shop, when their brother tradesmen are enjoying their "day of rest" after six days' labour.

London, S.W. "SPES."

Sir,—A good deal has been written of late upon the above subject. Will you allow me to add a few words?

I was very pleased with the remarks of "Volo," in a recent issue and would that his plan were universally adopted.

I took a business in this town twenty-three years since, it had then been established twenty-seven years. To my great regret I found it had been the custom to sell on Sunday anything and everything that a country druggist's shop contains; this unnecessary and unchristianlike traffic I determined to discontinue and placing a card inside the window of the shop door, whereon was written, "Medicines only sold on Sunday," I soon found my customers for hair oil, capers, etc., etc., on that day, diminish considerably and in the course of a year or so it became a rarity for me to be asked for anything of the kind on the first day of the week. I have kept to this plan up to the present time, and intend doing so as long as I am in business; should anyone be curious to know how my "returns" were affected by so doing, I can assure them they have considerably increased.

With regard to late closing I consider twelve hours a day quite long enough to be behind the counter. I have never had an assistant or apprentice, yet am thankful to say I have been blessed with good health, and although I am now fifty-three years of age and have brought up a large family I can take a walk of from thirty to forty miles in a day with little inconvenience. Of course I have not neglected the "rules of health:" on rising I have a cold bath, excepting in very severe weather, when I take it with just the chill off. I open shop at 8 o'clock, and as there is from two to six hours' daylight during the greater part of the year, before this time, I get out and enjoy it (many and many a good dish of trout have I brought home before breakfast, that have fallen to my rod). If this plan were more generally adopted, I feel sure the health of members of our trade would be considerably benefited.

When I was an assistant I arranged to have half a day (from 1.30 till 11) once a week, instead of going out at night after closing shop; this was a great boon to me and I believe such an arrangement, where it can be made, will be found beneficial alike to employer and employed.

WILTSHIRE.

P.S.—For the last eight or ten years we have closed our shops here at 4 p.m., one day in the week.

Sir,—After six years' experience as assistant and a like period as principal, I am very fully convinced that in provincial towns (not having had a lengthened city experience I will not venture to speak in reference to that), the whole question lies in this, "Is the principal so penurious as to wish to enslave himself or assistant on the day of rest in order to help his week-day trade?" Absolutely necessity for Sunday trading is almost infinitesimal, to prove which I will state the following facts:—I happen to have the oldest established business in this town, in a central position, to which is attached a good family business and a fair share of poor customers. It is my custom to be absent, otherwise occupied, every Sunday during the following hours, 9.0 to 12.30, 1.30 to 4.0, 6.0 to 9.0. No assistant is in the house, though it is rarely left for domestic reason, and it is seldom that any customer applies during my absence, and I scarcely ever remember having heard a complaint that any hardship has resulted through my inattention. The fact is, people know pretty well when they can find me if they have real wants; and, I might say, it is no use their applying for anything else—they would not get it, and they apply at the time when they know (though we have no light in the shop), I shall be found there. We average about two customers per Sabbath the year round. Facts, sir, are stubborn things.

60, Market Place, Hull. J. CHAS. STOREY.

W. M. MacNaughton.—The preparation is a proprietary one, the formula of which has not been published in this country. It has been alleged, however, to consist mainly of the électuaire lénitif of the Codex.

J. A. H.—The following recipe for a cement for joining leather is given in the new edition of Cooley:—Gutta percha, 4 parts; caoutchouc, 1 part (both cut small); bisulphide of carbon, 8 parts: mix in a close vessel and dissolve by the heat of a water-bath. To be gently warmed before using.

"*Quæro.*"—(1) The chloral hydrate and camphor should be triturated together until they liquefy. See, on the dispensing of chloral hydrate and camphor, vol. viii., pp. 319, 339, 398 and 406. (2) You would do rightly in using the Pharmacopœia preparation.

"*Nemo.*"—See the recipe for tooth wash, before, p. 443.

F. C. Maggs.—Myrtle wax is obtained from two or three species of *Myrica* and is used for hardening candles, making "heel-ball," and by "medico-botanists," for ointments, etc. We believe that its value is less than that of ordinary wax.

A. C. and *T. W. L.*—The oleate of lead in the prescriptions sent is no doubt that referred to in a paper on the treatment of eczema, by Dr. Sawyer, which appeared in the *Practitioner* for November. It is there said to be "prepared by heating a mixture of oleic acid and oxide of lead."

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Plowman, Dispenser, Subscriber.

COTO BARK AND ITS CHIEF CONSTITUENTS.*

BY J. JOBST AND O. HESSE.

One of the authors, in the early part of the year 1873, obtained, through a London firm of importers, a specimen of stem bark from Bolivia, which was called "coto cinchona," although it had no resemblance to cinchona bark. About a year later Professor Wittstein obtained some of the same kind of bark from a Hamburgh firm, who informed him that the bark had been collected from the same districts as the cinchonas, in the interior of Bolivia, and that it was used internally, either in the form of powder or of an alcoholic extract, as a remedy in cases of diarrhœa and colic, and for neuralgia in the face. It had been also recommended in cases of rheumatism and gout.

According to Martens the bark is obtained from a cinchona; hence the name "coto cinchona." Wittstein believes that many of its properties belong rather to the *Rubiaceæ* than to the *Laurineæ* or *Terebinthinaceæ*.

The name coto bark, or coto-coto is met with in Brazil, and is there applied to bark obtained from a rubiaceous species, the *Palicurea densiflora*, Martius. But whether this plant produces their coto bark, or some bark allied to it, is unknown to the authors.

The first coto bark obtained by the authors, and which they term "genuine coto bark," to distinguish it from other kinds which have been lately met with in commerce, has been anatomically examined by C. Hartz,† with whose results the authors for the most part agree.

This bark consists of irregular, flat, and slightly curved pieces of about 0·6 m. long, and 60 mm. broad, by 8 to 14 mm. thick. It is of a reddish cinnamon colour, but somewhat darker on the inner side. As a rule it has the appearance as if the outer layer had been intentionally removed. It has a pleasant cinnamon smell at first, but soon has a pungent irritating action on the nostrils. The taste is pungent, but not bitter, expectorant, or astringent. It has a somewhat unequal texture, the outside forming a granular and tolerably even breaking mass, lying on a coarse fibrous and uneven breaking cellular portion of which the inside consists.

Hartz found that the membranes of all the cells, with the exception of the sclerenchymatous and liber cells, gave a blue reaction like pure cellulose with iodochloride of zinc, as well as with iodine and sulphuric acid. According to him they are all thin walled, and more or less contain a brown coloured substance which belongs to the class of phlobaphen and could be removed by ammonia or potash. The sclerenchymatous and liber cells are, on the contrary, of a gold yellow colour, and are not coloured, even after a month's immersion, by a solution of iodine or rosaniline, on being immediately after washed with glycerine. With the exception of plasma they contain no organized constituent. Their membranes are composed of many concentric porous layers which are very hard, and without previous treatment are not coloured by iodochloride of zinc, or by iodine and sulphuric acid.

The parenchyma cells of the external and internal bark contain a small quantity of tannin which must originally have existed in a soluble form. It occurs along with phlobaphen, and the more abundantly in those cells which are richer in this latter substance. Starch, in single or semi-granules, is present in small quantity in almost all the cells of the parenchyma, and the granules generally exist in greater number in the inner half of the cell. Hartz has also found in the same cell-formation entire cells frequently full of a colourless or slightly yellow-coloured mixture, from which, after extraction by and evaporation of the ether, was obtained a camphor-like smelling substance, crystallizing in prismatic needles.

From coto bark Wittstein* obtained (*a*) an ethereal oil of a pale yellow colour, lighter than water and possessing a biting aromatic taste; (*b*), a volatile alkaloid resembling trimethylamine; (*c*), a yellowish brown soft resin and a dark brown hard resin; also starch, gum, sugar, oxalic acid (as lime salt), tannic acid, formic, acetic and butyric acids.

Jobst has found in the bark a fine crystalline body, cotoïn,† and two other crystalline bodies, dicotoïn and piperonylic acid. The therapeutic action of the bark has been investigated by Dr. v. Gietl,‡ who prescribed the bark for diarrhœa, partly in the form of a powder, and partly as an alcoholic tincture. It was successful in fifteen cases out of sixteen in which it was employed. Direct experiment confirmed the supposition that this action was due to cotoïn.

Whilst these experiments were being made another kind of coto bark came into the market, having much outward resemblance to the bark above described. It was said to have been collected from the shores of the river Mapiri in Bolivia. This bark occurs in pieces of 0·7 m. long, by 40 to 76 mm. broad, and 12 to 18 mm. thick. The fracture and colour of the bark are similar to the "genuine" coto bark, but not unfrequently it has deep whitish furrows on its surface. In smell it is less pungent, somewhat resembling nutmegs, and it has a slightly pungent taste. In order to distinguish this bark it has been named *paracoto* bark, although it is frequently improperly called coto bark.

From the experiments of Dr. Burkart with an alcoholic tincture of paracoto bark it would appear that its therapeutic action is similar to, although somewhat less active than, coto bark. The chemical investigation of the bark now shows it to contain piperonylic acid like "genuine" coto bark, but it has also other constituents which differ from the constitution of Cotoïn and Dicotoïn, viz., paracotoïn, hydrocotoïn, dibenzolhydrocoton, leucotin, oxyleucotin, a volatile oil, a tolerable quantity of liquid resin, and a very small quantity of tannic acid. The tannic acid and resin were not further investigated. The authors have been unable to confirm the statement of Wittstein that the bark investigated by him contained a volatile alkaloid; they have examined large quantities of paracoto bark, but could not discover evidence of the existence of any volatile alkaloid. The therapeutic action of the bark is chiefly due to the paracotoïn.

Of the two kinds of bark, paracoto bark is more frequently to be met with, although there is no difference in their commercial designation. Therefore it is not surprising that some manufacturers have failed to obtain cotoïn. As a rule, the commercial preparation termed cotoïn consists of a mixture of crystalline products such as could be obtained from

* Abstract of a paper in *Liebig's 'Annalen,'* 199, 17—96.

† *Pharm. Journ.*, [3], vol. vi., p. 301.

* *Pharmaceutical Journal*, [3], vol. vi., p. 302.

† *Pharmaceutical Journal*, [3], vol. vi., p. 764.

‡ *Pharmaceutical Journal*, [3], vol. vi., p. 302.

paracoto bark by extraction with ether, etc. But as cotoïn and paracotoïn have a physiological action which is quantitatively different, this confusion has given rise to differences of opinion among medical men as to the action of this substance. The object of the present paper is to prevent the spreading of these erroneous views by describing the characteristic features of these bodies, so that they may be very easily distinguished.

(*To be continued.*)

ASPIDIUM MARGINALE, SWARTZ.*

BY GEORGE W. KENNEDY.

At the last meeting of the Pennsylvania Pharmaceutical Association, held in Reading, Mr. Charles H. Cressler, of Chambersburg, placed on exhibition a living plant of *Aspidium Marginale*, accompanied by specimens of the rhizome and stipes, the oleoresin prepared from the rhizome, and a tape worm expelled by its use. Mr. Cressler claims for it medicinal properties, similar to those of the European *Aspidium Filix Mas.* A partial analysis of the plant was made by Mr. J. L. Patterson, of Philadelphia (see *American Journal of Pharmacy*, 1875, p. 292). He obtained an oleoresin by percolation with ether, which he says will compare favourably in appearance with the best German article obtainable, and isolated filicic acid, and a resin, besides other principles of less medicinal importance.

Professor Maisch obtained a sample of the oleoresin, and gave it to a friend, who by its use was relieved of a tape worm, including the head.

It was suggested at our last meeting, and has been advocated since by the editor of the *American Journal of Pharmacy*, that pharmacists should submit the oleoresin of *Aspidium marginale* to physicians, and that the results obtained be duly recorded, the object being the determination of its true therapeutic effect, and if found efficient, its introduction into the next Pharmacopœia.

In compliance with a promise, the writer made some experiments with the rhizome, which he now proposes to state.

The plant grows abundantly in rich woods and on the hillsides in Schuylkill county, where the writer resides, and is most common in the northern portion of it. The fronds arise to the height of from nine to twenty inches, are from two to four inches in width, ovate, oblong in outline, evergreen, smooth, thickish, and almost coriaceous. The pinnæ are lanceolate, broadest near the base and deeply pinnatifid, the lobes oblong crenate, serrate, the lower ones nearly distinct. The sori or fruit dots are round, somewhat kidney-shaped, and are found close to the margin, from which character this species takes its name. The rhizome closely resembles that of *Aspidium Filix Mas.* The characteristic points for distinguishing the two drugs have been described in an article by Professor Maisch in the *American Journal of Pharmacy*, 1878, p. 292.

Autumn being considered the most favourable time for collecting the drug, the writer gathered a quantity of the fern in the latter part of last October, and separated the greenish portions of the subterraneous parts, consisting of the leaf-stalks and rhizome, which were weighed, and exposed to the air and sun until completely air dry. The loss in weight was 66·20 per cent., and the yield of air-dried material 33·80 per cent. A portion of this was exposed to 120° F., in a common oven, until it ceased to lose weight, the loss amounting to 12·25 per cent., making a total loss of 78·45 per cent., and a yield of the anhydrous article of 21·55 per cent.

The air-dried rhizome was reduced to powder sufficiently fine to pass through a sieve of forty meshes. It was moistened with ether, specific gravity 0·750, packed in a glass apparatus like a Kipp's gas generator, and ether poured upon it until completely exhausted. The ethereal solution thus obtained was of a reddish-brown colour, with a greenish tinge. It was transferred to a glass retort, and the retort placed in hot water, until at least 75 per cent. of the ether was recovered in a receiver kept chilled with ice. Pharmacists not having the facilities for evaporating by steam heat will find this a very convenient process for the recovery of ether, as no serious results can take place from flame. The liquid remaining in the retort was transferred to a shallow vessel or capsule exposed to the air, and evaporated spontaneously until nearly all the ether odour has passed away. Thus prepared, the oleoresin was thick, oily, of a brownish-green colour, opaque, decidedly acid to test paper, and of an acrid and nauseous taste.

In a short time precipitation of a resinous substance took place, and in a longer time filicic acid, in a granular form, was deposited on the bottom and sides of the bottle. The writer is of the opinion that the cause of this deposit is due principally to continuing the evaporation too far, because, as the ether disappears, the remaining alcohol generally found in ordinary ether is incapable of holding the oil, resin, etc., in solution. On the addition of a small quantity of chloroform or stronger ether, a beautiful dark reddish-brown solution is obtained. I would, therefore, suggest that in preparing the oleoresin, stronger ether be used.

Four fluid ounces of the oleoresin were prepared, and of this, three-fourths were given to four physicians, with the request that they would watch its action closely, and report the results at their earliest convenience. Only one physician has, thus far, had occasion to use the oleoresin, with which twelve feet, at one time, and ten feet, at another, in all twenty-two, feet of tapeworm were expelled. Since that time, the patient has not complained, and the doctor believes that the head was discharged. A friend, who has been annoyed with tænia for some time, has been treated with kameela (*Rottlera tinctoria*) and kooso (*Brayera anthelmintica*) with unsatisfactory results, discharging only small pieces of the worm. Since he has been using the oleoresin of *Aspidium Marginale*, a piece eight feet long was expelled at one time, and I hope that, with a continued use of the present treatment, a cure may be effected.

The oleoresin was administered in the following way: —One and a-half fluid drachms were placed in a two-ounce vial, half filled with granulated sugar, well shaken; filled with water, and again well shaken. The patient, after fasting about twenty-four hours, at 10 o'clock p.m., took one-third; at 11 o'clock p.m., one-third, and at 6 o'clock, next morning, the balance, which was followed, two hours afterwards, with a large dose of castor oil. The parasite, or a portion of it, was expelled in a few hours.

Three experiments were made with the view of ascertaining the amount of ethereal extract the drug would yield, one pound being operated upon at each experiment. In each case the yield was about one and a-half ounces, or 9·375 per cent.

On incineration I obtained from the rhizome a small quantity of ash, estimated at 4 per cent., which I found to consist principally of lime, potash, silica, phosphoric, sulphuric and carbonic acids.

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* From the 'Proceedings of the Pennsylvania Pharmaceutical Association, 1878—79.'

The Pharmaceutical Journal.

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1879.

ALTHOUGH in pharmaceutical affairs, as in most other respects, the past year has been characterized by unusual dullness, it has not been altogether uneventful. In the first place we may refer with satisfaction to the fact that certain questions which have for some time past disturbed the tranquility of the pharmaceutical atmosphere have been either definitively settled or dealt with in such a manner as to do away with the possibility of injurious dissension. During the past year sundry females have been elected members of the Pharmaceutical Society; but as yet none of them have aspired to become also members of the Council, and there are still no signs that this event will at any future time lead to the fulfilment of the dire foreboding that the presidential chair might one day be filled by an old woman. Another event that has been brought about by concession to abstract principle relates to the reporting of the proceedings of the Council of the Pharmaceutical Society. The "gate" has now been opened, and it is believed that when it has been passed the illuminating effect of the pharmaceutical press will be materially augmented. We will not, however, venture to anticipate the consequences of this event, or to predict whether any additional lens-power thus provided will operate by reflection or by refraction. For our own part we will simply state that the report of the Council's proceedings—furnished as hitherto by the official reporter under the direct authority of that body—will still continue to be published in this Journal in the respective weeks when the Council meetings are held.

The Special General Meeting of the Society held during the first days of the year marked the decline of an agitation which, at one time, seemed to threaten the production of disunion and conflict in the pharmaceutical body; but that tendency has now so far subsided that there is little reason to apprehend its revival. Opinions will probably still differ as to the influence exercised by that meeting in respect to the immediate question discussed; but we can at least rejoice to think that it operated like oil on troubled waters, and by affording scope for a little declamation gave vent to some pent-up energy. Soon afterwards the irksome SHEPPERLEY case was decisively brought to an end, and though in some quarters regret was felt that this event was not celebrated after the fashion of an Irish wake, probably everyone will by this time be glad that the case can be treated as a thing of the past. The subsequent attempts to advance reform in medical legislation were of such a nature as to remove any uneasiness that might be felt on the score of interference with the ordinary business of chemists and druggists, and the general expression of public opinion was so unmistakably opposed to such a step that it would have been difficult to demonstrate the existence of any further cause for apprehension. Medical defence associations it is true, still remained in the field, and, perhaps, they have not yet altogether ceased from troubling; but in regard to the subject of counter practice by chemists and druggists it may be fairly assumed that there is no longer much to be feared. At least, this seems to be the natural inference to be drawn from the suggestion offered by Dr. B. W. RICHARDSON in a presidential address, with the object of making medical practice a part of the recognized business of a chemist and druggist, and establishing for that purpose an inferior degree of medical qualification. Though we have no sympathy with this project, its proposition from such a quarter is certainly no slight recognition of the necessity that exists in many instances for the services of the chemist and druggist in advising as to the use of medicine.

The subject of co-operative trading is, next to that of "counter practice," the one which has attracted most notice from chemists and druggists, who, in common with the general trading community, have experienced the injurious effects of the competition set up by what is termed the "store" system. Unfortunately we cannot in regard to this subject refer to any settlement of the questions that it has raised, or to any step that has been taken towards providing an effectual remedy for the evils which retail traders have suffered in consequence of the spread of the "store" system. The propositions that have been put forward with that object have been almost always vague, contradictory, and to some extent impracticable. Some extremely opinionated and often injudicious speeches have been made at public meetings, and much of the evidence given before the Select Committee of the House of Commons was not in any degree better calculated to be of service to the interests of retail traders. In fact they have in general merely suffered and complained, without having apparently formed any distinct and generally accepted idea how they are to help themselves, and at the present moment it seems that such an idea has yet to be developed.

Though chemists and druggists are to some extent situated differently from other classes of tradesmen in regard to the "store" system, the difference obtains only with a part of their business. Under existing conditions a large portion of the business done by them, in many instances, is altogether foreign to pharmacy, consisting simply of hand to hand transfer of articles from the seller to the purchaser, and requiring no greater skill than is necessary for the draper or the grocer in conducting their trades. It is in this department of the chemist and druggist's business that the influence of the "store" system is most severely felt, and hence we have had numerous complaints of the loss of trade in patent medicines and articles of a similar nature by reason of their being sold at the "stores" at reduced prices. The result experienced is no doubt very serious in cases where the trade in such articles constitutes a very considerable proportion of the chemist and druggist's business, and it is natural that it should have given rise to very general inquiry how this destructive competition is to be met. Some have recommended the adoption of the "store" system by selling at the same rates, others have suggested the total abandonment of the trade in patent medicines and articles of such a nature as can be sold by any person of ordinary trading capacity. These two proposals represent extreme measures that are not altogether necessarily alternatives, though they may be taken as having their origin from two incompatible ideas respecting the nature of the chemist and druggist's business. The plan of competing with the "stores" in the matter of price is one which presupposes that the business of the chemist and druggist is in no respect different from that of the grocer or the draper, and if the assumption were correct this plan would probably be the best to adopt, provided the advantages of very extensive sales and immediate cash payments could be secured.

But the assumption above referred to is one that cannot be maintained. This circumstance has repeatedly been testified to almost involuntarily and in no instance, perhaps, more distinctly than by one of the witnesses before the Select Committee, who, as a chemist and druggist himself, and in answer to the question why he did not sell a certain proprietary cosmetic preparation at the same price that the "stores" did, stated that he could not do so. Underlying this statement is to be recognized a sense of the fact that the business of the chemist and druggist is so far different from all other kinds of trade as not to admit of its being conducted upon the same lines and under the same conditions as to rate of profit that would satisfy the requirements of other kinds of business. Closely connected with this view of the matter is the idea from which originates the recommendation to abandon altogether the trade in patent medicines and what are termed druggists' sundries. According to that idea this trade is inconsistent with the business of the pharmacist, and if the practice of pharmacy were an occupation sufficiently separated from other kinds of business that idea might command more general consideration as a guiding principle. That it is not so, however, would be superfluous for us to contend, and that it can ever become so is perhaps more than one can venture to hope. In many cases it would almost amount to giving up business if the sundry trade of a chemist and druggist's shop were discontinued, and even where purely pharmaceutical business is so extensive as to render such a course practicable, we doubt whether its adoption would not entail great disadvantage. It is precisely for this reason that it seems impossible to take as alternative plans the entire abandonment of trade in sundries or the sale of these articles at "store" prices.

The conditions affecting individual cases are so various that regard must be had to the conditions obtaining in particular instances rather than to abstract principle, and looking at the matter from this point of view it seems that the practical alternative is either to maintain prices at such a rate as is compatible with the general character of purely pharmaceutical business, or else to take a lower status and compete with the "stores" in the price of sundry articles.

But though the mixed nature of the chemist and druggist's business introduces some special difficulty in dealing with the "store" competition, as regards the trade in patent medicines and sundries, the conditions under which the purely pharmaceutical portion of that business is conducted furnish reasonable grounds for seeking to protect that portion of the business from being interfered with. It was upon this ground that the prosecution of the London and Provincial Supply Association was undertaken by the Council of the Pharmaceutical Society. The appeal against the judgment given in favour of the "stores" by the County Court Judge has during the past year resulted in a reversal of that judgment, mainly upon the ground that it was not competent for an association of persons, not specially qualified, to do what any one of the number could not lawfully do. This decision of the Lord Chief Justice and Mr. Justice Mellor has been appealed against by the London and Provincial Supply Association, and it was hoped that the hearing of the appeal would have been brought on before the end of the year. Unfortunately this has been impossible, and the matter still remains open. In all probability, however, the case will be heard and decided early in the coming year, and it will then be seen whether the existing provisions of the Pharmacy Act thoroughly suffice for the protection of pharmaceutical business from the interference of unqualified persons, or whether further legislation must be sought for to secure this.

As regards the ordinary trade features of the chemists and druggists' business, it seems scarcely possible to expect the Legislature to enforce restrictions in favour of chemists and druggists, unless the articles sold contain dangerous poisons or in some way come within the scope of the provisions of the Pharmacy Act. That this is the case with many patent medicines is notorious to those conversant with the business, though it is not so well known to the public generally, and it is beyond question that fatal accidents have resulted from the indiscriminate sale of such articles, and from this ignorance on the part of the public.

The status of the pharmacist in Great Britain has been the subject of a large amount of discussion during the year and has been the topic of several presidential addresses. At Sheffield, the President of the Pharmaceutical Conference, Mr. G. F. Schacht, varying his stand-point from the internal one taken at Dublin, from which he was able to recognize the typical pharmacist as an illustration of a high order of citizen, went outside the pharmaceutical body to discuss the estimate of the pharmacist by others. The conclusion was not very flattering, namely, that in the eyes of the public pharmacists are tradesmen neglected by "Society" and credited with being "its obliged and humble servants, slavishly ready to do whatever is told them, and to take for payment whatever cannot be conveniently bestowed on the professional man on the one hand or the co-operative stores on the other." This public estimate of pharmacists, Mr. Schacht considers to be mainly the echo and reflection of that previously adopted by a large proportion of the medical profession, arising mainly from an indifferentism, due possibly to the isolation of pharmacy and its teaching from the general medical curriculum. As a first step towards unification he suggested that every student in medicine,—using the term in the broad sense inclusive of pharmacy,—whatever branch he may intend ultimately to practise, should be brought at some period of his training through one common portal, which might consist of one of the sets of the examinations.

In the Inaugural Sessional Address delivered in Bloomsbury Square in October, Dr. Tilden took up still another position, that of one who was once closely associated with pharmacists, but who has now so far severed his connection with them as to be able to look on their proceedings from the standpoint of an outsider. Some of the passages in this address were very outspoken, the key note being that so far and so long as the pharmacist is a trader he must take with other traders the chances of competition with the "stores" and submit to the neglect of what is called "Society." For an improvement in the pharmacist's position Dr. Tilden looks to the gradual but steady development of the professional phase of his calling, in which he need not fear the competition of the mere trader. As an attempt in this direction may be here mentioned the inquiry set on foot by the Rochdale Chemists' Association, with a view towards the development of the pharmaceutical portion of the business and promoting the transfer of the dispensing of medicine from the medical practitioner to the chemist and druggist.

A similar tone was observable in an address delivered a few days afterwards by Dr. C. Symes, as President of the Liverpool Chemists' Association. Already, urged the speaker, the public regards pharmacy as something above an ordinary trade and the pharmacist as a man of superior intelligence, and although the fact that he is a shopkeeper militates against him with the superficial portion of "Society," yet those who have the most substantial claims to position themselves readily accord to pharmacists their proper status. It was suggested that pharmacists should educate themselves and the public to speak of their places of business as pharmacies and to regard the charges for dispensing as fees or payment for professional work.

In the following month the President of the North British Branch, Mr. J. B. Stephenson, dealt with the same subject. Referring to complaints of the non-recognition of the true position of pharmacy and the pharmacist by the medical profession and the public, Mr. Stephenson said that, as far as his experience went, such complaints were groundless. Assuming as a fact the dual nature of pharmacy as a calling, he wishes to magnify the profession as much as possible, but by no means to minimize the trade. One reason given for this desire was the opinion that the fees at present paid by the public for the professional, or dispensing, portion of the pharmacist's services are insufficiently remunerative, so that if the public insists upon withdrawing from him the profits derived from dealing in such articles as can be obtained from the stores, higher fees will have to be paid for medicine. A prominent feature in this address was a strong protest against the existing traffic in patent medicines. Its effect in changing the calling of the pharmacist from being a compounder of medicine to becoming a salesman of the preparations of others was pointed out, and pharmacists were urged to utilize the prestige of their influence—which had hitherto served to float many of these preparations—in the opposite direction, for the purpose of discouraging and discrediting the whole system

A large amount of correspondence provoked by a pungent letter signed "Hampshire" has also been devoted to the future of the pharmacist. A great number of these letters were occupied principally with the subject of prices, and many of them showed indications that the writers thought the prosperity of their calling would depend upon the price that might be obtained for patent medicines. In fact, the subject of patent medicines has, during the whole year, furnished a running fire of discussion which has been addressed mainly to two questions, first, what should the pharmacist do in the presence of the enormous competition in the sale of patent medicines by grocers and others which has developed during the last few years? and, secondly, can unregistered persons be prevented from dealing, under the cover of the patent medicine stamp, in preparations consisting altogether or in part of scheduled poisons? With respect to the former question, opinions have been very divergent, as in the discussion relating to "stores," many being in favour of adherence to the advertised prices, whilst others would meet their cutting competitors by selling at equally low, or even lower, prices. There have not been wanting those, however, who think with Mr. STEPHENSON that the time has come for the pharmacist to wash his hands of this system of quackery, and like another FRANKENSTEIN do what he can to destroy the monster he has assisted to create.

The second question was brought under the consideration of the Council of the Pharmaceutical Society in July, on a motion by Mr. HAMPSON that the General Purposes Committee should be instructed to take into consideration the largely increasing sale of patent medicines containing scheduled poisons by unregistered persons, and to report thereon especially with regard to the advisability of endeavouring to restrict the sale of such preparations to registered persons. In the discussion it was incidentally stated that the subject had been under the consideration of the Pharmacy Act Amendment Committee, which had arrived at the conclusion that it was not advisable at present to attempt to obtain further legislation on this point. But the PRESIDENT expressed a decided opinion that the Pharmacy Act, 1868, is sufficiently strong to prevent the sale of definite scheduled poisons by unregistered persons, and cannot be evaded by simply sticking a duty stamp on the containing vessel. The motion was agreed to, but no report from the Committee on the subject has yet been published.

The subject was set down as well in the September agenda paper of the Law and Parliamentary Committee of the Chemists and Druggists' Trade Association. This Committee, also, evidently recognizing the difficulty of obtaining legislation without evidence that it would be conducive to the public interest, ordered a circular to be sent out asking for well-authenticated instances in which fatal results have followed from the sale of scheduled poisons under cover of the patent medicine stamp and for suggestions and information on the sale of patent medicines generally. The replies evoked were read at a subsequent meeting of the Committee; their nature was not reported, but they do not appear to have contributed much to the elucidation of the subject, as no step was taken beyond instructing Mr. HAYDON to continue his quest for information.

The modification introduced into the Dental Bill, for the purpose of enabling chemists and druggists actually engaged in the practice of dentistry at the passing of the Act to be registered as dentists, has had a result which seems to have greatly surprised the promoters of this measure. The number of persons so registered in the United Kingdom amounts to 2049, or upwards of one-third of the entire number of persons registered under the Act, and those who desire to see the right to use the title of dentist restricted to persons specially engaged in the practice of dentistry in all its branches have recently sought to make out that the Act was never intended to confer legal recognition upon anyone who was not engaged in the practice of dentistry in that more extended sense. They contend that the mere extraction or stopping of teeth and such minor operations, commonly practised by chemists and druggists, do not entitle them to be called dentists or to obtain registration as such. We have, on several occasions, pointed out in reply to these cavils that we cannot perceive any reason why a person habitually engaged in conducting any dental operations should not be termed a dentist, and though we willingly concede that no person so engaged should assume the designation of dentist unless he is competent to the work he undertakes, we cannot admit that the use of that designation necessarily involves practical acquaintance with the entire range of dental practice as at present generally understood. Chemists and druggists claimed recognition under the Act, inasmuch as many of them had long been in the habit of extracting teeth, and because they apprehended, from the restrictive object of the Bill, that their continuance of that practice would have been construed as an infringement of the law if the Act had not given them recognition. We cannot regard their action in this way as other than justifiable as a measure of self-protection, and although heartily sympathizing with the dental reformers in their desire to establish a high standard of professional qualification and a trustworthy indication of dental skill, we must confess that the objections raised to the registration of chemists and druggists seem to us somewhat illiberal.

The Weights and Measures Act is still practically in abeyance as it affects chemists and druggists, but we have so recently dealt with this subject that it would be useless to reiterate in this place. So far as we can learn the local authorities are not taking any steps to carry out the provisions of the new Act: the only persons active are certain enterprising inspectors who undertake to construe the Act and, according to their lights, to furnish interpretations of it, chiefly with the result of creating confusion of ideas and mystification. It is, however, at least clear that these officers have yet to be taught their business, especially in regard to the verification, stamping and inspection of apothecaries' weights and measures, and in some instances that we are acquainted with they have undoubtedly exceeded their powers by doing things that are not authorized by the Act. As already pointed out it is the local authorities throughout the country who have to lay down regulations for carrying out the provisions of the Act, and until we hear that in any particular instances this is done and approved of by the Board of Trade, the inspectors of weights and measures will really have no authority upon which to act.

In a Parliamentary session that was unusually unproductive of legislation, there was not much effected to interest the chemist and druggist. Medical Bills were introduced, but not passed; nevertheless, they were carefully watched by the Council during the time they were under consideration. Besides this, the Sale of Food and Drugs Act was amended so as to clear up doubts as to what constitutes prejudice to the purchaser, and a new Petroleum Act was passed prescribing a new method of testing the flashing point of hydrocarbon oil.

Several cases of prosecution for breaches of the Pharmacy Act have been recorded besides that against the London and Provincial Supply Association already referred to. Two other prosecutions instituted by the Council have been reported, in one of which it was decided that a patent medicine stamp does not cover the sale of a scheduled poison. There have also been a large number of unreported cases, in which persons have discontinued their illegal practices after being warned, or have paid the penalty without going into court. The Chemists and Druggists' Trade Association has also obtained convictions in six cases under the provisions of the 17th section, and the police in various parts of the country have been similarly successful in ten other cases.

Twenty-six cases of prosecutions under the provisions of the Sale of Food and Drugs Act have been reported as relating to substances that are sometimes, with the exception of the last, retailed by chemists and druggists. These are sweet spirit of nitre (2), cream of tartar (8), milk of sulphur (4), tincture of camphor (1), tincture of rhubarb (1), violet powder (1), castor oil pills (2), annatto (1), soda water (1), baking powder (1), dispensing of a prescription (1), and paregoric devoid of opium (3). There were convictions in twelve of these cases, but it is a significant commentary on the inference sometimes drawn from the returns furnished by public analysts, with respect to the sale of adulterated drugs, that in only two instances, the sale of tincture of camphor deficient in spirit and of milk of sulphur, was the convicted person a chemist and druggist.

Referring next to matters more immediately affecting the Pharmaceutical Society, we remark first that the Council, which now exercises such important functions in the interests of pharmacists, as well as of the public, has undergone a slight change in its constitution. Two of its members, who had served the Society in it for some years, and who retired by rotation, Messrs. Betty and Hanbury, declined to be again nominated. Another member, Mr. Cracknell, who retired by rotation, was not re-elected. The new members elected were Messrs. Richardson, Squire, and Symes. Another vacancy, caused by the resignation of Mr. Fairlie, was filled by the Council selecting Mr. Slipper. Once more the Presidency is held by Mr. G. W. Sandford, succeeding Mr. Williams, who had filled the office during three years; Mr. Schacht was chosen Vice-President, in the place of Mr. Bottle; and Mr. Greenish was again elected Treasurer.

The history of the examinations, although not so stirring as in some previous years, has not been without incident, but the two alterations made in the arrangements may be described rather as confirming practices already obtaining than as presenting any novel features. On more than one occasion since the Preliminary examination has been conducted by the College of Preceptors the questions have included an exercise not strictly within the limits of the Regulations, upon the translation of Latin into English. Although it was understood that these cases were simply tentative and were not allowed to affect the result of the examination, they answered the purpose of calling attention to the "half-process" of examining in the Latin language hitherto adopted, and in March, upon a joint recommendation of the Boards of Examiners for England and Scotland, it was resolved by the Council that after the 31st of December, 1879, candidates for the Preliminary examination should be required to translate simple sentences from English into Latin. The other alteration was the incorporation in the Bye-laws, at a Special General Meeting held on the same day as the Annual Meeting, of certain regulations with respect to the fees paid by candidates who fail to attend or are unsuccessful in the examination room.

In February was published a letter from an esteemed correspondent, adopting the *nom de plume* of Devon, which might reasonably have raised the suspicion that the writer was attempting to demonstrate the truth of the saying that figures may be made to prove anything; for, though professedly it was based on the official statistics, successive paragraphs of the letter contained the different propositions that each candidate in London during 1878 had had to face on the average 13·8 examiners, that there had been more than half as many examiners as candidates, and that in the Major there had been nearly two examiners to each candidate. In the reply to the criticism evoked it became, however, apparent that Devon's object was to raise a protest against the *vivâ voce* examinations on the ground that they deter nervous men and favour "cramming." In his opinion *vivâ voce* examinations are the stumbling block in the way of men trying to attain the higher qualification, and their substitution by an examination mainly written, conducted by examiners appointed only three days previous to the examination day, was suggested as likely to double the percentage of Minor men passing on to the Major examination.

Whatever may be the defects of the present system, however, it can hardly be said to have an unduly deterrent effect, since the number of persons passing the qualifying examinations during the year have been probably amply sufficient to supply the gaps which death or other causes may have made in the ranks, whilst, what is more satisfactory, the number who have passed the Major is nearly equal to the passes and failures combined in the previous year. The total number of candidates examined has been 2296, of whom 134 sat for the Major, 656 for the Minor, 32 for the Modified, and 1474 for the Preliminary examination; this was 365 in excess of the gross total of candidates in 1878. Of the 134 Major candidates, 76 or 56·7 per cent. passed, against 51 out of 81, or 61·7 per cent. in 1878. Of the 656 Minor candidates, 331, or just over 50 per cent. passed, the proportion being nearly the same as in the previous year, and of the 32 Modified candidates 20 passed. The Preliminary examination yielded 783 successful candidates, or 53·1 per cent. of the whole, against 47·6 per cent. in 1878, besides which 47 certificates of other examining bodies have been received in lieu of it.

The subject of the amendment of the Pharmacy Act, 1868, has been under the consideration of the Council on several occasions, and in March a Committee was appointed with power to obtain the necessary legal assistance to draft a Bill embodying the recommendations of a previous Committee on the subject, and to deal among other things with the question of titles.

A considerable amount of interest has been displayed in respect to the revision of the British Pharmacopœia, and the relation in which pharmacists should stand to it. In December Mr. HAMPSON brought forward a motion to the effect that the Medical Council should be asked to receive a deputation to urge upon it the desirability of the Pharmaceutical Council being legally empowered to nominate pharmacists to co-operate with the Medical Council in framing and amending future editions of the British Pharmacopœia. The motion was, however, lost.

Another subject that has been under the consideration of the Council has been the HANBURY Memorial Fund. This has now been closed, the amount invested having reached £400. The Council has now formally accepted the trust of administering the fund, and a die for the medal, which is to be awarded every two years, has been prepared.

A Special General Meeting of the Society was held in January to consider a motion requesting the Council to assist, by a pecuniary grant, the Trade Association in paying the expenses incurred in the defence of the SHEPPERLEY case. The motion was agreed to, but the Council had been advised that it could not deal with the Society's Funds in such a manner. The Annual Meeting was held, as usual, in May, when the principal topic for discussion was the proposed admission of women to membership, which, so far as that meeting was concerned, was decided adversely by a small majority. Notwithstanding this the Council at its meeting in October elected two ladies as members. A Special General Meeting was held after the Annual Meeting to sanction an alteration in the Bye-laws. In the evening of the same day the Annual Conversazione took place at South Kensington. At the October Evening Meeting the annual distribution of prizes given by the Society was made, the PEREIRA Medal once more going to a student in the Society's school. The students were afterwards addressed by Dr. TILDEN.

The Benevolent Fund has again been the medium of a large amount of much needed help. In annuities there has been expended £950, and in grants for temporary relief about £720, making a total of £1670, or £300 in excess of the expenditure in the previous year. Towards meeting this there has been received £1200 in subscriptions and £55 in donations, being about £120 less than the receipts in 1878. In December three new annuitants were elected, bringing the number up to 32, but by the death of Mrs. TRUMPER, a few days since, this has been reduced to 31.

The Society's Library has been increased by nearly three hundred volumes and pamphlets, the donations and purchases having been about equal in number. Some valuable works have been purchased out of the HANBURY Bequest, which is now all spent. The circulation of books has been larger than in the previous year, an increased proportion (about one-third) having gone into the country. The attendance of readers in the Library during the day has been smaller, but during the evening larger, than in the preceding year. The Museum, also, has been enriched by a large number of donations, some of considerable value. It may appear almost invidious to mention some of the donors without mentioning all, but their great value will excuse special reference to the collections of opium products, presented by Messrs. MACFARLAN and Messrs. T. and H. SMITH; of coto and other products, presented by Dr. HESSE; of American drugs, given by the Philadelphia College of Pharmacy; of foreign drugs, by Mr. CHRISTY, to whose business energy many of them owe their introduction; and of Indian drugs, by Dr. DYMOCK.

The usual Evening Meetings have been held during the present year, but it is regrettable to have to record that the attendance on some occasions has been small. No doubt this is affected by the fact that the papers can be perused in this Journal two or three days after they are read at a meeting; but it should be remembered that, apart from the stimulus which the expectation of having a good audience gives to the production of papers many points of interest arise in the discussions following the reading of them, and these discussions are, of course, entirely dependent upon the persons present at the meetings. There were exceptions, however, when the lecture theatre was well filled, on the occasions of two lectures by Professor REDWOOD, on "Electricity as a Source of Light," and one by Professor BENTLEY, on "The Life of the Plant." The papers read at the Evening Meetings, ten in number (against fifteen last year), have been as follows:—"Myrtus Chekan," by Mr. E. M. HOLMES; "An Examination of Distilled Essence of Lemon," by Dr. W. A. TILDEN; "The Estimation of Diastase," and "Extract of Malt," by Messrs. W. R. DUNSTAN and A. F. DIMMOCK; "Note on Plasma," by Mr. W. WILLMOTT; "The Action of Iodine on Rhubarb," by Mr. H. G. GREENISH; "Monguno Bark," by Professor G. DRAGENDORFF; "Note on Shea Butter," by Mr. E. M. HOLMES; "Taraxacum," by Dr. C. SYMES; and "A Method for the Volumetric Estimation of Arsenic Acid," by Mr. W. A. H. NAYLOR. The last evening was devoted to a discussion relating to the new Weights and Measures Act, the subject having been introduced by Dr. B. H. PAUL.

The North British Branch has enjoyed a fair measure of prosperity, and at its Annual Meeting in April the Council was able to present a favourable report. On that occasion Mr. J. B. STEPHENSON was reelected President, Mr. A. NAPIER, Vice-President, and Mr. JOHN MACKAY, to whom the Branch owes so much of its success, was reappointed Honorary Secretary. Evening meetings have been held as usual and several valuable papers read at them have appeared in these columns.

Turning to the sister island we are pleased to have to record an arrangement that has brought this Journal into closer relations with the pharmacists of Ireland. In 1878 the Council of the Pharmaceutical Society of Ireland decided to furnish an official report of its proceedings to this Journal. Early in the present year it made an application to the Council of the British Society, which was acceded to, for the regular supply of this Journal to each of its members, and this arrangement has been carried out. The present therefore presents a suitable opportunity for a brief epitome of the history of this Society.

The Pharmaceutical Society of Ireland was incorporated by Act of Parliament in August, 1875, and held its first meeting on September of the same year. It then consisted of the twenty-one members of Council named in the Act. Since that period 151 pharmaceutical chemists have been registered, 147 having been registered after examination, and 4, as being licentiate apothecaries, were under the Act exempt from examination. About 90 pharmaceutical chemists have been elected members of the Society since its formation, and at the present time it appears to be in a fairly prosperous state. During the year 1879, 71 candidates resented themselves for the Preliminary examination, of whom 60 passed and 11 were rejected. There were 18 candidates for the licence to act as pharmaceutical chemists, of whom 11 passed and 7 were rejected. Since April, 1876, 164 candidates have passed the Preliminary examination of this Society under the new code of regulations, most of whom have to appear for their final examination at some future date. In November last the Council resolved that the certificate of having passed the Preliminary examination of the Pharmaceutical Society of Great Britain should be accepted as equivalent to the corresponding examination of the Irish Society. Lastly, it having been thought desirable to secure, if possible, some alteration in the Act constituting the Society, chiefly in the direction of compelling all sellers of scheduled poisons to become registered, a draft of an amendment Bill was discussed and agreed to by the Society at its annual meeting in October.

The year has not been marked by any of those sensational introductions to the materia medica that occasionally for a time appear to be of such surpassing value, but eventually afford so large a percentage of absolute failures. It has not, however, passed without the mention of a few new drugs, coming principally from Liberia, Japan, and the never-failing stores of the western hemisphere, and affording materials for testing the warrant for a local reputation, which in some cases has been made to cover a wider area by the efforts of public-spirited advertisers. Perhaps, however, the substance that has attracted most attention is the bladder wrack (*Fucus vesiculosus*), which is to be found abundantly on our own shores. Reputed to be the principal constituent of a well-advertised nostrum for obesity, which, whatever it may have consisted of earlier in its history, undoubtedly now contains it, preparations of *Fucus vesiculosus* have come into demand. This alga would seem to be worthy of further investigation, and Mr. CONROY has done useful service in presenting a *résumé* of what has been written about its therapeutics, as well as in indicating a method for its pharmaceutical treatment. Among the Liberian drugs have occurred some bearing such suggestive names as "erysipelas plant," "dysentery plant," "abortive plant," "cream of tartar plant," as well as a comparatively pure elemi resin. Among the Japanese drugs are some that, like the aconite of which the chemical history has been partially worked out, promise to be at least as valuable as their analogues at present in use in this country and America; as, for instance, a species of *Patrinia*, with an odour more powerful than ordinary valerian, and two species of *Coptis* containing berberine. Under the trivial name of "cascara sagrado," the bark of the Californian *Rhamnus Purshiana* has been brought forward as a remedy for constipation, and probably it may possess properties similar to those attributed to the bark of *R. Frangula*. "Yerba reuma" is a name of the same class, and the drug is said to be derived from the *Frankenia grandifolia.* The "herba santa maria," which has been the object of a few inquiries, is, according to Mr. Rey, the *Chenopodium ambrosioides*, L., a Brazilian plant enjoying in its native country some reputation as a neurotic and a vermifuge. Another Brazilian plant, *Ocimum basilicum*, has been mentioned as yielding a juice that is also a powerful vermifuge. The *Myrtus Chekan*, Spreng., a Chilian plant possessing aromatic properties, and said to be useful in the treatment of bronchitis and as a general tonic, was the subject of a paper read at an Evening Meeting by Mr. E. M. Holmes. "Folia carobæ," the leaves of the *Jacaranda procera*, also a South America tree, have been reported as coming into use on the continent as an antisyphilitic and alterative. Lastly, one of the most interesting contributions to the history of the crude materia medica, in which Mr. E. M. Holmes called attention to a long cylindrical bean, occurring sometimes amongst calabar beans of the more orthodox shape, if it did not exactly introduce a new drug, nevertheless pointed to a hitherto unexpected botanical source of it. Turning to the animal kingdom, "ostrich pepsine" appears likely to belie the omnidigestive promise of its name, and if the statements made at the November Evening Meeting as to its non-activity be confirmed, its reputation in this country may be said to have bloomed and withered in a few fleeting months. And a similar fate appears to await the only other recent addition to the animal materia medica, the *Blatta orientalis.*

Besides fresh substances suggested as additions to the materia medica, our knowledge has been advanced during the year with respect to others which possess still, more or less, the character of novelties. "Bidara laut," the wood and bark, probably, of *Strychnos Ligustrina*, used in India as a popular remedy against dysentery and which two or three years since furnished the subject of an animated dispute in Germany, has been examined by Mr. H. G. Greenish, who found a specimen to contain in the dry wood equal to 2·26 per cent. of anhydrous brucia and in the bark the large amount of 7·38 per cent., but no strychnia. It would therefore appear to be a convenient source of pure brucia that might be used in clearing up the physiological doubt whether the action hitherto attributed to brucia has not really been due to its contamination with strychnia. The same experimenter examined also the wood and bark of *Strychnos Colubrinum* and found them to contain both strychnia and brucia, in which they resemble "false angustura bark," as ascertained by Professor Dragendorff and Mr. Shenstone. Incidentally, his observations also suggest the inference that the percentage of alkaloid in the *Strychnos* barks diminishes with the age and thickness of the specimen.

The great interest which has in late years been excited in curari, principally from an expectation that it might be useful in the treatment of hydrophobia, has led to the examination of other species of *Strychnos*, a plant or plants of which genus it is believed furnish its principal constituent. The result has been that several American species have been found to exercise the physiological action characteristic of curari rather than the well-known one of the Asiatic species with which the name strychnia is generally associated, and that some species possess this property in so mild a form as to allow of the hope that soon a definite and manageable preparation may take the place of the dangerous and uncertain one now imported as "curari."

The bark of *Alstonia constricta*, known as the "Australian fever bark," which has also been the subject of a dispute as to its alkaloidal constituent, —some observers saying that it had one and others none,—has been further examined by Messrs. Oberlin and Schlagdenhauffen, who report that they have obtained from it two alkaloids, one crystalline (alstonine) and the other amorphous (alstonicine); the possible relation of the amorphous to the crystalline substance being indicated by its name. This bark has on more than one occasion during the year been confounded with "dita bark," which is obtained from the *Alstonia scholaris*, and was some time since alleged to yield a febrifuge equal to quinine.

Quebracho blanco bark, from the *Aspidosperma Quebracho*, which has been long used in South America for the same purposes as cinchona bark, has come into more prominence this year in consequence of the isolation, by Herr Fraude, of an alkaloid which he has named "aspidospermine," and which is alleged to have a specific action in relieving dyspnœa. Here, also, a similarity of name has induced an almost ludicrous mistake, and a "quebracho colorado" *wood* from the *Loxopterygium Lorentzii*, a plant belonging to a different order, which wood has lately been imported into Europe for tanning purposes, has no doubt sometimes been supplied for the "quebracho blanco" *bark*. Lotur bark, another bark that was formerly looked upon as a cinchona bark, has been investigated by Dr. Hesse, who reports that he has isolated from it three alkaloids, which he has named "loturine," "colloturine," and "loturidine," and which all give an intense blue-violet fluorescence in dilute acid solutions. Amongst the other alkaloidal principles that have been announced as discovered are "anthocercine," from a solanaceous plant, *Anthocercis viscosa*, and "baccarina," from *Baccharis cordifolia*, a Composite plant said to be a cause of sheep poisoning in some parts of South America. In the hands of M. Tanret, also, pomegranate root bark has yielded three other alkaloids, besides pelletierine, but these have not yet been fully described. On the other hand the list of alkaloids has been reduced by two, "mercurialine," a volatile alkaloid attributed to *Mercurialis annua* and *M. perennis*, having been identified as trimethylamine; and the supposed "piturine," from the curious drug "pituri," being reported by M. PETIT as identical with nicotine.

Nor have investigators been lacking for older and more widely known drugs, such as rhubarb, myrrh, veratrum, ginger and others. To take perhaps the most ancient first. Although the curious obscurity which so long has hung about the origin of this drug has not yet been quite removed, a thorough examination, partly of new materials, by Dr. TRIMEN, confirms the opinion that true myrrh is obtained from the *Balsamodendron Myrrha*, Nees, and that the plant grows in Somali-land and on the Red Sea coast of tropical Africa. An interesting account of the different sorts of myrrh has also appeared in a paper by Mr. R. H. PARKER.

On the subject of rhubarb, Mr. H. G. GREENISH has published the results obtained in the analysis of four specimens, named respectively rheum chinense, sibiricum, mandshuricum, and palmatum. So far as commercial value is indicative of quality, these results may be said to be confirmatory of the theory that the most important active principle of rhubarb is cathartic acid, since it is present in much the largest proportion (4·96 per cent.) in rheum chinense, whilst from the mandshuricum and palmatum rhubarbs, although they approach chinense in the amount of chrysophan and tannin present, cathartic acid is nearly absent, being apparently replaced in the latter by mucilaginous matter. The same investigator has made some experiments as to the trustworthiness of the amount of iodine absorbed by rhubarb as an indication of the quality of the root, and reports that it cannot be depended upon, as the absorption does not depend on the active ingredient alone.

Ginger is another substance which notwithstanding the antiquity of its use as a condiment and drug has been hitherto very imperfectly known. Even concerning the essential oil, the only principle that has been supposed to have been studied, very conflicting statements have been made. This reproach has now been removed to a considerable extent by the investigation made by Mr. THRESH. From the ethereal extract, which contains the most important constituents of the rhizome, Mr. THRESH obtained the essential oil as a limpid straw-coloured liquid, sp. gr. ·815, having an odour different from that of ginger and an aromatic camphoraceous taste, and soluble in 25 parts of alcohol of sp. gr. ·815. From the fact that by exposure to heat it became darkened in colour and of higher specific gravity it seems probable that this liquid is a mixture of two or more bodies with different densities and boiling points, and Mr. THRESH thinks that probably the most volatile constituent of the original oil has the finest aroma. Passing by some fatty bodies and neutral and acid resins, which were separated and studied, it may be stated that the active pungent principle of ginger was obtained as a viscid, pale straw-coloured liquid, entirely devoid of odour, with a very pungent, slightly bitter taste, and very soluble in alcohol, even when dilute. This principle has been named "gingerol." Both the aqueous solution of the ethereal extract and an aqueous extract gave indications of the presence of an alkaloid. The value of this investigation was made immediately manifest by the application of the resulting knowledge in the modification of the formula for "soluble essence of ginger."

Continuing their researches upon the veratrum alkaloids, Messrs. WRIGHT and LUFF have this year reported upon the results obtained with the roots of *Veratrum album* and *V. viride*. From the former they state that they have separated, besides jervine ($C_{26}H_{37}NO_3$), three other alkaloids, previously undescribed. Two of these, pseudojervine ($C_{29}H_{43}NO_7$) and rubijervine ($C_{26}H_{43}NO_2$), are crystalline, while the third, named veratralbine ($C_{28}H_{43}NO_5$), is amorphous. Not one of these four is capable of exciting sneezing; but there was also a small quantity of another base observed, which when mixed with veratralbine was powerfully sternutatory, and as this property was lost on saponification, and a small quantity of veratric acid formed, the authors think the presence of veratrine was indicated. From the roots of *V. viride* they obtained, but in much smaller proportion, jervine, pseudojervine, rubijervine, and signs of the base yielding veratric acid. Veratralbine was not detected, or only as a trace, but in its place was cevadine ($C_{32}H_{49}NO_9$), defined as the "veratrine of Merck" by the same authors in their previous paper, when it was obtained from sabadilla seeds. A paper on *Veratrum viride*, by Mr. C. BULLOCK, of Philadelphia, whose name has been previously associated with this subject, is partially confirmatory of these results, though this observer claims to have obtained a much larger yield of alkaloids by the process which he describes. It has also been announced by M. HETET that he has obtained veratrine from the leaves of *Sarracenia purpurea*.

Aconite, also, has been the subject of further research by Dr. WRIGHT, and he has reported to the Pharmaceutical Conference that, like Messrs. PAUL and KINGZETT, he has separated from Japanese aconite a crystallizable alkaloid differing from aconitine, which he has named "japaconitine," and represents by the formula $C_{66}H_{88}N_2O_{21}$. This Dr. WRIGHT supposes may be a dehydrated derivative of an alkaloid differing from aconitine by containing four more atoms of hydrogen; but no trace of this hypothetical base was found. Dr. WRIGHT also confirmed the statement that the Japanese aconite root is considerably richer in crystallizable base than the root of *A. Napellus*. Not the least important statement contained in this report was one that, practically, all the alkaloids present in the roots were extracted by unacidulated alcohol, a fertile cause of decomposition being thus avoided. Dr. WRIGHT reported, also, that he had separated an alkaloidal substance from atis roots (*A. heterophyllum*), but that the numbers obtained on analysis of a small quantity did not answer to the formula attributed to atisine by Mr. BROUGHTON. Another observer, however, Dr. WASOWICZ, has reported that with a substance isolated by him from atis root he has obtained figures closely approximating to those required.

Cinchona has once more contributed its quota to the literature of the year. A remark in a letter to the Secretary of State for India from Mr. J. E. HOWARD, implying the possibility that the unpleasant results alleged to sometimes follow the administration of the mixed alkaloids of succirubra bark might be due to the presence of aricine, or perhaps paricine resulting from its alteration, gave rise to a correspondence, not devoid of asperity, between that gentleman and Dr. HESSE, the most satisfactory outcome of which was a communication from Dr. HESSE, giving a lucid description of the preparation and characters of those two alkaloids. Mr. DAVID HOWARD has put on record the observation that in the bark of *C. officinalis* from the Indian Government plantations the proportion of quinine and total crystallizable alkaloid appears to increase with age (going back as far as 1863), whilst that from *C. succirubra* is known to deteriorate when beyond a certain age. From Dorpat Herr MANDELN has reported that in experimenting on the citrates of quinine he has obtained an anhydrous acid salt, containing one molecule of quinine to one of citric acid; an anhydrous neutral salt, containing three molecules of quinine to two of acid; and a basic salt, containing two molecules of quinine to one of acid and half a molecule of water. Early in the year Mr. W. STEVENSON described a modification of the Pharmacopœia process for the estimation of quinine in citrate of iron and quinine, consisting principally in the use of a saturated solution of quinine in dilute ammonia water in washing the precipitate. Further on, in a useful paper read before the Pharmaceutical Conference, Mr. F. W. FLETCHER described an application of Dr. PAUL's plan of fractional crystallization to the same end. Mr. CHALLICE has also described an improved method of producing the thalleioquin reaction in dilute solutions of quinine. In the more purely pharmaceutical direction, Mr. GILMOUR has called attention to the amount of quinine in EASTON's syrup and the loss which takes place during the washing of the precipitate in its preparation, amounting to 10 per cent. even when care is taken to use the slightest possible excess of ammonia. This loss Mr. E. SMITH has proposed to avoid by dissolving the sulphate of quinine directly in the phosphoric acid and ignoring the small quantity of sulphuric acid, a plan that has been endorsed from the other side of the Atlantic by Mr. DAVIDSON, with a caution to avoid the use of sugar containing ultramarine in making the syrup.

Opium, by its varying composition, still furnishes problems for solution. M. PETIT has suggested a process for its rapid assay, which consists in extracting with cold water, and adding ammonia and then alcohol to the filtered liquid. The crystalline precipitate contains narcotine (varying in some test experiments from 6 to 9 per cent. of the precipitate), but this, when greater accuracy is required, may be estimated by adding the combining equivalent for pure morphia of sulphuric acid, and then titrating the acid left free in consequence of the inability of narcotine to saturate an acid liquor. Professor FLUCKIGER has described another process requiring more time, which consists in extracting the opium with water during twelve hours, filtering, adding to the filtrate alcohol, ether, and finally ammonia water, and allowing the mixture to stand a day or two. In a process suggested for adoption in the United States Pharmacopœia, Professor PRESCOTT subjects the opium to a preliminary treatment with benzole, then digesting it in nearly boiling water, and adding to the filtered liquor successively benzin, ether and chloride of ammonium. The meconates of morphia have been the subject of some interesting experiments by Mr. DOTT which appear to show that a trimeconate of morphia is not formed, but that a definite dimeconate, crystallizing with five molecules of water, is. An amorphous substance which was probably the monomeconate, proved to be very unstable, decomposing into the dibasic salt and free meconic acid.

Ergot, too, has received some further contributions to its history. The investigation of the circumstances attending a periodical fatality and prevalence of foot rot among sheep near Bristol, led Mr. STODDART to the conclusion that they were due to the growth of an ergot upon the ray grass on which the sheep fed. The development of the fungus on the *Lolium perenne* was carefully observed and the inference drawn from its life-history was that for pharmaceutical purposes the ergot of rye should be gathered in the months of August or September, as the fungus then attains its greatest medicinal activity at the close of the vegetative period. Some doubts having been thrown by Herr BLUMBERG upon the nature of one of the alkaloids of ergot,—ergotinine,—its discoverer sent to this Journal a reclamation describing his method of obtaining it in a crystalline form, accompanied by a specimen. Lastly, a solution for hypodermic injection has been suggested by M. YVON, made by exhausting ergot, previously treated with carbon bisulphide, with water containing a small quantity of tartaric acid. It may be remarked here that a similar preliminary treatment of colchicum seed with petroleum spirit, to remove fatty matter, has been recommended.

The report by Dr. Rutherford on the physiological actions of drugs on the secretion of bile has aroused an interest in a whole group of resinoid substances which have been suggested for experiment as cholagogues,—such as euonymin, iridin, leptandrin and juglandin, and information has been supplied respecting their source and preparation. Euonymin appears to be most in request, and there has been some uncertainty in consequence of different samples varying in colour. This variation has, however, been explained by Mr. J. Moss as principally dependent upon the age of the bark from which it is prepared; that with a green colour being from young bark, and the brown, and less active, from old bark. The colour of podophyllin, and the causes affecting it, have been discussed in a paper by Mr. Lloyd. An examination by Mr. Flowers has demonstrated that the milk-juice from *Lactuca Canadensis* contains several principles identical with those occurring in lactucarium prepared from *L. virosa;* and with respect to this substance Mr. Lemberger suggests the removal of caoutchouc by treatment with petroleum spirit, before using it for pharmaceutical purposes.

Extract of malt is a preparation that has come into considerable demand, and is supplied by numerous competing makers, in forms presenting varying physical aspects. Messrs. Dunstan and Dimmock, therefore, did useful service in throwing some light upon their composition. Considering that probably the value of malt extract depends almost entirely upon the diastase it contains, the authors described a process for its estimation, but it is a significant commentary upon this assumption, that in the advertisement of a well-known preparation, which it is claimed is prepared according to Baron Liebig's own recipe, it is put forward as a merit that the extract is perfectly free from diastase.

It will now be necessary to refer to a number of subjects with more brevity. With respect to coto bark and cotoin, although they appear to be making their way into favour, some confusion exists between them and another similar bark and its products. To dispel this Messrs. Jobst and Hesse have published an elaborate paper, the first portion of an abstract of which appears in the present number of this Journal. Pilocarpine also appears to retain a place, and a great improvement in the process of its preparation, by using ammoniated alcohol, has been described by Mr. Gerrard. Araroba, or Goa powder another substance that has assumed considerable importance during the last few years, has had its botanical origin determined, it being attributed to a leguminous plant which has been named *Andira Araroba.* According to Herr Liebermann, araroba does not contain chrysophanic acid, but a substance which he has named chrysarobin, of which the chrysophanic acid that has been obtained by the treatment of araroba has been an oxidation product. Chaulmoogra oil, another new remedy, has been examined by Mr. Moss, who separated from it a new fat acid, which he has named gynocardic acid, and to this Dymock's colour reaction for chaulmoogra oil appears to be due. No alkaloid, or only very slight traces could be detected. The nature of glycyrrhizin has been the subject of further investigations by two chemists, but unfortunately with discordant results, Mr. Habermann looking upon it as an acid containing nitrogen, and Mr. Sestini as a glucoside free from nitrogen. The composition of the milk of the cow tree has been determined, and the actual existence of the curious fermentative principle which has long been attributed to the juice of the *Carica Papaya* has been proved and its separation reported almost simultaneously by two observers. Cows' milk also has yielded to Mr. Blyth two alkaloidal principles, which have been named galactine and lactochrome. Amongst other new bodies that have been made known during the past year are scillipicrin, scillitoxin and scillin, from the squill; kinoin, a crystalline body, from Malabar kino; spergulin, a fluorescent body, from the seeds of species of *Spergula;* teucrin, an acid substance, from the *Teucrium fruticans;* camellin, a bitter substance, said to resemble digitalin in its reactions, from the seeds of *Camellia japonica;* and berberonic acid, formed by the decomposition of berberine. Berberine and its salts have been the subject of several papers, and this is only indicative of the increased attention which is being directed, especially in the United States, to this alkaloid and the plants containing it.

To the literature of pure pharmacy there have been numerous other contributions. Perhaps one of the most ambitious has been that of Dr. Squibb on Repercolation, a process which, it is to be feared, before it could be carried out with the scientific accuracy shadowed forth in the paper, would require much more uniformity of practice and skill in the operators than at present obtains, in this country, at least. A process of Remaceration has also been described by Mr. Rother, based upon principles followed in many beet-sugar factories. An apparatus for continual dialysis, suited to the preparation of dialysed iron, has been described by M. Lebaigue. Extracts have been the subject of a readable paper by M. Schmitt, triturations of one by M. Wesselhoff, and a simple standard for solutions kept for dispensing purposes has been suggested by Mr. Mushens. With respect to pills a gelatine coating has been recommended by Mr. Dimock, and powdered marsh mallow root has been mentioned as an excipient. Mr. Mead, also, has provided a useful formula for preparing suppositories containing green extracts with a basis of gelatine. Spirit of nitrous ether has again been the subject of several communications, in one of which Mr. Smeeton has advocated a return to the Edinburgh process for its preparation. Methods for its analysis have been described by Dr. Dupré, Dr. Muter, and Mr. Rimmington, that of the last-mentioned differing from the others in the separation of all the constituents and in the decomposition of the potassium nitrite formed in estimating the nitrite of ethyl by means of the zinc copper couple. Mr. Allen, too, has described the process followed by him in the estimation of alcoholic tinctures.

Thymol, by its insolubility, sometimes presents inconveniences to the pharmacist. Dr. Symes has noted the fact that milk is a good solvent of this substance, and that thymol liquefies when triturated with chloral and camphor. Some ambiguity appears to exist in certain quarters respecting the characters of thymol and menthol, and this Mr. Mason endeavoured to clear up in a paper read before the Liverpool Association. A similar confusion as to the botanical source has also been apparent.

A clear mistura guaiaci has been suggested by Mr. B. Squire, made by diluting the tincture with glycerine. Mr. Hornsby has also pointed out that if sufficient liquor potassæ be added to tincture of guaiacum it may be diluted with water without producing more than opalescence. Mr. Collier described to the Conference the use of tincture of quillaia in preparing this and similar mixtures, in the emulsification of oils and in the extinguishment of mercury; he also contributed a paper on the chemical history of saponin from soap bark, in which it appears to exist as a lime compound. Tincture of kino has evoked an amount of discussion disproportionate to the frequency with which it is used, and for the avoidance of the gelatinization that occasionally takes place in it,—probably dependent upon the variety of kino used in its preparation,—the addition of glycerine has been suggested, as also have been occasional agitation and exposure to light. The use of a tincture of marsh rosemary root (*Statice Caroliniana*) has been recommended as a substitute for both tincture of kino and tincture of catechu.

The hygroscopic nature of plasma has been the subject of observation by Mr. Willmott. He finds it to be due to the glycerine, which has the property of absorbing moisture from the atmosphere until a certain proportion is reached, and he proposes to substitute a similar quantity of water for some of the glycerine ordered to be used in making the glycerine of starch. Complaints as to difficulty sometimes experienced in preparing a miscible Gregory's powder induced Mr. Gilmour to make some experiments, which appear to indicate that this nonmiscibility is due to the magnesia or other powders being in too dry a condition, and that this objectionable dryness may be produced by the apparatus used in the mixing. Among other communications that have been published may be mentioned formulæ for pharmaceutical preparations of coca and of drosera as well as some medicated solutions of alumina. Recipes for the preparation of some drugs for smoking have also appeared. Taraxacum, in respect to the best time for its collection, has also been the subject of a paper by Dr. Symes, who favours November or December if frost has not occurred.

The formation of nitrites and nitrates under different circumstances has been the subject of considerable attention. Mr. Waring, continuing his researches, has reported that exposure to light prevents nitrification, that presence of carbonate of calcium appears to be indispensable to the growth of the ferment, and that nitrification takes place more rapidly in proportion as the temperature is increased from 50° to 86° F., but that 104° F. is fatal to the ferment. Dr. Davy, following in the same direction, has made some experiments which appear to show that nitrification is not affected by light, but that it requires a supply of air or free oxygen, and that it goes on most rapidly at a temperature of from 70° to 80° F. It was also noticed that in a liquid containing much animal matter the process is stopped or goes on very slowly, or the nitrites and nitrates may be decomposed and disappear after being formed. Sometimes in water containing sewage impurities there is a very rapid formation of nitrites at the expense of the free ammonia. Recently Messrs. Schloesing and Muntz have announced the isolation of the "ferment." The important bearing that some of these observations have upon the analysis of water must be obvious, and may help to explain the inconclusive results of the discussion upon an exhaustive paper read by Dr. Tidy before the Chemical Society, when the one thing most manifest was the uncertainty attending all the present methods of water analysis in the absence of any knowledge of the history of a water.

An examination, by Dr. Tilden, of a specimen of essential oil of lemon obtained by distillation, which confirmed the presence in it of a terpene agreeing with the terebenthene of French oil of turpentine, and of a peculiar terpene, named citrene, further led to the unexpected observation that it was superior in odour to the foreign essence, and, in consequence of the interest excited, the method of its preparation was subsequently described by Mr. Moss. Chamomile oil has been the subject of a series of investigations, from which it appears that it contains isobutyric and angelic acids in combination with isobutyl, and angelic and tiglic acids in combination with amyl and other bodies. Tiglic acid has also been found to be the volatile acid of croton oil and identical with methylcrotonic acid; it has also been proved to be produced from angelic acid by the action of heat. Further, the specific gravity and rotatory power of a large number of essential oils have been determined by Dr. Symes.

A modification of Dr. De Vrij's process of preparing bromide of ethyl has been proposed, consisting principally in the use of a dilute sulphuric acid in the preparation of the sulphethylic acid. Hydrobromic acid has been prepared by the action of bromine upon oil of copaiba, and its composition as obtained by the ordinary methods of preparation, known as Fothergill's or Wade's, has been discussed by Mr. Palmer. A useful modification of the usual process for preparing solution of perchloride of iron, by adding the iron solution to the acid, instead of the reverse, has been suggested by Mr. Shuttleworth, and it has been suggested to extend the change to the solution of persulphate. The influence of sugar on the formation of gallate and tannate of iron has been studied by Dr. W. I. Clark, who has found that its presence up to a certain point (3·2 per cent.) favours the formation of a precipitate when a solution of tannin is mixed with one of ferrous sulphate, but if in greater proportion an increasing retardation takes place. It is curious that the percentage of iron is smaller in proportion as the quantity of precipitate is greater.

Numerous other papers having special chemical interest have been published, but it will be impossible to do more than mention a few of them. Messrs. Dupré and Hake have described two new methods for the estimation of minute quantities of carbon. Mr. Naylor has given a method for the volumetric estimation of arsenic acid, based upon the reaction which takes place between arseniate of soda and iodine. Mr. Allen has suggested the action of nitric acid as a means of detecting an admixture of petroleum spirit with benzol. Mr. Siebold utilizes the colour reaction of iodine to detect the presence of alcohol in chloroform. Dr. Senier has corrected a text-book error as to the saligenin test for salicin. Professor Leeds has published an elaborate investigation as to the influence of light upon iodides. Dr. De Witt has described a new series of colouring matters derived from diazo compounds. Further, the synthesis of several compounds has been reported, such as that of atropine from tropic acid and tropin, of milk sugar, cane sugar, helicin, and possibly salicin. In the application of practical chemistry to manufactures the two most important developments have been Holloway's process of roasting pyrites, a modification of the Bessemer steel process, and Vincent's utilization of beet residues in the preparation of trimethylamine, methyl chloride and other compounds.

Whatever may be the case in other fields, the past year promises to be a memorable one in the history of the so-called elements, whether in respect to the number of substances that have been added to the list, or the increase in the probability that at least some at present included in it will have to give up their claim to the title. The inferences drawn from the spectrum researches of Mr. Lockyer have received some countenance from the experiments of Professor Meyer on chlorine, aided by his improved method of taking vapour densities, and the conclusion of this investigator's research will be awaited with considerable curiosity. Just at the close of the year, too, it is alleged that Mr. Edison has solved the great problem of rendering the electric light available for ordinary lighting purposes.

The annual meetings of societies in which British pharmacists take special interest have been those of the Chemists and Druggists' Trade Association, held in London in May, the British Medical Association, held in Cork in August, and the British Pharmaceutical Conference and the British Association, held in Sheffield, also in August. The American Pharmaceutical Association met in Indianapolis and the German Apothecaries' Association in Hanover, both in September.

Some very interesting lectures have been reported in this Journal during the past twelve months. Besides those of Professor Redwood on "Electricity as a Source of Light" and Professor Bentley on "The Life of a Plant," may be mentioned those of Mr. Perkin on "Alizarin," of Professor Abel on "Detonating Agents," and Mr. Crookes on "Radiant Matter." To these may be added the paper of Professor Claypole on the "Migration of Plants from Europe to America;" one by M. Herlandt on the "Relations existing between the Active Principles of Plants and their Botanical Characters," which we hope to supplement shortly by one on the same subject written by Professor Dragendorff; a continuation by Mr. H. B. Baildon of his "Thoughts on Botany;" and Professor Allman's Presidential Address to the British Association. Nor must we forget to mention the continuation of Dr. Dymock's valuable Notes on Indian Drugs.

During the year some valuable works on pharmacy and the sciences allied to it have been published. Some of these are new, such as Stille and Maisch's 'Dispensatory,' Roscoe and Schorlemmer's 'Inorganic Chemistry,' Blyth's 'Manual of Practical Chemistry,' Allen's 'Commercial Organic Analysis,' as well as the Year-Book of the British Conference, the Report on Pharmacy of the American Association, and the admirable 'Jahresbericht' of Dr. Dragendorff. There have also appeared new editions of 'Pharmacographia,' Wurtz's 'Chemistry,' Cooley's 'Cyclopædia,' and Piesse's 'Perfumery.'

The year has not passed away without death robbing chemistry and pharmacy of many of their votaries, but the most prominent of these have been natives of other countries. Thus Germany has lost Mohr, Sonnenschein and Giessler, France has lost Poggiale, Chevalier and Boutron, and the United States has lost in Dr. Wood one of the authors of the celebrated Dispensatory. Messrs. Mohr and Wood were Honorary Members of the Pharmaceutical Society of Great Britain. In this country we have also had to record the death of Mr. Bartlett, formerly a Member of the Council, and Messrs. Walker, Robinson and Thompson, who have served the Society in the capacity of Local Secretaries.

We have now come to an end of our task. Enough has been said to show that the year 1879, if not crowded with striking events, was not without a useful history. Our last words shall be a hearty wish for the prosperity of pharmacy and pharmacists in the year that is now opening.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The sixth general meeting of the thirty-first session was held at the Royal Institution on Thursday evening, December 18, the President, Dr. Charles Symes in the chair.

The minutes of the previous meeting were read and confirmed.

The President, in calling attention to the new Weights and Measures Act, said: "Those present who were engaged in pharmacy will be aware that recently a sensation has been got up on the question of apothecaries' weights and measures, and that those who appear to be the best informed also appear to be very imperfectly informed as to the actual working requirements of the Act, which, by the way, are of vastly more importance to us than the shapes of the standards. What I wish particularly now to say, however, is that I believe the specially legalizing of these weights and measures is a retrogade step, and one which we shall all sooner or later regret. Now, when we are looking forward to the universal adoption of the metric system, any attempt to prop up one which is rapidly falling into decay, and had already received its death-blow in its expulsion from the last Pharmacopœia, cannot but prove prejudicial."

The President then exhibited a new kind of spirit lamp, which burns by means of a glass wool wick. He said that in Germany a new kerosene lamp has been introduced which burns on this principle, and that a similar wick has been suggested as suitable for spirit lamps. Greater heat is said to be obtained with little or no consumption of wick, and as the flame keeps more closely to the wick the lamp could be moved about quickly without danger of it going out.

Mr. Alex. Watt, F.C.S., F.I.C., exhibited Scheibler's thermo-regulator, and gave a very interesting description of its working, which he practically illustrated.

The paper for the evening was then read, on—

The Chemistry of Tanning.

BY EDWARD DAVIES, F.C.S., F.I.C.

The skins of beasts being the first recorded material used for clothing, the best method of preparing them for use was necessarily one of the first questions presented for solution to the mind of man. Simple cleansing from blood and fat, and drying in the air was doubtless all that was done for long periods of time; but more elaborate methods were gradually practised, with the view of making the skins more supple and of preserving them from the action of the weather, until at last the art of tanning became a recognized occupation among men.

It is not known when the use of oak bark or other substances containing the little understood class of astringent bodies called tannins was found out. The whole history of the art in ancient times is almost a blank, the methods used being no doubt kept secret among the craft and handed on from father to son, unwritten and carefully kept from the world at large.

The chemistry of tanning involves a knowledge of the materials employed, firstly, of the skin, and secondly, of the substances used to change the skin from a body drying into a translucent, horny, hard hide, into fibrous, opaque, flexible leather.

The skin of animals consists, first, on the outside, of a thin cellular layer called the epidermis, horny and dead on the outside and constantly replaced from within; then the *rete mucosum*, in which the colouring matter exists which gives the colour to the skin of man; then the corium, or true skin, a layer varying in thickness in various animals and in different parts of the same animal; this is the layer from which leather is made, and consists of fibres intersecting each other in every direction, connected by a cellular structure which binds them together. On the inner side the skin is lined with a fat-bearing tissue, which separates it from the muscles or flesh. In tanning leather this and the outer layers are separated from the corium by preliminary operations.

The various mechanical portions of the process of tanning will be omitted except when they are connected with chemical action. One of these is the removal of hair, for which the most diverse processes have been used.

1. *Sweating.*—In this method under the influence of moisture, a semi-putrefaction takes place in the epidermis, which becomes disintegrated and loosens the hair.

2. *Liming.*—In this milk of lime is used. The cellular tissues are destroyed, whilst the fibres remain uninjured. It is important not to carry this action too far, or the cellular connecting tissue of the corium will be injured, and the leather irreparably damaged. Lime soaps are also formed with the fatty matters.

3. *The Use of Sulphides.*—Alkaline sulphides and the sulphides of calcium and barium have long been used as depilatories. Rusma, a mixture of 1 part orpiment and 2 or 3 parts slaked lime, is practically used, and this is a good example of an empirical process from which chemical knowledge enables us to deduce a scientific one. A decomposition takes place between the two bodies, by which calcium sulphide is formed, and this substance might just as well be used direct, and the dangerous arsenic avoided. Mr. Warington proposed 3 parts polysulphide of sodium, 10 of slaked lime and 10 of starch. M. Matern, of Antwerp, in 1872, exhibited at Vienna a new depilatory liquid, consisting of slaked lime, soda and sulphur, some sulphide of sodium being formed. In 1873, M. Eitner used this mixture successfully, and then got pure sulphide of sodium, by which bullocks' hides were depilated in fifteen hours. Crystallized sulphide of sodium is used; 1 kilogram is dissolved in 2 litres of water and thickened with 3 kilograms of slaked lime. This is painted on the hair side, working it well in, the hides folded together, put into a warm room about 19° C., covered with a wet rug and left fifteen hours. The hides must be well washed before scraping off the hair, or the hands of the workmen will suffer. Further details will be found in a valuable paper in the *Journal of the Chemical Society*, 1876, p. 982. Sodium sulphide can be easily made at a low price, if a demand should arise, by the reduction of the sulphate.

4. *By the Use of Acid Liquor.*—This is produced by the fermentation of barley meal, giving rise to lactic and acetic acids. This is not available for heavy hides as it swells them too much.

The next operation is the swelling or raising of the hides. When lime has been used to remove the hair it is necessary to remove this from the interior of the hide as it would injure the leather. The hides are put into spent or red tan liquors, which contain gallic and lactic acids. These not only remove the lime, but as the lime has become carbonated the evolution of carbonic acid gas tends to swell the hides and enable the tannin more readily to enter the fibres. Lime is also sometimes removed by the use of the excrements of pigeons, fowls and dogs. The action of this disgusting mixture has been ascribed to uric acid, but it is more probable that ammonium chloride is formed, which is decomposed by the lime, calcium chloride being formed.

All these operations have as their object the preparation of the hides for the true tanning operation, which consists in immersing the hides in a solution containing tannin. This combines with the organic matter of which the fibres of the corium are composed, and forms an imputrescible compound which is leather. Two theories have been propounded to explain this. The first is, that the tannin unites with the fibres in their unchanged state, and the action goes slowly on until the fibres are acted on through their entire thickness, and that the length of time necessary to thoroughly permeate the skin, and the fibres throughout, is the reason why one or even two years have been taken for very thick hides.

The other, advocated by Dr. F. Crace Calvert in the Cantor lectures for 1864, is that the hides are composed of a substance analogous to the organic matter of bones, or osseine, which does not unite with tannin, and that there is a slow transformation of this into the isomeric body gelatine, which, as it is formed, unites with the tannin. The slowness with which thick hides are tanned would be explained by the long time required to bring about this transformation. Although this view has the sanction of such an eminent name, my own opinion is that the first is the correct one, as a simple experiment will show. Hide dried and rasped is shaken up with a dilute solution of oak-bark, from which in a minute or two it will so thoroughly remove the tannin that iron salts will give no reaction. This shows that tannin can unite with unaltered hide.

The chemistry of the tannins is not at all clearly worked out. They are obtained with difficulty in a pure state without decomposition, as they appear to be unstable complex bodies. There are certainly several kinds, differing greatly in composition although possessing certain properties in common. The tannin best known in the separate state is that obtained from nut-galls. Until recently this, when obtained by ether, was supposed to be a pure glucoside of gallic acid; that is, that it was a compound containing the elements of glucose and of gallic acid, less the elements of water.

$$C_{27}H_{22}O_{17}+4H_2O=C_6H_{12}O_6+3C_7H_6O_5.$$

Later investigations have show that it contains varying qualities of digallic acid together with tannin and that pure tannin is almost unattainable. Messrs. Paul and Kingzett (*Journal of the Chemical Society*, 1878, p. 217) state that commercial tannin examined by them in no case contained any glucose and was merely digallic acid, $C_{14}H_{10}O_9$, which with H_2O gives—

$$C_{14}H_{10}O_9+H_2O=2C_7H_6O_5.$$

M. Schiff holds the same view. Schlorlemmer, in 'Chemistry of the Carbon Compounds' says, "there cannot be any doubt that tannin contains a glucoside of gallic or digallic acid. Possibly the tannin as it exists in the nut-galls is a glucoside of digallic acid, and is decomposed by the process of extraction, although this is remarkable, as nothing but ether is used.

The tannin of oak-bark, or quercitannic acid, according to Stenhouse does not give gallic acid when boiled with dilute acids, but a reddish-brown substance. Tannins have been divided into pathological and physiological tannins. The former including the galls due to the injuries produced by insects, the latter are the tannins forming natural constituents of plants.

They may also be roughly divided into two classes, according to the colour which they give with Fe_2Cl_6, some giving a blue-black and others a green. The first comprises the tannins contained in nut-galls, oak-bark, myrobalans, sumach, valonia and divi-divi. The second includes catechu, kino, mimosa bark, larch and birch bark. That this indicates a real difference in chemical composition is shown by their behaviour with tartar emetic in presence of ammonium chloride. The first class give a dense precipitate; the second are only partially precipitated. The tannins from various sources agree in precipitating gelatine, especially in presence of alum or salt, and in precipitating the alkaloids. Tannin decolorizes a solution of iodine in iodide of potassium to a very large extent, forming hydriodic acid and ellagic acid. I have tried to find a quantitative process for estimating tannin upon this reaction, but without success.

The various processes which have been proposed for testing the amount of tannin in various materials present a disheartening prospect to the student. In our ignorance as to the true chemical nature of the tannins all the processes are of the most empirical character, and in the absence of a pure standard tannin to work upon tho results obtained are only relatively true. Two samples of the same material may be compared, but when two different materials are taken their relation to one another cannot be certainly stated. The principal processes are:—

1. The gelatine process. With this I cannot get a distinct end reaction. The solution of gelatine is necessarily so dilute that to produce a distinct precipitate in the filtered liquor a considerable quantity of ether, tannin or gelatine, as the case may be, must be added. Spotting the solution on a mirror, very valuable in many cases, does not succeed any better. In works a gravimetric application of this process is a good deal used. A solution of the tanning material having been made, a known quantity is precipitated with gelatine in a dilute solution, boiled, and the precipitate washed on a weighed filter, dried and weighed; two-fifths of the precipitate is assumed to be tannin. Now the combination of tannin with gelatine has long been known to be of variable composition, according to the circumstances under which it was made, and I have made experiments which show that if to a known weight of gelatine a small excess of tannin from various materials has been added, the precipitate washed and weighed, the results were so astounding in their variation that I hesitate to publish them without repetition.

2. Gerland's tartar emetic process. This process, published in the *Chemical News*, August 1, 1863, is in my opinion the best for those tannins to which it is applicable. It will only do for the iron-bluing tannins. I refer for details to the original paper, noticing a very curious point. Using the author's proportions of 2·611 grams tartar emetic per litre I invariably find any sample of so-called pure tannin which I can get tests about 75 per cent. The author says that he got one which tested 97 per cent. I was therefore glad to read in the paper by Messrs. Paul and Kingzett that they had got 76 per cent. from commercial tannin. Assuming that commercial *pure* tannin is, if not pure, at all events the only attainable standard, Gerland's standard solution should be reduced in strength by one-fourth, and I then find that the results agree in several cases with Neubauer's.

3. Neubauer's process. This consists in using permanganate of potassium in a dilute solution of tannin containing sulphate of indigo. The results are constant for the same sample, but seem to be uniformly too high. The great fault of the process is the necessity for removing gallic acid if present. It must almost necessarily give too high results when we remember that there is a variety of organic matter present besides tannin and gallic acid, and that it is assumed that these exert no reducing action until the whole of the tannin, gallic acid and indigo are oxidized. When the gallic acid is removed by gelatine another organic body is introduced, though it is said to have little or no action. Nevertheless, for substances of the iron-greening class it appears to be almost the only process which we have.

4. Hanmer's method with rasped hide added to a tanning solution, and taking the sp. gr. before and after the removal of the tannin. This is too delicate for practical use, the differences being very small. It is also assumed that nothing dissolves out of the hide in cold water. It is also stated that gallic and other organic acids are absorbed, and I have noticed that the colouring matter of the solution is almost entirely removed. The difficulty of rasping the hide, of which a large quantity is required, is also very great.

5. Wagner's cinchonine process with magenta for indicator. This has failed so completely in my hands that I should feel obliged if anyone would inform me where full details of the process are to be had. Using the proportions given I find that the supernatant liquid is coloured long before all the tannin is precipitated.

Time will not allow of an account of other processes for preparing leather. Any substance which will form an insoluble non-putrescible compound with the fibres of the skin may be considered as a tanning agent. Alum is used in the "Tawing" process, and salts of iron were proposed so far back as 1842, by M. Bordier. He oxidized ferrous sulphate with nitric acid to produce a basic ferric sulphate, in a solution of which the hides are then to be steeped. In 1855 a patent was taken out in England for a similar process. It seems to have fallen into disuse until very recently, when Professor Knapp took out a patent which very closely resembles Bordier's. In the *Chemical News*, January 17, 1879, is a paragraph from a foreign journal entitled "Revolution in Tanning." "Professor Knapp proposes the use of a basic ferric sulphate instead of oak-bark or other tanniferous material. He adds to a boiling solution of copperas the quantity of nitric acid requisite for the peroxidation of the iron and after the reaction is over adds more copperas. The hides are suspended in the cold solution at a suitable degree of concentration, and are ready in from two to four days." To complete the proof of the chaotic state of the chemistry of tanning and of the contradictory statements about it, in the *Journal of the Chemical Society*, January 1, 1879, there is an abstract of a paper by Gottfriedsen, in which he states that an examination of iron-tanned leather had been made by Muntz, who considers that it is not leather at all, and that no combination of oxide of iron with the fibres of the hide is formed. He, on the other hand, affirms that leather so made is more lasting than bark-tanned leather. This review of the state of our knowledge of the chemistry of one of the oldest and most important manufactures, shows how much remains to be done before a perfect explanation of the chemical reactions can be arrived at. As in many other cases practice has got before theory, but a perfect theory must be found before practice can be also perfect, and then, no doubt, time and material will be saved, and still further improvements made in leather.

The paper, which was illustrated with a very fine collection of the various products used in the art of tanning, was much appreciated by those present, and gave rise to a short discussion, in which the President, Messrs. Conroy, Haddock and Watt took part.

On the motion of Mr. Watt, seconded by Mr. Woodcock, a unanimous vote of thanks was passsed to Mr. Davies.

Mr. Davies replied at some length to the points raised in the discussion, and the meeting closed.

ROCHDALE CHEMISTS' ASSOCIATION.

The annual meeting of the Rochdale Chemists' Association was held on Tuesday evening, December 9, in the Town Hall (by the kind permission of the mayor). An excellent repast was provided in the refreshment room, partaken of by over forty persons, comprising members of the Association, their wives and daughters and a few invited guests. Afterwards, the company adjourned to one of the lower rooms.

A report of the work of the Association during the year was read by the Secretary, Mr. J. W. Bamford, which showed that the society had not been inactive, efforts having been made to give the Association a wider constituency; these efforts had, however, not proved very successful. The present number of its members is sixteen, one having died during the year.

The Association not having realized what was desired,—the co-operation of the neighbouring towns of Bury and Heywood,—maintains a very friendly relation with the Association of Manchester, although that relation is not strictly of an official character.

The subject of dispensing the prescriptions of medical men has engrossed a large portion of the energies of the Association. The readers of the *Pharmaceutical Journal* will not be entirely ignorant of those efforts.

A class for the study of chemistry has been commenced, for the exclusive benefit of the apprentices and assistants. This class, although meeting separately, is in connection with the Government science classes of the town.

The President, Mr. R. Robinson, delivered an address, of which the following is a brief abstract:—

The President said that although the Association had not been successful in its efforts to get the medical men to give up dispensing, yet the exchange of ideas and opinions between the two bodies had had the good effect of promoting a more friendly feeling between them, and he thought other associations would do well to take up the question and ever keep it well to the front. It was pleasing to find so many of the young men, the future chemists, ready and willing to take a practical part in their meetings. By a few pleasing experiments some of them would demonstrate that fire, air, earth and water were not the simple bodies they were thought to be, in times not so very remote. As the students progressed in their studies they would find chemistry the most fascinating of all sciences. It enabled us to some extent to look into Nature's laboratory and see and comprehend a few of the wonderful changes continually going on. Reference was made to a few of the products of the combustion of coal, and that probably it only required an extension of knowledge to convert the almost valueless charcoal into the priceless and sparkling diamond. We might ridicule the idea of the alchemist of old attempting to convert the baser metals into gold, but might it not some day be found that gold is a compound of elements which have been chemicaly combined in Nature's crucible? The discoverer of aniline dyes did not convert coals into diamonds, but into something quite as good; he delighted millions by his discovery, gave employment to thousands in making and using his dyes, and last, but not least, realized a handsome fortune. And so it might be with our students: they might not be able to make gold, produce a diamond, or discover a new dye, but they might by research find something quite as profitable to themselves, and perhaps more useful to their fellows, and if they did none of these things they would still have their reward if they diligently sought for the hidden treasures of nature and science.

Mr. W. A. Scott moved the adoption of the report, and referring to the address of the President said that the diamond was first supposed to be of vegetable origin by Sir Isaac Newton, a supposition which was afterwards verified by Cavendish or Priestley, who succeeded in burning it.

Mr. Ellis Lord seconded the motion, observing that the question of the indiscriminate sale of poisons was one to which the Pharmaceutical Society should give its attention.

Mr. Wilkinson, of Cheetham Hill, Manchester, thought the poison question was a very difficult one, and one that might lead to serious injury to the interests of chemists themselves if an attempt was made to put a stop to the evil that had been referred to.

Mr. Hermann Woolley expressed his cordial thanks for being invited to the meeting, and congratulated the Association on its vigorous and healthy tone. Referring to the Association at Manchester, which he and Mr. Wilkinson represented, he said it was a mutual advantage that the union should be intimate. Referring to the subject of patent medicines, he thought the time was coming when the trade in these articles would pass into other hands and the chemist would be left to the prosecution of the duties of his calling pure and simple.

In the course of the evening, Mr. Harold Woolley exhibited a number of Geissler's tubes, and a small model of a magneto-electric engine, working a small pump, which contributed to the entertainment of the meeting.

Mr. Alderman Taylor proposed a vote of thanks to the gentlemen from Manchester, who had favoured the meeting by their presence, and especially to Mr. Woolley for his beautiful experiments. This was seconded by Mr. W. A. Scott, and supported by Mr. Hadfield, and carried by acclamation.

The remainder of the evening was spent in the performance of a variety of experiments by the students of the Association, Mr. Lees producing aniline and Turkey red dye by appropriate reagents.

Mr. Renshaw gave a series of illustrations of the *modus operandi* of chemical analysis, showing variously coloured precipitates from the mixture of colourless solutions.

Mr. W. Bamford performed a number of experiments in frictional electricity.

Messrs. Robinson and Handley concluded the series by a variety of experiments with gases.

A very hearty vote of thanks to the President for his genial conduct in the chair, moved by Mr. Alderman Taylor, and carried with acclamation, brought the proceedings to a termination shortly after eleven o'clock.

HULL CHEMISTS' ASSOCIATION.

The annual supper in connection with this Association was held on Thursday, December 18, at the Cross Keys Hotel, Market Place. The Mayor (Alderman King, M.D.) presided, and amongst those present were the Rev. J. McCormick the Rev. J. Branston, Councillors Field, Thompson, Smith, Myers, Wallis, and Fryer, Dr. Holden (Medical Officer of Health), Mr. O'Donoghue (Clerk of the School Board), Mr. Niven, etc.

The loyal and patriotic toasts having been duly honoured, the Mayor gave "The Archbishop and Clergy of all Denominations." The Rev. J. McCormick and the Rev. J. Branston responded.

Mr. J. Oldham proposed "The Mayor and Corporation," and the toast was acknowledged by the Mayor, who next gave the toast of the evening, "Success to the Chemists' Association. Mr. G. Myers (President) responded.

Mr. Allison proposed "The Town and Trade of Hull." Mr. T. J. Smith responded.

Several other toasts were given, including "The Medical Profession," "The Visitors," "The Lecturer," and "The Officers," "The Pharmaceutical Society," and the "Trade Defence Association," a very pleasant evening being spent.

Parliamentary and Law Proceedings.

Cream of Tartar Prosecution.

At the Fareham Petty Sessions, held on Tuesday, December 23, before F. Bradshaw, W. H. Deane, and F. Bretherton, Esqrs., and Captain Turner, Mr. William Octavius Smith, chemist and druggist, of Titchfield, was summoned upon the information of police-sergeant James Duke, of the Hants Constabulary—local inspector under the Sale of Food and Drugs Act—for that he did sell to James Duke, the purchaser, and to his prejudice, a certain drug, to wit, cream of tartar, which was not of the nature, substance and quality demanded by the said James Duke.

Police-sergeant Duke deposed that on November 14, he in company with another constable went to Titchfield, and at the defendant's shop purchased a quarter of a pound of cream of tartar, and then told the defendant that it was for the purpose of having it analysed. It was divided into three portions, each of which was sealed. One portion was given to the defendant, another retained by him, and the third was forwarded to Mr. Arthur Angell, the public analyst for the county, in order that he might make an analysis of it. This he did and reported that the sample contained the following percentages of foreign ingredients, viz., tartrate of lime, 9·26, and sulphate of barium, 0·29. He also reported that these substances were insoluble, and were not injurious to health.

Mr. Granger, barrister-at-law, said: He appeared for the defendant, who was charged under the Food and Drugs Act with selling, to the purchaser's prejudice, a certain drug, to wit, cream of tartar. He should show that Mr. Smith, who succeeded to the business of Mr. Chitty, got all his drugs from one of the first wholesale houses in London, viz., Messrs. Barron, Squire and Co. His predecessor, Mr. Chitty, had been in the habit of dealing with the firm, and Mr. Smith knowing it to be a first-rate house continued the custom. He should prove, by calling witnesses, that cream of tartar was made from the juice of the grape, and that it was brought over to this country in the form of crystals which only required to be ground to be ready for use. Nothing whatever was done to it except this, and he should prove that the presence of tartrate of lime in it was a necessity which could not be avoided. If it were to be said that unless there was no tartrate of lime in cream of tartar it must not be sold, then that would mean putting a stop to the sale altogether. This tartrate of lime came from the earth, and the analyst himself had told them that it was not injurious to health. He should also call before them Dr. Paul, editor of the *Pharmaceutical Journal*, who would tell them that this cream of tartar came up to the standard of the British Pharmacopœia, which was the recognized standard for all drugs. He had analysed a sample sent him by Mr. Smith, and the result differed slightly from that obtained by the public analyst, but this Dr. Paul would probably be able to explain. He (Mr. Granger) could say with confidence that it was not an offence within the "Food and Drugs Act." It was not a mixture injurious to health, and therefore did not come within the first section, but it came distinctly within the fourth sub-section of the sixth section. The sixth section was to the effect that "no person shall sell to the prejudice of the purchaser, any article, food, or drug not of the nature, substance or quality demanded by such purchaser;" and the fourth sub-section was to the effect that it should not be deemed an offence "where the food or drug is unavoidably mixed with some extraneous matter in the process of preparation." The tartrate of lime was something which was unavoidably mixed with the cream of tartar in the process of preparation. He failed to see how the sub-section could be got over, when he showed them that the cream of tartar in question was the best article of the kind that could be purchased, and he had no doubt the magistrates would consider it their duty to dismiss the summons.

William Octavius Smith, the defendant, was then sworn, and the following evidence was taken. Witness said he was a registered chemist and had succeeded this year to the business of a chemist and druggist at Titchfield, for some time carried on by Mr. Chitty. He found that Mr. Chitty was in the habit of getting his drugs from the wholesale house of Barron, Squire and Co., and knowing that firm by name as one of the first houses in the trade he continued to get all his drugs from it. He produced an invoice from Messrs. Barron, Squire and Co. of a parcel of drugs, including some cream of tartar. This cream of tartar was passed into stock in the condition in which it was received, and he had sold it with the greatest confidence. He had sent the sealed sample given him by the police-sergeant to Dr. Paul for the purpose of having it analysed.

Dr. Benjamin Horatio Paul was then sworn. He said he was a consulting and analytical chemist, and editor of the *Pharmaceutical Journal*, and had had much experience in these matters. He received from the defendant a sample of cream of tartar, sealed with the seal of the Hants Constabulary, on November 15. He analysed it and found that it contained 6·95 per cent of dry tartrate of lime and 0·3 per cent. of sulphate of barium. The remainder consisted of bitartrate of potash. In reply to a question as to how cream of tartar is made, he said it was altogether manufactured abroad in the wine-growing districts, and was made by boiling the argols, deposited in the process of fermentation, in water for the purpose of separating what was insoluble. The crystals thus obtained were then sent over to this country, and only require to be crushed to be ready for use. He did not agree with the public analyst in saying that the ingredients, besides the bitartrate of potash, were insoluble. The sulphate of barium was insoluble, but beyond that the whole was perfectly soluble. He thought perhaps the nature of the soil had something to do with the quantity of these ingredients occurring in the cream of tartar, but the way in which wine was made had probably more. He had never met with a sample without tartrate of lime. A certain portion was an inevitable necessity, as it was impossible to avoid a portion of it becoming mixed with the tartrate of potash. Some of the argols contained as much as from 30 to 50 per cent. of tartrate of lime. The percentage in cream of tartar varied from 1 to 10 or 12 per cent., generally it was about 6 or 7 per cent. In his opinion that sold by defendant was a very good commercial sample. He explained the difference in his analysis and that made by the public analyst, by supposing it to be due to the circumstance that the latter had returned the amount of tartrate of lime as containing water, whereas he had returned it as perfectly dry. The sulphate of barium was not injurious; it was absolutely insoluble.

Mr. Inspector Littlefield: If I go to a chemist's shop and ask for a sample of cream of tartar, should I expect to get such as has been analysed?—Yes, you would get something very like it.

Captain Turner: Does cream of tartar depreciate through being kept in stock, or being opened?—No, not at all.

Can you account for the presence of the sulphate of barium?—I cannot; but the quantity is almost infinitesimal.

Is it possible to extract the lime?—Yes, with considerable difficulty, but not without largely enhancing the price of the article. I do not think if it was extracted that would make any material alteration in its merits.

Is this sulphate of barium found in all samples?—No, not always.

Mr. Frederick Barron, of the firm of Barron, Squire and Co., was then sworn. He stated that he had supplied the shop, now occupied by Mr. Smith, for about sixteen years, but he had a gentlemen behind him whom he had supplied for forty years. The cream of tartar which he sent to Mr. Smith was of the first commercial quality. It was the highest priced article of its kind in the market. The crystals were purchased from the brokers who sold for the manufacturers, and nothing whatever was done to them beyond crushing them.

At this stage Mr. Bradshaw interposed and said the magistrates were all agreed to dismiss the case.

Mr. Granger therefore made an application for costs He said it was surely never the intention of the Act that respectable tradesmen should be brought up in the way the defendant had been. It was a very serious matter, for upon the quality of a chemist's drugs his success and reputation depended. He thought it a case where the magistrates might exercise their right to dismiss it with costs.

Mr. William Flux, of the firm of Flux, Slade and Co., solicitors, who watched the case on behalf of the Pharmaceutical Society of Great Britain, asked to be allowed to say a few words on the question of costs. There had been several cases similar to the present, each in its turn dismissed, and he was anxious that the Society should be able to say that a case had been dismissed with costs. It might be deemed expedient that representations should be made to a central authority with a view to the prevention of similar attacks on the qualities of drugs sold by chemists. The character of a chemist's drugs should be as far above suspicion and as carefully guarded as the personal reputation of anyone should be, and when the qualities of articles sold by a chemist were called in question, he must remain exposed to the suspicions of friends and neighbours, or call upon such gentlemen as were present to attend at great inconvenience and expense to properly support him before the magistrates. As he (Mr. Flux) read the statute, the costs, if awarded to the defendant, would not have to be borne by the policeman who had acted in regard to the purchase, but would fall upon the county, and the dismissal with costs was especially desirable.

The magistrates consulted and said that upon principle they would allow costs, but that some limit should be put to them and they therefore fixed the amount at three guineas.

Excise Prosecution at Aberdare.

At Aberdare Police Court, on Tuesday December 23, (before the stipendiary, Mr. J. Bishop), Daniel Tudor Williams, carrying on business in Gadlys Road, was summoned for selling a bottle of whisky, he not holding a licence entitling him to do so. Mr. W. H. Priest, supervisor of the Methyr district, appeared on behalf of the Excise authorities in support of the summons, and Mr. Kenshole (Messrs. Linton and Kenshole) appeared for the defendant.

John Davies stated that on November 14 he went to the defendant's shop in Gadlys Road, Aberdare, for some salts and a bottle of whisky, which was supplied to him by Mrs. Williams. Defendant's wife at first showed some little hesitation in serving him with the whisky, and said they were out of it, but eventually, however, she let him have the bottle produced, and charged 2*s.* 4*d.* for it.

Thomas Nash Williams, manager of the New Inn public-house, High Street, said that he walked up to the Gadlys Road, with the last witness, who was his son-in-law. He asked him to go into defendant's shop for the bottle of whisky, and saw Davies go into the shop and come out again with it. This was all the evidence in support of the summons.

For the defence defendant's servant, Maria Floud, was called, who stated that she was washing out the shop at the time John Davies came in asked for some salts. When he asked for a bottle of whisky Mrs. Williams replied that she did not keep spirits, and Davies left without it. Ann Griffiths, who was in a room adjoining defendant's shop, also spoke to not hearing Davies ask for the bottle of whisky.

The Stipendiary remarked to defendant's solicitor that it was no use to call such witnesses, because if they did not hear the whisky asked for and sold it appeared that there were others who did.

For the defence it was alleged that the witnesses brought forward were as equally worthy of credence as were those for the prosecution.

The Stipendiary considered the case proved, and fined the defendant £12 10*s.*, one-fourth of the full penalty of £50.

Mr. Priest pointed out that by one section of the Act of Parliament, a person who had held a licence and had been convicted of selling spirits was not again allowed to hold such a licence. The fine was paid. It may be explained that the defendant formerly held a licence, which he did not renew in July last.—*Western Mail.*

Communications, Letters, etc., have been received from Messrs. Bennett, Lloyd, Jarmay, Dymock, Williams, Smith, Rayson, Evans, Junior, Poor Old A., Senex, Libertas, Fortuna fortibus favet, Minor, W. S. T.

COTO BARK AND ITS CHIEF CONSTITUENTS.*

BY J. JOBST AND O. HESSE.

(*Concluded from page* 522.)

Cotoïn.†

To obtain cotoïn the "genuine" coto bark in a powdered state is extracted by percolation with cold ether; the greater part of the ether is distilled off and the still warm residue is mixed with warm petroleum spirit. After proper admixture there separates on cooling a blackish brown oily-resinous mass. The solution is allowed to become completely clear, then decanted off, and allowed to evaporate spontaneously. Cotoïn gradually separates out in large pale-yellow crystals. A great part of the cotoïn remains with the oily residue. This is boiled with water and lime, and the still hot clear brownish yellow solution is saturated with acetic or hydrochloric acid, which causes a reddish white turbidity. After twenty-four hours the solution has become clear, and large glistening yellowish laminæ have been formed, which are often more than a centimetre long, together with pale yellow needles which separate in single crystals or in groups of crystals. Both forms of crystallization belong to cotoïn.

The crude cotoïn can be obtained in a perfectly pure state by one or two crystallizations from boiling water containing animal charcoal. This method of purification only serves for the preparation of small quantities of cotoïn, as it melts in boiling water, and in that condition is only sparingly soluble.

Thus obtained, cotoïn forms pale yellow curved prisms, whilst a chloroform or alcoholic solution of it deposits on slow evaporation large prisms or plates. In the latter case it sometimes is deposited in an amorphous condition crystallizing only after some time. It is easily soluble in alcohol, chloroform, benzine, acetone and carbon bisulphide, but is insoluble in petroleum spirit. It is somewhat more soluble in boiling water than in cold; the latter dissolves very little of it although the solution is rendered tolerably yellow in colour.

Caustic and carbonated alkalies easily dissolve cotoïn, but it is completely re-precipitated on adding excess of hydrochloric or sulphuric acid. Carbonic anhydride precipitates the greater part of it from these basic solutions. It is also soluble in potassium disulphite, but is reprecipitated unchanged on the addition of an acid.

Cotoïn gives a blood-red colour with concentrated nitric acid in the cold, and gradually dissolves on heating to the same colour. A red resin separates from these solutions on cooling or on adding water. Concentrated sulphuric acid gives a brownish-yellow solution. Concentrated hydrochloric acid gives a yellow colour and a yellow solution when heated; but cotoïn crystallizes out unaltered on cooling the solution.

An aqueous solution of cotoïn has a neutral reaction and reduces silver and gold salts in the cold. Acetate of lead causes no precipitation, but the basic acetate gives a yellow precipitate. Ferric chloride gives in a dilute solution a brownish-black coloration, and also a blackish-brown precipitate in a concentrated solution. Ferric chloride gives a deep brownish-red coloration, and an aqueous solution of acetate of lead a yellow crystalline precipitate, when either of them is added to an alcoholic solution of cotoïn. Fehling's solution is slowly reduced by it in the cold, but quickly when heated.

Cotoïn has a bitter taste, and its dust has a sternutatory effect on the nostrils. Its solution has no action on polarized light. At 130° (uncorr.) it melts to a yellowish liquid which solidifies on cooling to a crystalline mass. A trace of the resinous substance considerably lowers the melting point.

Cotoïn is not volatile and is decomposed when heated at a high temperature. It contains no water of crystallization, and shows no loss in weight at 100° or 140° C., if it has been previously dried in a desiccator.

Purified cotoïn gave on analysis numbers corresponding to the formula $C_{22}H_{18}O_6$.

As the aqueous solution of cotoïn has a neutral reaction, it has not therefore the properties of an acid. It dissolves in alkalies, lime and magnesia, to yellowish brown solutions. These solutions, on exposure to air, gradually become of a dark brown.

When cotoïn is dissolved in excess of ammonia and plumbic acetate added to the solution, there is produced a fine yellow amorphous precipitate of triplumbic cotoïn, $C_{22}H_{12}Pb_3O_6$. On adding basic lead acetate to an aqueous solution of cotoïn a yellow amorphous precipitate is produced, containing less lead than the before-mentioned compound.

Tribromocotoïn.—$C_{22}H_{15}Br_3O_6$ (m. p. 114° uncorr.) is obtained in beautiful yellow prisms by saturating a chloroform solution of cotoïn with bromine. It is almost insoluble in cold water, and is partly decomposed at a boiling temperature, but is easily soluble in alcohol, chloroform and ether. Triacetyl cotoïn, $C_{22}H_{15}O_3$, $(C_2H_3O_2)_3$ (m. p. 94° uncorr.), crystallizes in large anhydrous prisms. It is easily soluble in chloroform and ether, with difficulty in cold but easily in hot alcohol.

As above observed, cotoïn is soluble in concentrated hydrochloric without decomposition, but it is completely decomposed when heated with hydrochloric acid in a sealed tube for two hours at 140°, yielding, on adding excess of ammonia to the solution, benzoic acid and a red amorphous substance that is soluble in ether.

By fusion with potash cotoïn is converted into benzoic acid and an oil having the odour of bitter almonds.

Dicotoïn.—When cotoïn was treated with boiling water and filtered, and the insoluble residue boiled with the filtrate, it was observed that leafy crystals separated out as often as this operation was repeated. These crystals were sifted out from the cotoïn crystals, and this method is, in fact, the only one known to the authors of separating dicotoïn from cotoïn.

Cotonetin, $C_{20}H_{16}O_5$, was the name first applied by them to this body, but further investigation showed that the formula $C_{44}H_{34}O_{11}$ is the correct one; hence they have termed it dicotoïn.

Dicotoïn melts in boiling water, in which it is only sparingly soluble. On cooling the solution, pale yellow, glistening laminæ are obtained, as well as crystals similar to those of cotoïn. If after this treatment the melted dicotoïn, or that which is undissolved by water, be dissolved in ether, and the solution be treated with animal charcoal and filtered, there is obtained on spontaneous evaporation of the ether a yellow amorphous residue, which is soon

* Abstract of a paper in *Liebig's 'Annalen,'* 199, 17—96.

† A specimen of cotoïn has been presented to the Museum of the Pharmaceutical Society by Dr. Hesse.

transformed into leafy crystals that melt at about 100°.

The analysis of these crystals showed the fact that dicotoïn is to a great extent transformed by boiling with water into what seemed at first to be an isomeric form of cotoïn, melting at a lower temperature than the prismatic form; but these differences proved on examination to be merely due to an impurity, and these leafy crystals were ordinary cotoïn. Dicotoïn is consequently an anhydride of cotoïn, and stands in the same relation to it as digallic acid to gallic acid. It crystallizes in glistening and almost white laminæ, which are easily soluble in alcohol, acetone, ether, chloroform, ammonia, and sodic hydrate. It is conconverted into cotoïn by being heated with potassic hydrate. It melts at 74—77.°

*Paracotoïn.**

This body is obtained from paracoto bark. The finely ground bark is extracted with ether, and the ether residue after some days solidifies to a crystalline mass. The solid mass, which consists of paracotoïn, oxyleucotin, leucotin, and dibenzoylhydrocoton, is separated by pressure from the resinous mother liquor, and then fractionally crystallized from hot alcohol. Paracotoïn crystallizes out first, and when quite pure gives no bluish-green colour when boiled with concentrated nitric acid, but forms a yellow to brownish-yellow solution.

Paracotoïn crystallizes in beautiful pale yellow laminæ, which melt at 152° (uncorr.), and sublime at a higher temperature, apparently unaltered in composition. It solidifies at 148° to a crystalline mass. It is easily soluble in ether, chloroform, boiling alcohol, acetone, and in benzine, from the last of which it crystallizes on cooling. It is somewhat soluble in boiling water, separating on cooling in delicate laminæ.

Paracotoïn has a neutral reaction, is tasteless, and gives no coloration with ferric chloride. Its chloroform solution has no action on the plane of polarized light. It is somewhat soluble in ammonia, more especially on being heated, and crystallizes out unchanged. Potassic or sodic hydrate dissolves it with decomposition, especially on heating, forming a weak acid, Paracotoinic acid, $C_{19}H_{14}O_7$.

Analysis of paracotoïn, dried at 100°, gave numbers agreeing with the formula $C_{19}H_{12}O_6$, so that it may be regarded in a certain degree as the anhydride of paracotoïnic acid.

Paracotoïn forms a yellowish-brown solution with concentrated sulphuric acid, and with concentrated nitric acid when heated. On cooling the nitric acid solution yellow prismatic crystals separate, probably a nitro compound of paracotoïn, which give protocatechuic acid and a carbonaceous mass when heated with concentrated hydrochloric acid at 140°. The nitro compound is unaffected by being heated for some hours with glacial acetic acid, or with acetic anhydride. Bromine has a peculiar action on paracotoïn. On adding bromine drop by drop to a chloroform solution of paracotoïn the bromine is at first absorbed, hydrobromic acid being evolved, but on adding more bromine there is separated a scarlet red crystalline precipitate. On collecting and washing this precipitate with chloroform, it was found that the portion in contact with the moist air had become intensely yellow, and this change quickly extended to the entire mass, hydrobromic acid at the same time being disengaged. Dried at 100° it lost hydrobromic acid, and acquired a chrome green colour. It appears to be a bromo-paracotoïn, $C_{33}H_{21}Br_3O_{12}$, and in the same manner as paracotoïn it yields paracotoïnic acid and the characteristic smell of paracumarhydrin when heated with a solution of potassic hydrate.

Paracotoïn is converted into protocatechuic acid by fusion with potassic hydrate. On adding sulphuric acid to the fused mass, and then distilling, a small quantity of formic acid distils over.

Paracumarhydrin.—When heated with a solution of potassic hydrate, paracotoïn forms a yellow solution, which soon becomes of a darker yellow, and gives off a volatile body, having a strong smell of cumarin. This volatile body, as well as the non-volatile portion which was obtained by extraction with ether, proved to be a substance which the authors have named paracumarhydrin, having the formula $C_9H_8O_3$.

Paracumarhydrin forms colourless laminæ, which smell like cumarin. It melts at 85° (uncorr.) when directly obtained from paracotoïn by the action of potash, but melts at 82—83° when recrystallized from boiling water, or when obtained in the other manner described. It was found to be impossible to convert it into cumarin, or into the hypothetical body paracumarin, by the action of dehydrating agents.

Paracumarhydrin has a neutral reaction. It is easily soluble in ether, alcohol, acetone, and chloroform, but sparingly so in cold water, although it easily dissolves in hot water, from which it crystallizes on cooling in large colourless laminæ. The formation of this body from paracotoïn would be easily explained by the following equation, $C_{19}H_{12}O_6 + 2H_2O = 2C_9H_8O_3 + CO_2$, but whether its formation may not depend on the production of a crystalline acid body, which was obtained in small quantity, could not be definitely ascertained. Its analysis approximated to the formula $C_9H_8O_4$; hence it may be a homologue of piperonylic acid. It melts at 200°, and dissolves with difficulty in boiling alcohol and in ether, separating in small crystals on evaporation.

Paracotoïnic Acid.—This acid is produced from paracotoïn by the action of baric hydrate, or milk of lime, but preferably by the action of potassic hydrate. Its formation from paracotoïn takes place according to the equation $C_{19}H_{12}O_6 + H_2O = C_{19}H_{14}O_7$. It is obtained as a fine yellow amorphous powder, which easily dissolves in alcohol and in ether, but is almost insoluble in pure water, although very easily soluble in ammoniacal water.

Ammonium, barium, calcium, lead, and silver salts have been obtained.

*Leucotin.**

This is the chief constituent of paracoto bark. It is separated from the crystalline mass remaining in the alcoholic mother liquor from which paracotoïn has been separated by adding glacial acetic acid, in which leucotin is very easily soluble. The expressed solution is evaporated, and the residue crystallized from very dilute boiling alcohol. Thus obtained, it is in the form of small white prisms which are very easily soluble in alcohol and ether, especially on being heated. It is especially soluble in chloroform, acetone, and glacial acetic acid. It melts in boiling

* A specimen of paracotoïn has been presented to the Society's Museum by Dr. Hesse.

* A specimen of leucotin has been presented to the Society's Museum by Dr. Hesse.

water, a small portion dissolving; on being cooled, the solution becomes milky, and then deposits small needles of leucotin. It is not apparently more soluble in alkaline water. It melts at 97°, solidifying on cooling to a crystalline mass. At a higher temperature it becomes brown, and evolves pungent vapours. Its alcoholic solution (2 p. c) has no action on polarized light. It has a neutral reaction, and forms no compounds with bases, not even with lead. With concentrated sulphuric acid it gives a dark yellow solution, and with concentrated nitric acid a bluish green resin and solution; the latter becomes turbid on the addition of water.

The formula $C_{21}H_{20}O_6$ was first assigned to leucotin, but further investigation showed that the formula $C_{34}H_{32}O_{10}$ is the more correct.

Dibromoleucotin, $C_{34}H_{30}Br_2O_{10}$ (m. p. 187°), and *tetrabromoleucotin* (m. p. 157°) have been obtained. By partial fusion with potassic hydrate in the presence of a little water, leucotin is converted for the most part into benzoic acid, together with protocatechuic acid, formic acid, and a new body, *cotogenin*, of the formula $C_{14}H_{14}O_5$. By continuing the action cotogenin is completely transformed into protocatechuic acid. It is believed to be a derivative of protocatechuic aldehyde. It melts at 210°, dissolves with difficulty in cold alcohol, but more easily in hot. These solutions give an intensely green coloration with ferric chloride.

A volatile body, *hydrocoton*, $C_{15}H_{21}O_6$ is formed at the same time by the action of the potassic hydrate on leucotin. Hydrocoton crystallizes in white prisms which melt at 48—49° (uncorr.). It gives dinitrocoton* by the action of concentrated nitric acid.

*Oxyleucotin.**

Most of the oxyleucotin would be found with the paracotoïn, as it is only to a slight extent separated from the latter by crystallization from alcohol; but it can be obtained by heating the mixture of the two bodies with dilute potash or soda, which dissolves the paracotoïn. The undissolved residue of oxyleucotin can be crystallized from boiling alcohol or glacial acetic acid. It forms large white prisms, which melt at 133·5° (uncorr.), and are insoluble in caustic alkalies. It readily dissolves in boiling alcohol or glacial acetic acid, separating on cooling in fine prismatic crystals, but only with difficulty in cold chloroform, ether, and benzine, although readily on warming. It corresponds in properties with leucotin. It contains no water of crystallization, and its now corrected formula is $C_{34}H_{32}O_{12}$.

Di- and tetra-bromo compounds have been obtained. Boiling aqueous solution of potassic hydrate has no action on oxyleucotin, but by fusion it is converted into hydrocoton, cotogenin, protocatechuic aldehyde and acid, benzoic and formic acids.

*Dibenzoylhydrocoton.**

This substance is contained in the crude leucotin, and is best separated from it by its insolubility in glacial acetic acid. It can be obtained in a state of purity by being converted into the dibromo-compound. It contains no water of crystallization, and is of the formula $C_{32}H_{32}O_8$. It crystallizes in white stunted prisms which melt at 113° (uncorr.), and solidify on cooling to a radiating crystalline mass. At a higher temperature it distils almost unchanged.

* Specimens of dinitrocoton, oxyleucotin and dibenzoylhydrocoton have been presented to the Society's Museum by Dr. Hesse.

It is very easily soluble in boiling alcohol (recrystallizing on cooling) and in chloroform, tolerably so in ether and acetone, but is quite insoluble in petroleum spirit, sparingly so in cold glacial acetic acid, although easily on being heated. It is somewhat soluble in boiling water and in hot potash, but separates out on cooling.

Dibenzoylhydrocoton is converted, for the most part, into hydrocoton and benzoic acid by fusion with potassic hydrate and into benzoic acid and unisolated decomposition products by the ation of concentrated hydrochloric acid in a sealed tube at 140°. Di- and tetra-bromo compounds have been obtained

*Hydrocotoïn.**

Hydrocotoïn remains in the resinous mother liquor from which the other bodies have been separated as above described. The resinous mass is treated with weak soda lye, and the solution precipitated with hydrochloric acid. The crude red resinous precipitate of hydrocotin is purified by crystallization from hot weak alcohol.

It crystallizes from a concentrated alcoholic solution in large pale yellow prisms, and from a dilute solution in hard, thin needles, which are often more than 5 c.m. in length. It is soluble in ether, sparingly so in petroleum spirit, but easily dissolves in chloroform, acetone, and in hot ammonia, crystallizing out on cooling. It has a neutral reaction. Ferric chloride gives a dark brownish red coloration as with cotoïn and dicotoïn. Concentrated nitric acid forms a blood-red solution when heated, which deposits a red resin on cooling. This resin dissolves in alcohol to a blood-red colour. It is partly soluble in boiling water, but is deposited in the form of almost white prisms on cooling. It melts at 98°; the formula is $C_{15}H_{14}O_4$.

Bromine, acetyl, and bromo-acetyl derivatives have been obtained.

Fusion with potassic hydrate converted it into hydrocoton and benzoic acid, and heating with concentrated hydrochloric acid in a sealed tube at 140° into benzoic acid and methylic chloride.

Piperonylic Acid ($C_8H_6O_4$).—This acid is obtained from the paracoto bark which has been already extracted with ether, by extracting the bark with lime water. The extract is made acid with hydrochloric acid and then shaken with ether. The ether residue is partly crystalline, and can be purified by re-crystallization from alcohol, then converted into a potassium salt, and the aqueous solution of this salt treated with animal charcoal. "Genuine" coto bark also contains this acid, but only in quantity sufficient to give a qualitative reaction.

The properties of piperonylic acid have been already described by Fittig and Mielck (*Liebig's Annalen*, 152, 40). Many of the salts described by them have also been prepared, in addition to many of its derivatives.

Ethereal Oil of Paracoto Bark.†—By boiling paracoto bark with water an ethereal oil distils over, which has the peculiar smell of the bark; but as the oil has a very high boiling point, a preferable method is to subject the bark to the action of superheated steam. The oil in the distillate can be extracted with ether.

By this treatment the authors have obtained from a large quantity of the bark about one kilogramme

* A specimen of hydrocotoïn has been presented to the Society's Museum by Dr. Hesse.

† A specimen of this essential oil has been presented to the Society's Museum by Dr. Hesse.

of the oil. Freshly prepared it is very mobile, colourless, neutral, and has a peculiar smell. Its specific gravity is 0·9275 at 15°. It has a lævo-rotatory power of 2·12°. It begins to boil at 78°, alcohol (from the ether used) distilling over; the temperature then rises to about 100°, and oil and water come over. The temperature goes up quickly to 160°, at which it remains for some time, gradually rising to 170°—175°, then to 220°—235°, and finally to 240°—250°. At the last temperature yellowish fumes are evolved, and a thick yellow mass remains in the still, which has not been further investigated. The chief part of the oil distils over at 220°—235°.

By repeated fractionation five characteristic oily bodies have been separated. α Paracoten, $C_{12}H_{18}$, b. p. 160° (uncorr.), and specific gravity 0·8727 at 15°. β Paracoten, $C_{11}H_{18}$, b. p. 170°—172° (uncorr.), specific gravity, 0·8846 at 15°.

α Paracotol*, $C_{15}H_{24}O$., b. p. 220°—222°, specific gravity, 0·9262 at 15°. It has a slight smell, and gives, with concentrated sulphuric acid, a deep red mass, and, with concentrated nitric acid, a yellow resin. Heated above its boiling point it becomes yellow, and is partly decomposed. It gradually acquires a yellow colour on exposure to air. This oil appears to be isomeric with cubeb oil, with which it has much similarity.

β Paracotol, $C_{28}H_{40}O_2$, b. p. 236° (uncorr.), specific gravity, 0·9526 at 15°. It is a colourless oil, with a slight aromatic smell. It is somewhat difficult to separate this oil from α paracotol.

γ Paracotol, $C_{28}H_{40}O_2$. This is an isomer of β paracotol, from which it is distinguished by its higher specific gravity, boiling point, and by its very slight action on the polarized ray.

Its specific gravity is 0·965 at 15°, and it boils at 240°—242° (uncorr.). It has a slight smell, is colourless, and becomes very quickly yellow on exposure to air, owing no doubt to oxygen being absorbed.

Physiological and Therapeutic Action of Coto Bark and its Constituents.

The conclusion arrived at by Dr. V. Gietl, who prescribed an alcoholic tincture of the bark, is that "We have in the new ('genuine') coto bark a specific remedy for diarrhœa in its various modifications."

Dr. Burkart has communicated his experience with regard to the employment of the bark itself and of an alcoholic tincture of it (1 : 9). In doses of 0·5 to 1·0 gram, the bark caused hiccough, nausea, a burning sensation in the stomach, and even vomiting. With a dose of 1 gram of the bark the burning feeling in the stomach was very considerable, extending from a quarter to half an hour; finally, most of the bark was vomited. The tincture was even more nauseous. When rubbed on the skin it produced hyperæmia, with a burning sensation.

Dr. Burkart also states that paracoto bark, similarly prescribed, has much the same effect as coto bark, excepting that its action on the skin, mucous membrane, and ulcerous surfaces is extremely slight, so that, to produce an action equal to coto bark, a considerably larger quantity must be used. He has also prescribed an alcoholic tincture of "genuine" coto bark, and his observations are in accord with those of V. Gietl's, but he believes that, on account of its secondary action on the stomach, the bark is not apparently suitable for therapeutic purposes.

For these and other reasons the authors recommend the employment of the active principles of these two barks, cotoïn and paracotoïn, both of which have yielded good results in the hands of Dr. Burkart, who employed cotoïn partly in the form of powder (·05 gram per dose every two or three hours), partly in aqueous solution (0·1 to 0·5: 120 with the addition of a taste corrective) in cases of acute and chronic stomachic catarrh. In cases of chronic stomachic catarrh, with relaxation of the coating of the stomach, it was specially efficacious, and in the diarrhœa of phthisis also causing a reduction of the febrile symptoms.

Cotoïn, in all cases, Dr. Burkart further remarks, is passed by the urine within 4—6 hours after being taken. To detect cotoïn in the urine he used the nitric acid reaction.

Paracotoïn was found to have absolutely no action on the mucous membrane.

Paracotoïn was employed with great success by Dr. Burkart in powder (in doses of 0·1 to 0·2 gram every two or three hours) in cases of chronic and acute stomachic catarrh, and with success in two cases out of three in cholera nostras.

Professor Bälz (Tokio, Japan,) has successfully employed paracotoïn in Asiatic cholera, and, where possible, by subcutaneous injection, in doses of 0·2 gram.

Oxyleucotin, leucotin, and hydrocotoïn have an analogous action, but in such a very slight degree that very large doses of these bodies are necessary to have the same effect as cotoïn and paracotoïn.

SYRUP OF LACTO-PHOSPHATE OF LIME.*

BY EDWARD S. KELLY.

This preparation is not a chemical combination, but a simple solution of phosphate of lime in lactic acid, preserved with sugar. The observations of Dussart mentioned by Dorvault may perhaps be considered the oldest authority upon this subject; he proposed the use of lacto-phosphate of lime, although its chemical formula had not been determined.

He found it useful in rachitis and osseous affections accompanying a bad state of the digestive organs and in dysentery. It was prepared by saturating lactic acid with gelatinous phosphate of lime concentrated over a water-bath to the consistence of honey, forming a white product, soluble in water, partially soluble in alcohol; it was given in the form of pastils and syrup, dose from 1 to 10 grams.

This gelatinous or hydrated phosphate of lime was recommended by Possoz and Collas as being better than the ordinary phosphate of lime. It is prepared thus:—Calcined bone is treated with hydrochloric acid, forming a solution, the acid is neutralized with carbonate of soda, and the precipitate washed and dried, but not enough to render it pulverulent; it contains 2 parts of water to 1 of lime.

Griffith's 'Universal Formulary,' third edition, gives a formula by Chiles for this syrup: solution of chloride of calcium is mixed with solution of phosphate of sodium and the resulting precipitate, after washing, is dissolved in conc. lactic acid and syrup added. As thus prepared it does not contain as much lactic acid as would seem desirable. Nelson, in his 'Druggist's Handbook of Private Formulas,' page 42, No. 111, gives a process which is the same as Neergaard's, except that the amount of sugar is a little larger.

* Specimens of α, β, γ, paracotol have been presented to the Society's Museum by Dr. Hesse.

* Read before the Alumni of the Mass. Coll. of Pharm. From *New Remedies*, November, 1879.

In the *Druggists' Circular*, volume 19, 1875, page 146, is an account of some so-called syrup lacto-phosphate of lime which, being tested, proved to be only solution of phosphate of lime in hydrochloric acid.

The 'Proc. of the Am. Pharm. Assoc.' contain various formulas for this syrup. In volume 19, page 161, is that of Neergaard's which is so well and favourably known. Volume 21, page 188, gives processes by R. Rother and C. Menière, the latter using lactate of sodium and acid phosphate of lime, dissolving each in a little water; the solutions are then mixed with syrup and flavoured. In volume 22, page 80, is Langelle's process, essentially that of Neergaard's. Volume 24, page 104, has a formula in which basic phosphate of lime is used, but the amount is only 3 grains to the tablespoonful. This basic salt is so made as to contain 25 per cent. of water, which renders it soluble, and in this condition it may be kept on hand ready for use; on page 241 of the same volume may be found the formula for its preparation.

The *American Journal of Pharmacy*, volume 45, page 234, contains a note by Brown, of Philadelphia, in which he states that he obviated the troublesome precipitate often met with in this syrup by using glucose in place of sugar.

Volume 48, page 58, of the same journal has the opinion of John W. Watts, of Baltimore, upon a so-called syrup lacto-phosphate of lime, into which phosphoric, lactic, and hydrochloric acids enter, prepared thus:—To the magma of freshly precipitated phosphate of lime the two former acids are added; these not being sufficient to dissolve all the lime, the hydrochloric acid is added, which is also said to be necessary to its preservation, not keeping more than two or three months without it, and being nearly enough to convert all the phosphate into chloride. The formula is given to show the amount of hydrochloric acid which it contains.

Phosphate of lime	℥ss. + gr. 16.
Dilute phosp. acid	ʒvij.
Lactic acid	ʒi.
Hydrochloric acid	ʒvi.
Sugar	q. s.

M.

Neergaard may justly be considered as the man who first brought syrup lacto-phosphate of lime to the attention of pharmacists, and his formula is the one I have adopted without modification; it is as follows:—

Conc. lactic acid	fl. ℥i.
Magma of freshly precipitated phosp. lime.	q. s.
Orange flower water	fl. ℥iss.
Distilled water	q. s. ad. fl. ℥viij.
Sugar	℥xi.

M. S. A.

The magma of phosphate of lime has been prepared both from the precipitated phosphate of lime of commerce and calcined bone; the latter is cheapest and hence used in making the syrup upon a large scale. The lime is put into a porcelain-lined kettle and hot water added, direct heat is applied, and strong, pure, hydrochloric acid added with stirring until the salt is dissolved; it is then removed from the fire and ammonia water *slowly* added (made thus, 880° ammonia, 1 part, and water, 7 parts), with constant stirring (to prevent the formation of hard curd-like masses in the precipitate), until the lime is all thrown down. The magma is now ready to be washed; it has generally been done by transferring to a cotton cloth and taking to the sink, running in water and squeezing out till the washings cease to give a precipitate with an acid solution of nitrate of silver. Of late the washing has been done by decantation, which is less tedious, and must be the process employed in large operations. Hot and cold water have both been used to wash the lime, but that treated with hot water is equally soluble with that treated with cold water. When all the solution of chloride of ammonium has been removed, and the magma transferred to a mortar, the lactic acid was added and by constant stirring made to dissolve the lime to saturation; the acid when saturated being still notably sour to the taste. The orange flower water and distilled water were then added to make the required amount; as the lime does not all go into solution, it is filtered and water added through the filter to preserve the measure. After the solution of the sugar is complete, the preparation is again filtered. Thus prepared, syrup lacto-phosphate of lime is of a light straw colour, pleasant acid taste, and agreeable flavour.

Mr. Neergaard remarks that heat should not be used to dissolve the sugar, as it would make the syrup milky, but no heat is required, as the quantity of sugar is not enough to make a saturated solution.

Having met with the same trouble spoken of by Mr. Brown, namely, precipitation, I have modified my process of late, adding one drachm of hydrochloric acid to each pint of the syrup thus made, the difficulty is obviated.

The character of this precipitate is much like the soft jelly often found floating in the syrup or adhering to the sides and bottom of the bottle; this will redissolve by the application of heat, but may not remain in permanent solution. The odour or colour does not change after this precipitation has taken place; hence the conclusion that it is not a fungous growth.

Although the testimony of physicians as to its therapeutical value does not agree, this syrup seems worthy of a place in the U. S. P. of 1880, and if we can judge by the formulas offered, and the number of manufacturers who quote it upon their lists, it has had a very considerable sale and use. Certainly for pleasant taste we have but few preparations which will favourably compare with it, and in these days this is a consideration both with physicians and those who must take medicines.

THE MINERAL CONSTITUENTS OF CINNAMON AND CASSIA.*

BY O. HEHNER, F.C.S.

The discrimination between ground cinnamon (*Cinnamomum Zeylanicum*) and cassia (cassia lignea and cassia vera) is a matter of some importance, but of considerable difficulty. These spices are imported into this country in very large quantities. Thus during the first forty-three weeks of this year 18,002 packages (of 56 lbs. each) of cassia lignea, against 13,212 packages of cinnamon (each weighing about ¾-cwt.), and during the same period of last year, 45,433 packages of cassia and 13,489 of cinnamon were imported. The wholesale prices of cinnamon fluctuate between 6*d.* and 4*s.* 3*d.* per lb., whilst cassia barely reaches 6*d.* Considering now the extreme similarity between these barks, both botanical and structural, not a little inducement exists to substitute the cheaper for, or mix it with the more valuable spice, and it is a fact, that notwithstanding the large amount of cassia imported, it is almost impossible to obtain it under its proper name at retail establishments. I am informed that cinnamon sticks are never ground, but always sold in their whole state, only cinnamon chips and cassia being powdered. Much cassia, no doubt, is used by distillers of essential oils, manufacturers of mixed spice and of curry powder, but it cannot be doubted that much of it finds its way into the consumer's hands under a name to which it has no valid claim. However this may be, it is important to public analysts that they should be in possession of means to discriminate between the two kinds of bark.

The only test which, as far as I am aware, has been in use, is that founded upon the alleged difference in the behaviour of the decoctions towards iodine. Thus Flückiger and Hanbury direct in their 'Pharmacographia' to "make a decoction of powdered cinnamon of known genuineness, and one of similar strength of the suspected

* Read before the Society of Public Analysts, November 19, 1879. From *The Analyst*, December, 1879.

powder. When cool and strained test a fluid ounce of each with one or two drops of tincture of iodine. A decoction of cinnamon is but little affected, but in that of cassia a deep blue-black tint is immediately produced." But, considering that both cassia and cinnamon contain much starch—as shown by the microscope—it seems *à priori* improbable that cassia starch should act normally towards iodine, whilst that of cinnamon refuses to do so. The different amount of tannin would certainly not explain the distinction, as has been suggested by Pereira, as *both* cassia and cinnamon are rich in tannic acid. But the fact is that decoctions of *both* cassia and the cheaper kinds of genuine cinnamon turn blue with iodine. A few drops of iodine are first decolorized by the solutions, but a point is readily reached when the blue colour permanently makes its appearance, modified, of course, by the yellow colour of the decoction. The finest samples of cinnamon do not react much with iodine, probably because, on account of their immaturity, they contain little real starch. The iodine test is therefore of very questionable value, and genuine cinnamon might by it be condemned as adulterated. It may be admitted that in the case of cassia the reaction is obtained more readily than with cinnamon.

To find, if possible, some real difference between the two kinds of bark, I examined their mineral constituents, believing that the more woody bark, cassia, would contain a larger amount of salts of lime and magnesia than the delicate membranous cinnamon. The following analyses show, however, that this supposition was not entirely substantiated. All analyses were made upon the ash obtained at the lowest possible temperature (below visible red heat), but not recarbonated, that is to say, precisely as they would result in an ordinary analysis.

	CINNAMON.			CASSIA	
Per lb.	1*s.* 10*d.*	3*s.*	3*s.* 6*d.*	Lignea.	Vera.
Coal	0·27	0 41	0·31	1·26	—
Sand	1·09	0·53	0·52	3·16	0·24
SiO_2	0·27	0·31	0·25	0·90	0·20
CO_2	29·29	32·27	32·40	*27·18	36·26
P_2O_5	3·52	2·20	3·00	3·67	1·13
SO_3	2·42	2·73	2·84	2·02	0·71
Cl	0·18	0·51	0·76	0·14	0·09
Fe_2O_3	0·78	0·41	0·46	1·23	6·14
Mn_3O_4	0·86	0·97	0·13	5·11	1·13
CaO	40·09	36·98	40·39	25·29	52·72
MgO	2·65	3·30	3·86	5·48	1·10
K_2O	14·22	16·70	10·35	20·58	5·60
Na_2O	3·98	2·97	4·65	3·98	0·90
	99·62	100·29	99·92	100·00	100·16
Ash	4·78	4·59	4·66	1·84	4·08

	WHOLE CINNAMON.					CINN. CHIPS.
Retail, per lb.	1*s.* 10*d.*	3*s.*	3*s.* 6*d.*	3*s.* 6*d.*	6*s.*	contg. wood, 9*d.* per lb.
Moisture	12·67	12·05	11·38	11·64	12·94	11·25
Ash in Bark	4·78	4·59	4·66	3·44	4·28	4·44
Lime in Ash	40·09	36·98	40·39	34·32	36·99	42·11
Mn_3O_4	0·86	0 97	0·13	0·62	0·59	0·34
Soluble Ash	25·04	28·98	25·22	26·36	17·67	18·34
Insoluble Ash	74·96	71·02	74 78	73·64	72·33	81·66

	CASSIA LIGNEA.			CASSIA VERA.	
	Whole.		Ground.		
Moisture	14·22	11·88	11·05	10·37	11·36
Ash in Bark	1·84	2·54	2·55	4·08	4·85
Lime in Ash	25·29	34·49	28·63	52·72	43·40
Mn_3O_4	5·11	4·94	3·55	1·13	1·53
Soluble Ash	40·58	26·78	30·91	8·36	15·89
Insoluble	59·42	73·22	69·09	91·64	84·11

Examining these figures it appears—*First*, that the *proportion of ash* in cinnamon fluctuates between comparatively narrow limits. Cassia vera contains an amount equal to that of cinnamon, but cassia lignea yields much less. *Secondly*, that the amount of *ash soluble in water* is about one quarter of cinnamon ash, less in cassia vera, more on cassia lignea. *Thirdly*, that cinnamon ash contains less than one per cent. of *oxide of manganese*, cassia vera upwards of one per cent., cassia lignea far more, up to five per cent. This is indeed the most noteworthy feature brought out by the analyses. The amount of manganese has a direct influence upon the colour of the ashes. Thus all cinnamon ashes are *white*, or nearly so, those of both descriptions of cassia *grey or brown*, and the latter, when heated with hydrochloric acid, yield an abundance of chlorine gas. Thus the amount of manganese serves to distinguish cinnamon from cassia lignea with a high degree of probability, and even a comparatively moderate admixture of the latter would thus be rendered evident in the former. The manganese is most readily separated from the ash by means of bromine after the phosphate of iron has been precipitated by acetate of soda.

* By difference.

The difference between cinnamon and cassia vera is not so marked, but the low proportion of soluble ash in this will be a point worthy of notice. But cassia vera is only imported to a very small extent, and it is, as an adulterant or substitute, of far less importance than the cassia commonly so-called, namely cassia lignea. It is, moreover, so mucilaginous that when heated with water it yields a glairy or ropy decoction.

All of the samples, the analyses of which are reported above, were of undoubted purity, and many of them were kindly furnished me by Messrs. J. Travers and Son, to whom I am much indebted. My thanks are also due to Mr. E. Riley for having assisted me in carrying out the investigation.

In the discussion which followed the reading of this paper, Dr. Dupré asked Mr. Hehner whether he had any information as to the places where the cinnamon and cassia came from. It might be that this remarkable amount of manganese was not always found; was there reason to suppose that it was really a characteristic of cassia, or that it was due to a local peculiarity of the district?

Mr. Stewart asked if Mr. Hehner had made any determinations of the quantity of iodine added in each case; it seemed to act much more rapidly with cassia than with cinnamon.

Mr. Hehner, replying to Dr. Dupré, said that he had had one of the samples of cassia lignea for two years, two other samples were quite recent, two cheap cinnamons were recent also, and they gave an ash very rich in manganese, which no doubt proved that they consisted of cassia. He had no doubt that by far the largest amount of ground cinnamon sold was really cassia. In reply to Mr. Stewart, he said cinnamon decoctions required, as a rule, a very much larger quantity of iodine. The test as given in different books was really contradictory. Flückiger and Hanbury say: first add one or two drops, and "a deep blue-black tint is immediately produced," and a few lines further on they say, "But the colour quickly disappears and becomes permanent only after much of the test has been added." No doubt there is a little more starch in cassia than in cinnamon.

CARLSBAD SALT.—(Dr. Uloth.)

The natural Carlsbad Salt, held in solution by the Carlsbad Mineral Spring, contains about 2 per cent. of potassium sulphate, which constituent was usually left out, when preparing the salt artificially. The author directs the following proportions, in order to prepare artificial Carlsbad water:—

Sodium Sulphate, Anhydrous	45 parts.
Sodium Bicarbonate	33 ,,
Sodium Chloride	20 ,,
Potassium Sulphate	2 ,,

Dissolve 4 parts of this in 500 parts of water. *Pharm. Zeit.*, and *Pharm. Centralh.*

The Pharmaceutical Journal.

SATURDAY, JANUARY 10, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

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DEATH BY MISADVENTURE.

THE London daily paper which lays claim to having the largest circulation in the world has within the last few days informed its readers in an editorial article that, "in spite of all our legal enact- "ments and provisions, gross neglect may still pre- "vail in the dispensing of dangerous drugs." The particular case that has called forth this dictum is of a nature that forbids dissent from the opinion expressed, and probably many who read the article and the details of the case to which it refers will be impressed with a conviction that it is but another illustration of the necessity, insisted upon sometimes in medical journals, for a thorough reform of the system under which poisonous and dangerous medicines are supplied to the public.

To a certain extent such an idea will be justified, not only by the facts of this particular case, but also by those of similar cases that we have lately had to record in this Journal, and so far as those cases are illustrative of the system under which dangerous drugs are supplied to the public we must acknowledge that there is no kind of foundation for objecting, as we recently did, to the demands of the *Medical Press and Circular* for "a speedy and sweeping reform," since it is impossible to read the case reported at page 557 without concurring with the opinion expressed by the jury that there had been gross neglect on the part of those whose duty it was to attend to the management of the drugs.

But while making this admission it must not be supposed that we retract in the slightest degree our objections to the views put forward in the medical journal above referred to, in so far as they tended to throw an imputation upon registered chemists and druggists. The case now under consideration is not one that justifies any such imputation, though in accordance with a common form of popular ignorance the writer in the *Daily Telegraph*, failing to recognize the fact that a place where drugs are sold across the counter is not necessarily a chemist and druggist's shop, makes use of the case to ground an argument as to the necessity for caution being exercised by chemists and druggists to avoid the hasty distribution of poison.

In reality as the sale of the drug which caused the death of the child did not take place in a chemist and druggist's shop at all, but in a shop having, it is true, that semblance, but kept by a regularly qualified medical practitioner, using the designation of a physician, and assisted in the conduct of his business by a licentiate of the Society of Apothecaries. Neither the one nor the other was directly responsible for the mistake by which the child's death was caused, but having left the shop open in the charge of a mere boy, who had on previous occasions manifested a precocious desire to officiate as a dispenser, there was, it must be admitted, too much reason for the censure expressed by the jury, and re-echoed by the *Daily Telegraph.*

Among the cases of death by misadventure a very considerable proportion are not at all the result of any neglect of the precautions prescribed by law for the observance of legally qualified vendors of poisonous drugs, but are due to want of caution or deliberate misuse on the part of the persons who obtain possession of such drugs, either by ordinary purchase or by means of a physician's prescription. Some of our medical reformers would recommend as a remedy against poisoning in this way the adoption of a system like that prevailing in some parts of the Continent, by which it is made impossible to obtain any kind of medicine except by the order of a qualified medical man; others would restrict the use to which prescriptions are to be put by patients for obtaining more than one supply of the medicine ordered. It may be that there are grounds upon which either, or both, of these plans could be advocated as being desirable and beneficial in the interest of the public, either in general or in reference to special instances; but the question whether this be so or not is one for consideration by medical men rather than by pharmacists. The advocacy of any such plans must, however, be founded upon well ascertained facts, not upon mere assumption, and even if it does sometimes happen that in the absence of such restrictions, cases of poisoning occur we contend that there is no ground for throwing blame upon chemists and druggists.

Such restrictions or rather regulation of the sale of poisons as there are in force have been brought into existence by the efforts of the Pharmaceutical Society, and it appears a mere gratuitous exhibition of ignorance to find fault with the authority possessed by that body in this respect. The cuckoo cry about the "facilities afforded for obtaining poisons," so often heard, is one that does not in reality convey any reproach to the registered chemist and druggist, who carries on his business in such a way as to give force to the specific provisions of the Pharmacy Act, and by the timely exercise of his skill and experience offers additional protection to his customers. However thoroughly his duties are performed in these respects, he cannot absolutely provide against a possible misadventure resulting from causes beyond his control. Only three weeks ago we referred to a case, illustrating this fact, in which a physician's prescription was made the medium of obtaining, in a perfectly legitimate way, sufficient poison to produce by its misuse a fatal result. The daily papers of this week report another case of a similar nature in Bayswater, where laudanum sold in accordance with the provisions of the Pharmacy Act was misapplied with fatal consequences. It is idle to talk about the facilities for obtaining narcotic and other poisons, as the jury is reported to have done at the inquest in this case, as if such facilities were unduly afforded by chemists and druggists, and especially is this kind of comment beside the question, so long as some of the most potent poisons can be readily obtained in the form of patent medicines at the grocers or the co-operative stores, without any indication of their dangerous nature to warn purchasers against their incautious use, so long also as the presentation of a physician's prescription enables a person to obtain, either from one or from several shops, a supply of poison that may have fatal effects if misapplied.

We contend, therefore, that the vague complaints often made in a sense detrimental to the chemist and druggist are as a rule without any foundation. The questions they raise are in reality questions for medical practitioners to consider and if possible deal with. Through the agency of the Pharmaceutical Society the drug trade has done its part towards regulating the sale of poison and limiting the facilities of obtaining poisons, and in the exercise of the more special functions of pharmacy the several members of that trade constantly furnish to the public, as well as to medical men, protection against the consequences of accidental mistakes in prescriptions. If in certain cases medical men desire to limit the use that is to be made of their prescriptions it is for them to institute such an arrangement among themselves and with their patients, possibly also with that object to seek the co-operation of the chemists and druggists who perform the supplementary work of dispensing the medicines they order. If it be desirable that a person suffering from neuralgia or the effects of intemperance should not be allowed to procure laudanum or chloral without a physician's order, the grounds upon which such restrictions are to be claimed must first be well made out and supported by the evidence of facts, and then it will be a question between the medica men who seek to impose such restrictions and the public who are to be subjected to them whether they will, on the one hand, be tolerated, and whether on the other, they can be enforced.

Besides the cases of the kind above referred to, there are some in which "death by misadventure" is certainly referable to neglect on the part of the persons who have the management of drugs, and, from the result of many years' special observation, we can affirm that such cases are more frequently traceable to medical men than to chemists and druggists. In stating this, we do not desire to make invidious or unnecessary comparisons, but merely to demonstrate the absence of any adequate foundation for much of the comment upon the subject of accidental poisoning which has appeared in the medical press. If the writer of the article in the *Daily Telegraph* of last Monday would correctly inform himself as to the actual circumstances of such cases we are confident he would perceive that, in regard to the sale of poisons, his special reference to chemists and druggists as requiring advice to observe caution where the public safety is concerned is not so much needed in that quarter as it is in others. In regard to the spirit of his general recommendations, however, we thoroughly concur with him, and in the interest not only of the public, but also that of chemists and druggists, we should be glad to see him at some future time dealing with the subject under the light of more accurate information.

ANOTHER CREAM OF TARTAR PROSECUTION.

At the moment of going to press we learn by telegram that another prosecution for the sale of cream of tartar containing six per cent. of tartrate of lime has been instituted at Romsey, and that the summons was dismissed. The defence of this case was conducted by the Birmingham Association, and we congratulate the executive of that body upon having so successfully followed the lead of the Society.

The number of instances in which prosecutions have been undertaken without any sufficient reason and where there was no foundation for the charge of adulteration is now so considerable, and the needless vexation and trouble caused thereby are so prejudicial, that there seems to be ample occasion for adopting the suggestion made by the President at the late meeting of the Council and communicating with the Local Government Board with the view of effecting some arrangement by which the certificates of public analysts should be subjected to competent scrutiny and consideration before being made the basis of prosecution. At present the decision of the question whether in any particular instance adulteration has been practised or not seems to be left in very incompetent hands, and to be dealt with in a manner calculated to cause much inconvenience and detriment to persons who are entirely blameless.

A CORRECTION.

By a slip of the pen, it was stated last week in our yearly *résumé*, that Mr. Schacht became Vice-Presi- in the place of Mr. Bottle. This was not correct, Mr. Savage having been Mr. Schacht's immediate predecessor in that office, which he had held for three years.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The next meeting of this Association will be held at George Street, Hanover Square, on Wednesday evening, January 14, when a paper on "Benzol and its Derivatives" will be read by Mr. G. W. Bullen.

The name of Mr. John Hurst, Pharmaceutical Chemist, has been placed by the Lord Chancellor on the Commission of the Peace for the Louth Borough. Also, in addition to the pharmacists already mentioned as having been elected to municipal office, Mr. Herbert J. Orchard, Chemist and Druggist, has been chosen Mayor of Newport, I.W.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, January 7, 1880.

MR. GEORGE WEBB SANDFORD, PRESIDENT.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT.

Present—Messrs. Atkins, Bottle, Churchill, Gostling, Greenish, Hampson, Hills, Robbins, Savage, Shaw, Squire, Slipper, Symes and Williams.

The minutes of the previous meeting were read and confirmed.

The minutes of the meeting for the election of annuitants were also read.

The SECRETARY stated, in reply to a question by Mr. Williams, arising out of the minutes, that the total amount of the Society's investments on the General Fund was about £22,000.

THE BOARD OF EXAMINERS.

The SECRETARY read a letter from the Privy Council, approving of the gentlemen appointed last month by the Council to act as examiners during the present year.

THE REPORTING OF COUNCIL PROCEEDINGS.

The SECRETARY read the report of the Special Committee appointed to make arrangements for the admission of reporters. The Committee recommended that a second table be placed in the Council room for the necessary accommodation of press reporters; and that press reporters should leave the room when the Council resolves itself into committee.

Mr. HAMPSON moved that the report be received and adopted.

Mr. GOSTLING seconded the motion.

The PRESIDENT said he had received one application for admission.

Mr. SHAW asked if the discussion on this motion should take place in committee.

The PRESIDENT thought it would be better.

Mr. HAMPSON saw no necessity for such a course.

The PRESIDENT suggested that the adoption of the Committee's report should be carried first, and then that any discussion on particular applications should take place in Committee.

The VICE-PRESIDENT suggested that an addition should be made to the Committee's report, providing that the editor of any journal which wished to be represented should make application, and that if his application were acceded to, a letter from the Secretary, stating that fact, should be the credential for a person entering the room as a reporter.

The PRESIDENT thought this suggestion was really covered by the resolution passed last month.

Mr. ATKINS thought the Vice-President's suggestion was well worthy of adoption.

Mr. HAMPSON did not see any necessity for hampering the matter with minute regulations of this sort.

The motion for the adoption of the report was then passed unanimously.

Mr. SYMES expressed his dissent from the Vice-President's suggestion.

Mr. SAVAGE moved that the consideration of the application received and the details should be considered in committee.

Mr. HAMPSON objected, and on the motion being put it was lost.

The application was about to be read, when

The VICE-PRESIDENT said he did not understand that the vote just taken was on the question of individual applications.

The PRESIDENT also stated that there were several matters of detail which he thought ought to be discussed, but which he had not been able to get the Committee to go into. These matters he still thought had better be discussed in committee. He thought the Vice-President's suggestion was a very good one, and was not intended to throw any difficulties in the way.

After some further discussion, in the course of which Mr. Squire stated that he had not understood the object of the motion for going into committee,

Mr. BOTTLE moved—

"That only one reporter be admitted from any journal at the same time."

He wished to do so before any application was read, in order that the motion might not have any personal application.

M. SHAW seconded the motion.

Mr. HAMPSON asked if notice ought not to have been given of this motion. It opened the whole question, *de novo*, in his opinion.

The PRESIDENT did not think it was necessary to give notice of such a motion, which only referred to the detail of arrangements to be made, and he thought the sooner the arrangements were made the better.

The motion was carried *nem. con.*

Mr. CHURCHILL said the Council had not yet settled the question of the reports of the committees, which was very important.

The PRESIDENT said he had intended to propose that, inasmuch as there were sometimes private matters included in the reports of the committees, the Council should, if necessary, go into committee to receive such reports, when, under the regulation already passed, the press reporters would be required to leave the room.

Mr. GOSTLING thought such a resolution a very proper one, and he would move it.

Mr. CHURCHILL seconded the motion.

The VICE-PRESIDENT thought the Council might have a broader regulation. The proceedings of committees were supposed to be private, and never published, but simply the fact that the reports were agreed to. If that were the case, and the constituency of the Council were in no way deemed entitled to know the contents of the reports of the committees, would it not be well to make a general regulation that reporters be not admitted until the reception of the reports was concluded? Why should they come into the room simply to be asked to leave it whenever a report was being read?

Mr. WILLIAMS said there was a difficulty in the words "if necessary." How could the Council tell whether it was necessary or not, unless the whole report were read.

Mr. GOSTLING said there would be some member of the Committee present who could say whether the report contained matter which ought not to be published.

Mr. WILLIAMS said in that case there would be a long discussion each time whether the Council should go into committee or not, which was not a practice to be encouraged, as it wasted a great deal of time.

Mr. GOSTLING remarked that as a rule the report of the General Purposes Committee contained details not proper to be published.

Mr. HAMPSON said if this motion were passed it would have the effect of shutting out all discussion of committee work. There had been many interesting and important discussions on reports of committees, and to shut them out would be to curtail the report even in the Society's own Journal.

Mr. SYMES thought the motion was scarcely in accordance with the recommendation of the Special Committee. The suggestion made to the Council was, he understood, that only some special portion of a report should be heard in committee. But, according to the motion, if there were two lines in a report, containing matter of a private nature the whole report would have to be taken in committee. The President himself had suggested that a red mark should be placed against the report of any matter which the Committee thought should be kept private.

The PRESIDENT said the paper from which he had just been reading was the same that he laid before the Committee. It would be quite competent for any gentleman who was a member of the Committee to say there were certain things in the report which ought not to be published. He could not join with the Vice-President in thinking that the reporters should be excluded until all the reports had been disposed of; if so they would only come in sometimes when the diplomas were being stamped, which always formed the last item on the agenda. He was quite willing that the motion should be put in any form which would make it workable.

Mr. Robbins said it appeared to him there was only one committee whose proceedings were of very great interest to the members outside, and that was the General Purposes Committee. But the members of Council all knew that there were a great many questions which came before that Committee which could not be published. The most important part of the Society's work was done in that Committee. What was done by the other committees was of comparatively little importance to readers outside.

Mr. Gostling said he would, at the President's suggestion, put the motion in the following form:—

"That inasmuch as matters of a private nature are sometimes recorded in the proceedings of the various committees, it will be well before such minutes are read, for the Council, if necessary, to resolve itself into committee for the purpose of receiving and considering the report of such private matters."

Mr. Churchill seconded the motion.

Mr. Williams thought the reports of the committees should always be read in committee, and that then it should be an open question whether the discussion should take place in committee or not. The report might contain nothing of a private nature, and might contain matter of great public interest which ought to be discussed openly and reported. That could be decided in two minutes, after the report had been read.

Mr. Atkins thought that all the differences which were now springing up like mushrooms might have been avoided if the Council had clearly made up its mind on the point of whether the reporters should be called upon to leave the room or not. The report of the Committee including that regulation had been adopted without any discussion, and he certainly was not aware that the subject was concluded, or he should have offered some remarks upon it. He felt more and more convinced that the reporters might have been allowed to remain subject to the same honourable regulations as the Council's own reporter. He did not wish to be a prophet of evil after having supported the change, but he thought it would be found that asking the reporters to be continually trotting in and out of the room would be a great nuisance.

The President said he had no fear of the reporters, but the Council ought to retain in its own hands the means of keeping them in order.

Mr. Williams then moved as an amendment—

"That the Council shall resolve itself into committee to receive the reports of all committees, and discussions thereon shall be taken in committee or open Council as decided by the Council at the time."

Mr. Squire seconded the amendment.

Mr. Hampson decidedly objected to the amendment. The report would be perfectly unintelligible if the reporter was unable to start with the text. It was the custom in all public bodies for the reports to be read and extracts from them to be published. It was only an occasional matter which the Council wished to keep private. He thought it very undesirable that either of these motions should pass. These important changes should be introduced in a proper way by notice of motion being given, so that members of Council should have an opportunity of thinking the subject over. He should much prefer to have the reporters present on all occasions and to trust to the honour of those gentlemen. He regretted now that the Council had agreed to the exclusion of reporters when in committee.

Mr. Squire said the question whether reporters shou be present in the room or not had been already decided and it did not bear on this point.

Mr. Savage said it did very largely, because if he understood the proposition aright, under any circumstance the report of a committee must be read in committee, and a resolution was already passed that reporters must leave the room when the Council was in committee, so that during the reading of the report of every committee, however insignificant, and however desirable it might be for them to be present, they must leave the room.

The President said that depended on which proposition was adopted.

Mr. Bottle drew attention to one of the Bye-Laws which said that every committee should present its report to the Council. Now it was proposed that the report should be made to a committee.

Mr. Symes wished to point out that this proposition, though it did not quite undo everything the Council did last month, would undo half or two-thirds of it, for the reports of the committees occupied at least half of the time. Mr. Williams's amendment would prevent the re-reporters coming in until the Council was about to break up.

The amendment was then put and lost, and the original motion was carried by a considerable majority.

Mr. Shaw said of course the responsibility would devolve upon some members of the respective committees, of moving that the Council should resolve itself into committee.

Mr. Atkins said he should move on another day that the reporters be not asked to leave the room.

Mr. Hills said he should move, if it were not too late, that the press reporters should be admitted on the same conditions as the official reporter.

The President said the Council had already decided the contrary. He then read an application he had received from the editor of the *Chemist and Druggist*, saying he should like to send a reporter to all meetings and to be allowed to attend himself occasionally. He asked for the latter favour purely for the sake of insuring accurate information, and he should wish to be regarded as a second reporter from his journal. He had further requested that the agenda paper and other documents furnished to the members of Council might be sent to him. Mr. Sandford had replied privately, acknowledging the receipt of the letter, and saying that as far as the first part of it was concerned he had not the slightest doubt that a reporter would be admitted, but with regard to the other points he could only submit them to the Council. In the meantime he should be glad to know what was meant by the "other documents." In reply to that Mr. Wootton said he had no special documemts in his own mind, he only thought that papers respecting the business of the Society were sometimes circulated, and, if so, he should of course be glad to have them, though not necessarily for publication. Mr. Wootton had also called on him, when he was informed that there were no documents handed to the Council but the agenda paper, except that occasionally reports of committees were circulated which were entirely private until they were in the hands of the Council collectively. Mr. Wootton said he did not make any point of the other documents. The first question, of course, was the admission of a reporter from the *Chemist and Druggist*.

Mr. Hampson moved and Mr. Atkins seconded—

"That a reporter from the *Chemist and Druggist* be admitted to the ordinary monthly meetings of the Council of this Society."

Mr. Williams thought before this motion was passed the Council had better discuss the second question, whether the editor also should be allowed to be present.

The President remarked that the resolution already passed on the motion of Mr, Bottle disposed of that.

The Vice-President said that the letter having been received he considered a certain answer should be sent to it, which should contain the conditions on which the reporter should be admitted. He should also like it to contain a paragraph to the effect he had before suggested, requesting that in the event of any change of the individual representing the journal he should bring that letter as his warranty for entering the Council-room.

The PRESIDENT said no doubt an answer should be sent; but he believed there was a gentleman waiting to come in.

Mr. SYMES thought it would be sufficient if the Secretary, in writing to the editor, called his attention in a footnote to the conditions attached to the admission of the reporter.

The motion was then put and carried unanimously.

The PRESIDENT said the application of the editor of the *Chemist and Druggist* to be himself occasionally present was already disposed of; then came the question of forwarding him the agenda and other documents.

Mr. BOTTLE thought there was no objection to sending him the agenda.

The VICE-PRESIDENT asked if a copy was supplied to the editor of the *Pharmaceutical Journal.*

The SECRETARY said no.

Mr. SYMES thought that was no objection; if he asked for one he would no doubt receive it.

Mr. WILLIAMS said the agenda was a private document, and if it were to be sent to any strangers there should be a resolution to that effect.

Mr. SHAW then moved—

"That the agenda paper of the ordinary Council meetings be sent to the editor of the *Chemist and Druggist,* marked 'private.'"

This was seconded by Mr. SYMES, and carried unanimously.

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Bown, John Quinton.
Carter, Francis.
Crook, Herbert.
Eaton, Edward Jarrett.
Greig, James.
Gulliver, William Inchle.
Harburn, Alfred.
Hugill, Arthur Major.
Kirk, William Peele.
Powell, William.
Richardson, William.
Williams, Thomas Henry.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscription for the current year, were elected "Members" of the Society:—

Bevan, William ....Harwich.
Bown, John Quinton ....Nottingham.
Carter, Francis.....................London.
Crook, Herbert......................Gravesend.
Eaton, Edward Jarrett ....Diss.
Gibbons, Walter ....Manchester.
Greig, James.........................Glasgow.
Gulliver, William Inchle.........London.
Harburn, Alfred ....Bishop Auckland.
Kirk, William Peele ....Retford.
Laxon, Matthew ....March.
Richardson, William Henry ...Lincoln.

The PRESIDENT said he was very glad to see so many who had just become qualified as pharmaceutical chemists joining the Society as members.

Mr. WILLIAMS wished to say a word or two with regard to a lady applying for membership before the next list was put to the vote, and he should move that the Council resolve itself into committee, as it was a private matter.

Mr. HAMPSON thought this was a dangerous precedent. He understood the election of members was always in open Council.

Mr. WILLIAMS remarked that what he had to say was of a personal nature, and ought to be said in committee.

The Council then went into committee.

The Council having resumed,—

Mr. HAMPSON expressed his satisfaction that the Society had decided to elect as a member a lady who for many years had aspired to this position, and that a question which had caused so much excitement in the Society was now thoroughly settled.

Chemists and Druggists.

The following registered Chemists and Druggists who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected Members of the Society:—

Leech, Elizabeth ....London.
Lewis, John Phillip...............Rickmansworth.
Turner, Robert Charlton.........Douglas (I. of Man)

ASSOCIATES IN BUSINESS.

The following, having passed their respective examination, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Bottomley, Albert Frederic ...Holbeck.
Coleman, Edward James.........Cardiff.
Francis, James.......................Carnarvon.
Lee, Alexander Milne ....Strichen.
Macpherson, Colin Allan .....Edinburgh.
Pearson, Henry......................Nottingham.
Walmsley, Robert ....Brighton.

Modified.

Emsley, Joseph ....London.
Rich, Geo. Benjamin Orridge...London.
Stewart, James......................Grantham.
Thompson, Thomas ....Sunderland.

ASSOCIATES.

The following, having passed their respective examinations and tendered their subscriptions for the current year, were elected "Associates" of the Society:—

Minor.

Adams, Benjamin...................Grantham.
Allison, William Billyard ....Retford.
Bell, Robert ....Lancaster.
Brown, Frederick...................Lincoln.
Brown, John..........................Pontefract.
Burrell, Thomas ....Edinburgh.
Collins, Robert Enos ....Old Leake.
Cox, Frederick John ....Newark.
Crichton, Alexander...............Burntisland.
Crowther, William Fearne ......Beverley.
Dawson, William ....London.
Garrett, John Henry ....Kineton.
Gordon, John ....Bradford.
Haden, Walter Edward ....Lichfield.
Hooper, David ....Southwark.
Logsdail, Henry ....Lincoln.
McDerment, James ....Ayr.
Protheroe, John Godwin.........Christchurch.
Rees, Harding ....South Norwood.
Robinson, Charles Bradshaw ...Great Bridge.

Modified.

Carter, James ....London.
Jones, Thomas ....London.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Allan, Alexander Fergusson ...Greenock.
Astley, Frederick Aspinall ...St. Anne's-on-the-Sea.
Bamforth, Joseph..................Manchester.
Blenkiron, Jeremy ....Shildon.
Boyd, Alexander ....Glasgow.
Brown, Fredk. William, jun. ...London.
Brown, George Wall ....Portsea.
Chamberlin, Charles James ...Barnsley.
Comer, Ernest Edward ....East Dereham.
Cooper, George Henry ....Oldham.
Crow, William Edward ....Louth.
Crowther, Charles J. H. ....London.
Dale, John Dickin ....Stafford.
Dickinson, John George ....Lancaster.
Down, Frank Walter ....Sittingbourne.
Dowty, William ....Evesham.
Elliott, Henry ....London.
Evison, Alfred ....Alfreton.
Gant, Robert Richard ....Norwich.
George, Alfred Walter...........Gt. Yarmouth.
Greaves, John Elijah ....London.
Greener, Michael Hindmarsh...Alnwick.
Hall, Robert Edward ....Camborne.
Hebron, Frank ....Knaresborough.
Hepworth, Harry..................Skipton.
Heron, Frederick Chambers ...London.
Hill, John ....Alford.
Hogg, Tom ....Derby.
Hughes, William ....Llandyssill.
Hunter, George Ackland ......London.
Jones, Ellis ....Portmadoc.
Jones, John Albert ....Liverpool.
Kerr, David ....Oakham.
King, Ebenezer Thomas ....Reading.
Lawrence, Harry ....Dudley.
Leicester, Thomas ....Chester.
Littleboy, Jno. W. Hattherden..Norwich.
Little, Walter G. ....London.
Marlar, John Frederick ....Halstead.
Martin, John........................Redruth.
Martin, John Bennett............Falmouth.
Mayo, Harry........................Towcester.
Miller, Frederick ....Strood.
Moore, Frank Philip ....Aberdeen.
Morgan, William ....St. Clears.
Morrison, Edward ....Kelso.
Northey, Edward John ....Truro.
Paine, Charles ....Belton.
Procter, George Woodyatt ......Sunderland.
Procter, Henry Raithby ....Boston.
Roberts, Rowland..................Holyhead.
Roberts, William ....Chester.
Robinson, John Whiteley ......Knaresborough.
Scholes, William I. ....Pendleton.
Skirrow, William..................Bingley.
Stothert, James ....Atherton.
Sutherland, David Alexander...Edinburgh.
Taylor, John Williams ....Norwich.
Thomas, David Robert ....Aberystwith.
Tomlin, John Percy...............Tunbridge Wells.
Watts, Robert ....Chatham.
Whineray, Edward ....Ulverston.
Wigg, James........................Streatham.
Willett, Frank Augustine ......Oxton.
Withers, William ....West Bromwich.
Williams, Arthur Gore ....Llandovery.
Williams, James Boden ....Manchester.
Wilson, Albert ....Garstang.
Wilson, David Wm. Richard ...Thirsk.
Wood, Arthur Wm. Henry......Ullesthorpe.
Woltz, Alfred Eugène ....London.
Young, Robert John ....Bideford.

Mr. Shaw said it was remarked some time ago that there were no apprentices coming into the trade; but he never before heard such a long list of names read.

Restoration to the Register.

The name of the following person was restored to the Register of Chemists and Druggists:—

George Barlow, Pocklington, Yorkshire.

Additions to the Register.

The Registrar reported that—
Henry Cutting, Selby, Yorkshire,
John Hardcastle, 23, Waterloo Road, Hunslett, Leeds,
Lloyd William Hughes, Ruthin, Denbighshire,
having severally made the statutory declaration that they were in business before the passing of the Pharmacy Act, 1868, and these declarations having been duly supported by duly qualified medical practitioners, their names had been placed on the Register.

Reports of Committees.

Finance.

The report of this Committee was read, including a recommendation that sundry accounts be paid.

The Vice-President said there was one item, namely, the Solicitor's bill, which he thought it would be useful should be explained to the Council, and he moved that the Council go into committee for that purpose.

This was agreed to, and the various items having been explained, the Council resumed, and the report and recommendations were received and adopted.

House.

The report of this Committee stated that the house-porter was somewhat recovered in health, and was able to resume his duties, although not fully restored; he was at present sleeping out of the house, but no permanent arrangement had been made.

The report was received and adopted.

Benevolent Fund

The report of this Committee included a recommendation of the following grants:—

£10 to the widow of a registered chemist and druggist. Applicant has had two previous grants of like amount.

£10 to a former member (from 1844 to 1867). Applicant has had several previous grants, beginning in 1867, and amounting in all to £55. He is in very bad health, and unable to do anything.

£10 to the widow of a former member (from 1866 to 1872). Applicant has had three previous grants.

£10 to the widow of a registered chemist and druggist. Applicant has had three previous grants.

The death of Mrs. Trumper, an annuitant, was reported.

Mr. Shaw said the Secretary had stated that a considerable number of the subscribers of 1878 had not subscribed during 1879, and he should like to ask if he could account for that in any way. Another fact which arose out of the late election he wished to refer to, namely, it appeared that the interest taken by the members with regard to the privilege of voting was being reduced year by year. Four years ago upwards of 4000 voting papers were returned, but this year there was a falling off of nearly 1000, notwithstanding that there had been more subscribers. He should also like to know if it were the fact that those who employed canvassing cards were the most successful. He was glad to see that one man had succeeded in obtaining an annuity, viz., Mr. Hollinworth, whom on a former occasion the Committee had declined to relieve because he was still in business, but he believed he had received the largest number of votes this year.

Mr. Williams remarked that Mr. Hollinworth sent no cards out at all, therefore it did not appear that they were of so much importance. He himself had given his vote to Mr. Hollinworth, being, to some extent, influenced by the fact that he had not sent out cards.

Mr. HAMPSON thought the Council must wait for a more lengthened experience before it could draw any conclusions on this point.

Mr. ROBBINS said this might be a convenient time to make an observation with regard to the election, by which subscribers might profit in future. At the last election, as usual, many papers were sent in which were informal, the majority because the voters did not take the trouble to sign their names. But another point, which was perhaps still more important, was this. A very large number of subscribers, he found, from a very laudable desire no doubt, voted for as many candidates as their votes would allow, notwithstanding there were only three annuitants to be elected; thus, if there were eight candidates and a person had eight votes to give, if he gave one to every candidate they would all be in the same relative position as they would have been had he not voted at all, so that he might have saved himself this useless labour which at the same time gave the scrutineers an immense amount of useless work. He hoped the subscribers would use a little more discretion in future and only give votes to as many candidates as there were annuitants to be elected.

Mr. HAMPSON said it must be born in mind that any vote given to a candidate who did not succeed was carried forward to his credit another year, so that every vote given was of some value.

The SECRETARY said the number of voters this year was really in excess of those in the year referred to. The diminution to which Mr. Shaw alluded arose in this way, that the office now, for the purpose of saving the expense of postage, only sent one voting paper to each person entitled to vote, whether he were a member or a subscriber, whereas formerly it was the practice to send a voting paper to each member and associate, and an additional one if he were a subscriber to the Fund.

Mr. SHAW said he had received two papers himself, one having reference to twenty votes which he had in virtue of a donation he had made as treasurer of a fund, and he had another paper with regard to his own personal votes.

The SECRETARY said that was an exceptional case; he should be glad to send him two papers, or even three, every year under the same circumstances.

Mr. SHAW asked if the Secretary could tell the difference between the subscriptions in 1878 and 1879 in round numbers?

The SECRETARY said the number of persons who did not subscribe this year but did in 1878 was 273, representing about £120. There were, however, fresh subscribers in 1879 who were not on the list in 1878.

Mr. ATKINS thought there could not be any great difficulty in finding out why there were not so many subscribers. It was perfectly clear that in the depressed state of trade throughout the country, in which all shared, especially in the agricultural districts, most painfully, many persons could not afford to subscribe, and probably they would have to face the same thing in another form in the shape of an increased number of applications for relief. With regard to the question of canvassing, he had received no cards at all this last year, and his votes had been given perfectly free and unfettered. He regretted to say that the candidate for whom he had voted, considering it was one of the most deserving cases, was one of the failures, but he hoped he would meet with more success another year.

The report and recommendations were then unanimously adopted.

LIBRARY, MUSEUM AND LABORATORY.

The Librarian's report had stated that the average attendance during the preceding month had been, day, 10; evening, 19. Circulation of books, town, 182; country, 74. Carriage paid, £1 18*s*. 9*d*.

The following donations to the Library had been received and the Committee had recommended that the usual letter of thanks be sent to the respective donors:—

Attfield (Professor J.), Chemistry, General, Medical and Pharmaceutical, 7th (U.S.) ed., 1876. From Mr. H. C. Lea, publisher.

Chemists' and Druggists' Diary, 1880. From the Publishers.

Royal Botanic Society of London, Fortieth Annual Report, 1879. From the Society.

Royal Medical and Chirurgical Society, Medico-Chirurgical Transactions, 1879, v. 62. From the Society.

Royal Society of London, Catalogue of Scientific Papers, 1864–73, v. 8, 1879. From the Society.

Tommasi (Dr. Donato):

Nuove Prove in Conferma alla Teoria termica sullo Stato nascente dell'Idrogeno, 1879.

Recherches sur la Constitution des Hydrates ferriques, [1879?].

Sull'Equilibrio termico nelle Azioni chimiche, 1879.

Poggiale, Réduction du Chlorure d'Argent par Tommasi, 1879. From Dr. Tommasi.

The Committee recommended the purchase of the following books for the Library:—

Annals of Chemical Medicine, ed. by J. L. W. Thudichum, 1879, v. 1.

Cavendish (H.), Electrical Researches, ed. by J. C. Maxwell, 1879.

Flückiger (F. A.) and D. Hanbury, Pharmacographia, 2nd ed., 1879. 2 *copies*.

Landauer (J.), Blowpipe Analysis, Eng. ed., by J. Taylor and W. E. Kay, 1879.

Milne (A.), Manual of Materia Medica and Therapeutics, by W. Craig, 4th ed., 1879.

Morfit (C.), Chemical and Pharmaceutic Manipulations, 1850.

Pasteur (L.), Studies on Fermentation, translated by F. Faulkner and D. C. Robb, 1879.

Royal College of Physicians of London, Translation of the New London Pharmacopœia, by J. B. Nevins, 1851.

Stillé (A.), and J. M. Maisch, National Dispensatory, 2nd ed., 1879.

Thomson (A. T.), Elements of Materia Medica and Therapeutics, 1832–3. 2 v.

Thomson (T.), History of Chemistry, 1830-1, 2 v.

The Curator had reported that the average attendance in the Museum had been, morning, 12; evening, 4. He had received letters from two gentlemen, offering specimens for the Museum, and was authorized to accept such as he deemed desirable. An offer to sell specimens of thorite and euxenite had also been received, and acting on the advice of Professor Redwood the Committee had recommended that they be purchased.

The Professors had attended and reported on their respective classes.

A proof of the first sheet of the 'Historical Sketch' had been laid before the Committee by Professor Redwood.

The Council went into committee to consider the question of books missing from the Library. On resuming, the report was received and adopted.

DANIEL HANBURY MEMORIAL MEDAL.

Mr. WILLIAMS said the Council was aware that a memorial fund had been raised in honour of the late Daniel Hanbury, and Mr. Daniel Bell Hanbury, his father, had expressed a wish to have a copy of the medal. A silver copy of the medal had been struck, and was now before the Council, and he had great pleasure in moving that it be presented to Mr. Daniel Bell Hanbury. Those who knew what that gentleman had done for the Society would agree with him that it was only a proper and very inadequate compliment to be paid to him.

Mr. Squire seconded the motion, which was carried unanimously.

Reports of Committees—*continued.*

GENERAL PURPOSES.

The Council went into committee to receive the report of this Committee. It included the usual report of the Solicitor as to cases placed in his hands, enclosing cheque for a penalty and costs which had been received, and also correspondence with various parties.

Several other cases of alleged infringement of the Pharmacy Act were also reported, and in one case a prosecution was recommended.

The report also included a letter received from Mr. Greaves, of Chesterfield, resigning his office as Local Secretary.

The Council having resumed,—

The President moved that the report and recommendations be received and adopted. He said it would have been seen from the report that he had authorized the solicitor of the Society to attend at the Fareham Petty Sessions on the prosecution of Mr. Smith for the sale of cream of tartar said to be adulterated. He did that on his own responsibility, and he thought it right to report to the Committee and to the Council why he had done so, and to ask their approval. Certain words had been introduced into the Sale of Food and Drugs Act, at the instigation of the Society, namely, "Where the food or drug is unavoidably mixed with some extraneous matter in the process of collection or preparation," it should not be deemed an adulteration; the cream of tartar in this case was simply contaminated with the tartrate of lime which was inherent in its preparation, because, according to the Pharmacopœia, bitartrate of potash was to be made from argol, and argol contained tartrate of lime, therefore, he thought that any prosecution of a chemist for selling cream of tartar which contained no more tartrate of lime than 6 per cent. was a vexatious prosecution and a proceeding against which the Council ought to fight. For that reason he had authorized the solicitor to attend as he had previously authorized him to do in the Chertsey case. One great advantage resulted from the solicitor's presence, namely, that at his instance the magistrates granted the defendant his costs, limiting them, however, to three guineas. It was true it was a small sum, but a principle was involved, because it showed that the chemist left the court in a much better position, and that it was considered by the magistrates to be a vexatious prosecution. Arising out of this cream of tartar case, a suggestion had been made that the Council should endeavour to get some referee appointed, beyond the county or district analyst, before whom the adulteration of drugs should be considered before any prosecution was authorized, and it was not altogether inopportune at this moment, because there was now a public prosecutor appointed, who commenced his work at the beginning of the year, and if the Council could possibly make any representation to the Local Government Board which would prevent these vexatious prosecutions, it would be very well to do so. At the same time, he must say that he felt the Society stood on very delicate ground in this matter, because its members should be the last persons to encourage anything like a sophistication of drugs. That could not be too strongly put forward. Anything like real adulteration or admixture, whether injurious to the persons using it or lessening the effect of the article, would at once be discountenanced by that Society, and he did not wish it to be understood that it was its business to defend every one who was prosecuted for adulteration, but rather to establish a general principle that there were one or two articles, such as cream of tartar and sweet spirits of nitre, with regard to which action was taken some time ago, and there might be others, as for instance, scammony, to which the special provision he had just quoted would apply. If an analyst took a parcel of scammony he might find a small percentage which was not scammony at all; all authorities admitted there must be a certain percentage of impurity in it. But the analyst might say it was not the article demanded. In such cases the Society ought to come forward, but not in others, and he should be as careful as anyone to prevent the Society coming forward to hinder a prosecution for real adulteration.

Mr. Hampson thought the explanation of the President was extremely satisfactory. The members of Council must all feel that he had not in any way overstepped the limits of the discretion reposed in him. No one at that board had any desire to countenance adulteration in any possible form, but it must be remembered that that Society, besides having certain important public functions to carry out, was a society of members of the trade, and by its charter was distinctly empowered to protect those who carried on the business of chemists and druggists. Of course the Society could not defend every case that occurred, but it was desirable to take up any typical case, such as would give a warning to analysts who probably did not always understand their profession, or public bodies, when they undertook such vexatious prosecutions as this.

The Vice-President said when he spoke on this matter in committee on the previous evening he had been careful to say that he heartily approved of the course taken by the President; but he expressed his gratification that his action had taken that somewhat informal course, and he was anxious that when the matter was discussed something similar to what had fallen from the President should be stated. The President had made it clear that he had regarded the act as an exceptional one, and one that, if followed at all, must be followed with the greatest caution in the future. He knew it was according to a resolution passed some time ago that private prosecutions might be defended if after careful consideration the Council thought it desirable. That resolution was passed in opposition to his judgment, but it existed, and therefore must be acted upon. But in such cases as this he thought there was a better course open than mere defence, one which the President had hinted at, that the Council should endeavour to establish what might be a standard condition of purity which the law should sanction, or say that all cases should be referred to some such authority as that Society before an analyst was allowed to prosecute at all. Either of those courses would be much more worthy of the attention of the Council than the defence of individual cases as they arose, which must always, to the outside public, appear more or less—no doubt erroneously—as if the Society were defending an impurity, not necessarily an adulteration, but an impurity, which was an awkward position, and one which he should not like to see become the general view of the matter. With regard to this particular case, he did feel that defence of a second case was a little unnecessary. The Society's legal officer had been sent to attend one case, and had got a verdict which was published before the world, and he thought the Council might have rested content with that trial, and referred every other defendant who appealed to it to the case the Society had assisted in making public. Everything had been made clear about the cream of tartar and he did not think the work needed to be done all over again. Certainly he should not be in favour of defending another case next week if it occurred, however much he might approve of the President's action in the past. At the same time he was perfectly content with the declaration of the President as to what his course should be in the future.

Mr. Savage said that but for the observation of the Vice-President he should have thought the explanation of the President was ample to meet the case, but from those observations it seemed necessary that something more should be said. There was a very clear expression in the 6th section of the Sale of Food and Drugs Act, namely, "where the food or drug is unavoidably mixed with some extraneous matter in the process of collection or preparation;"—that was the precise case before them, and he took it if another case were to arise of a similar character the Council would be perfectly justified in taking the same course again. There he differed from the Vice-President; because whatever might have taken place in a case already decided, it must be clearly understood that the evidence adduced there went for nothing in another case; it was no evidence in a court of justice unless the facts were proved, and to do that you must have the solicitor there, and also the evidence previously given. It was necessary for the Society to justify the confidence placed in it, and come forward and support every case of this kind where it was found that injustice was being done to an individual.

Mr. Atkins expressed his gratification that the President had done what he had, and he was very thankful the law officer had been instructed to move in the matter. He maintained that the accused having come out of court in the way he had after the support he had received from that Council, was in a much better position than if he had simply defended the case at his own charge. It gave him a status which he could not otherwise have secured. Therefore he differed from the Vice-President on the general principle. It was not the first time he had heard it cogently argued from his point of view; but he entirely differed from him. The Pharmaceutical Society was formed, amongst other things, for the protection of those who carried on the business of chemists and druggists, and although it might not be desirable to repeat frequent defences of cream of tartar cases, still when a typical case occurred it was not only a privilege. but a duty to step forward and defend it. He would declare as emphatically as anyone that the Society utterly repudiated adulteration; but when it was believed, as in this case, that there would have been a maladministration of justice, seeing that the Society was not formed simply for the promoting of pharmacy, or of education, but to protect pharmacists, it was its duty to come forward. Many men could not efficiently defend themselves in such cases; they lost their nerve when prosecuted, and the Society could give validity to a defence which no individual man could. He knew that great satisfaction had been felt that the Society had acted in this matter, and he hoped the same course would be adopted in future.

Mr. Robbins thought the members of Council must all be satisfied with the step Mr. Sandford had taken in the matter, but they ought not to let it remain where it was. He quite sympathized with Mr. Schacht in his dislike to defending cases of adulteration. He himself would not vote for defending any cases of adulteration, but he contended that this was not such a case. The pure bitartrate of potash was not cream of tartar, but this was a very difficult thing for magistrates to decide, and the Council ought to come to some decision what amount of tartrate of lime in bitartrate of potash might be considered pure cream of tartar. If the Council could not define that point, how could the magistrates, who knew nothing whatever about the matter? He thought it was the duty of the Council to fix on some standard of purity.

Mr. Williams wished to remind Mr. Robbins that to fix a standard for a natural product was impossible. Analysts had tried to do so with regard to milk, but had not succeeded. So it would be found with cream of tartar made in various countries, and according as it was treated with what was called the plastering process or not, so there would be a variation in the amount of tartrate of lime. It was understood that the grape juice itself did contain tartrate of lime, but to what extent had never been established, and it would probably differ with the soil in which the grape grew. Some authorities went as high as 16 or even 20 per cent. of lime in perfectly natural and unadulterated cream of tartar, and therefore it would be quite impossible to fix a standard. He should like to make one more remark with regard to the position of the President. It was not fair that he should be appealed to and that he should have, without any advice, to take serious action in cases which did not give him time to summon the General Purposes Committee. He had before suggested that it would be a good thing for the Council to appoint a small sub-committee of some kind to be consulted by the President on any matter of importance which arose suddenly and required prompt action. The next case might not be of so simple a character, when the advice of a small committee would be both welcome to the President and to the general interest of the Society, and he should be inclined to give a notice of motion to carry out the suggestion.

Mr. Shaw said he understood the adoption of the report had been moved, and there was no amendment; and therefore he thought this discussion was rather irregular. The President had acted very properly in this case, and he hoped the result obtained for the first time of getting the defendant his costs would have the effect of putting an end to these vexatious proceedings.

The President said he was perfectly satisfied with the approval he had received from the Council and hoped no more time would be spent in discussing the subject.

The motion for the adoption of the report was then put and carried unanimously.

Weights and Measures.

The President said he had been informed the other day, by a maker of graduated measures, that he had applied to the city inspector to get his measures marked, and was told that no measure could be marked under the Act except those which contained a given measure as "level full." He (the President) felt that was altogether a mistake, and went to see Mr. Chaney about it. Mr. Chaney laughed at the idea, and said, "You will see our own standards are graduated up to a certain mark, not to the brim." The 46th section of the Act clearly provided for the making of graduated measures, because it spoke of measures partly composed of glass and partly of metal. Mr. Chaney told him that a great deal was in the hands of the inspectors. The Central Board would ultimately give out the standards to be used by all inspectors, but had not yet done so, and therefore the inspectors were not in a position to verify the measures. Still each inspector in his own district must administer the law to some extent according to his own judgment. Mr. Chaney also gave him a report by the Board of Trade, of its proceedings under the Weights and Measures Act, in which it was stated that every information would be given by the Central Board to the local authorities, and the latter were invited to communicate personally with the officer in charge of the standards, or if necessary, with the Assistant-Secretary of the Board. He suggested to Mr. Chaney that the Council might possibly send a memorial to the Board of Trade to endeavour to get some definite instructions sent to all the district inspectors so as to bring them into harmony with one another. It had already been suggested that there should be one uniform mark, and that separate districts should have a little distinctive mark in addition. The President then read the draft of a memorial which he thought it would be advisable to send to the Board of Trade or to Mr. Farrer.

Mr. Symes thought the Society, as a body, had wasted a deal of valuable time over this question, for it was not yet at all ripe. It had been taking cognizance of over-officiousness of local inspectors and giving them an importance they did not merit. He himself thought it would be better to let the matter ripen, for it would be probably years before the Act was carried into force in some localities, and in others perhaps it would never be enforced at all. He thought it would be much better, therefore, to wait until the matter was more ripe before taking further action.

Mr. Hampson said members of the trade were very anxious for information on this matter. He had been in correspondence with several persons who wanted to know how they could get their measures stamped, and who were in a state of trepidation lest they should be pounced upon by inspectors who did not understand their business. There was no doubt that inspectors would require a special education before they were able to carry out the Act of Parliament, but he somewhat demurred to Mr. Symes's remarks, and thought it would be very advisable for the Council to put itself in communication with the Government officers who had special charge of this Act, and, if possible, bring about a uniform method of inspection so as to avoid anything like officiousness or ignorant interference by the inspectors. He certainly thought it would be a long time before the Act was carried out, but there was a law in force, and the trade ought to be prepared for anything which might arise. He thought such a memorial as had been suggested would be a very valuable opportunity of leading the authorities in the right direction.

Mr. Shaw said he had been for many years acquainted with the inspector of weights and measures in Liverpool, who had sought information from him recently on various points. He told him that he had received from the head office in London his first consignment of measures for the purpose of verifying apothecaries' measures, including a 4 oz., 3 oz., 2 oz., 1 oz., ½ oz., 2 drachms and 1 drachm. These were metal cylinders which had to be filled to the brim. From what he stated it was optional with any local board or corporation to adopt the Act or not in reference to that district.

The President said they must all adopt the Act.

Mr. Shaw said he meant as to putting it in operation in their district. At any rate, it had been adopted in Liverpool, and that was the reason why the inspector had been in communication with the office in London. He was now waiting for the larger measures, such as the 30, 40, 20, and 10 ounce measures. He did not know how the verification would be accomplished.

Mr. Williams could not agree with Mr. Symes, that the Council or the Society had wasted time in considering this question. The apothecaries' weights and measures had now been legalized, and it would be a source of great annoyance to many members of the trade if they should be fined for the possession of weights and measures not stamped. Very possibly in some cases the law would not be carried out, but that would be the fault of the authorities, and the Council must assume it would be carried out everywhere. It was evident, however, that the local authorities required instruction, and it was in evidence that the central board was willing to give that instruction. Therefore he thought a memorial, such as proposed, should be sent from the Council, and if necessary, a deputation should wait on Mr. Farrer and settle any question which might arise. It was most desirable that if possible this instruction should be made so simple and uniform that members could not suffer vexatious prosecution.

Mr. Savage said that the Brighton Town Council refused to have anything to do with this Act for some time, but it had now ordered a set of weights and measures.

Mr. Gostling supported the proposition that a memorial be sent, and he hoped there would also be a short epitome of the regulations printed in the Calendar.

Mr. Symes said he did not oppose the memorial being sent; he only thought the Council had helped to fan the excitement which Mr. Hampson had spoken of, and so far, had done nothing to satisfy it.

Mr. Williams reminded Mr. Symes that the matter was forced upon the Council by the conduct of certain local officials in the north.

The following resolution was then carried unanimously, on the motion of Mr. Greenish, seconded by Mr. Williams:—

"That a memorial be presented to the Board of Trade, urging the necessity of uniform practice in verifying and marking measures in the various districts throughout the country."

Report of Examinations.

December, 1879.

ENGLAND AND WALES.

	Candidates. Examined.	Passed.	Failed.
Major, 10th	7	5	2
„ 11th	6	3	3
„ 17th	6	4	2
	—19	—12	— 7
Minor, 10th	17	5	12
„ 11th	21	15	6
„ 17th	21	8	13
„ 18th	25	10	15
	—84	—38	—46
Modified, 10th	4	2	2
Totals	107	52	55

SCOTLAND.

	Candidates. Examined.	Passed.	Failed.
Major, 17th	1	0	1
Minor, 17th	9	8	1
„ 18th	6	3	3
	—15	—11	— 4
Modified, 18th	2	0	2
Totals	18	11	7

Preliminary Examination.

2 certificates were received in lieu of the Society's Examination:—

1 College of Preceptors.
1 University of Cambridge.

On the motion of Mr. Schacht, seconded by Mr. Bottle, it was resolved—

"That the absence from the examination, of which they had given notice to attend, be excused in the case of certain candidates (*named in the Resolution*), a medical certificate in each case having been handed to the Secretary."

Inundations in Hungary.

The President read a letter he had received from Dr Paul, enclosing one from the President of the Pharmaceutical Society of Hungary, thanking the Members of the Council and other subscribers for the aid they had given to meet the distress amongst pharmacists occasioned by the recent floods in that country.

Provincial Transactions.

SUNDERLAND CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The general meeting of the Sunderland Chemists' Assistants and Apprentices' Association was held at the rooms, corner of William Street, on Monday evening, the 5th inst. The chair was occupied by the President, Mr. A. Harding. After some preliminary business had been settled the Secretary (Mr. J. J. Browell) read the reports of the last session. The number of honorary members is 26, of members 22; the average attendance at the meetings had been 12. The income of the past session amounted to £15 8*s*. 11*d*., the expenditure being £4 3*s*. 1*d*., leaving a balance of £11 5*s*. 10*d*. The Association is indebted to Messrs. Barron, Squire and Co. for a donation of £2 2*s*., and to Dr. Muter and Mr. Baxter for their liberal contribution of books.

The reports having been adopted, the President expressed his pleasure at the prosperous condition of the Association, as manifested by the balance in hand as well as by the attendance of members, which he hoped would increase still further, and in speaking of the progress which had been made during the past session congratulated the members on the establishment of the classes which had been formed, and said that he trusted the members would avail themselves of the opportunities now offered by the society and would attend as many of them as possible. A materia medica class had been arranged to be held fortnightly, conducted by Mr. T. Walton. A pharmaceutical chemistry class and botany class were held weekly by Mr. J. J. Browell. The fees of the chemistry class, amounting to 30*s.*, had been expended in the purchase of apparatus, etc. The President then thanked the members for the assistance they had rendered during the past session and hoped that the society would be as successful in the future as it had been in the past and that it would be a means of benefiting the members in more ways than one.

A hearty vote of thanks was accorded to the officers and committee, to those gentlemen who had assisted with contributions of money and books, to those gentlemen of the town who had come forward and given their interesting lectures, and to those members who had read papers.

The election of officers was then proceeded with, the following being the result:—Mr. J. J. Browell, President; Mr. A. Harding, Mr. R. H. Mushens, Vice-Presidents; Mr. C. Rankin, Secretary; Mr. J. Peacock, Treasurer; Mr. J. Humphrey, Librarian; Messrs. J. W. Robinson, R. Leithead, J. G. Johnson, J. Scelly, J. Whitfield, J. Cowey, Committee.

Proceedings of Scientific Societies.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the Association was held on January 1, 1880, at 32A, George Street, when a paper on the "Examination of Urine" was read by Mr. W. A. H. Naylor, F.C.S., who stated that the acidity of urine is now generally admitted to be principally due to the presence of the acid phosphate of sodium. Qualitative and quantitative processes, illustrated experimentally, were next given for the detection and estimation of uric acid, urea, sugar, albumen, etc., only those methods being recommended which had, in the author's hands, proved satisfactory. In conclusion the hope was expressed that pharmacists would give this branch of analysis the attention it deserves.

After the discussion, a vote of thanks having been proposed by Mr. James, seconded by Mr. Wallis and carried, the meeting terminated.

Parliamentary and Law Proceedings.

Poisoning by Morphia.

On Saturday, January 3, Mr. S. Collier held an inquiry at the Eagle Tavern, East India Road, Poplar, relative to the death of Lilian Selina Holt, aged five, which occurred on the previous Wednesday.

Selina Holt, mother of the deceased, said that on the previous Tuesday the child was unwell, and witness sent a girl named Hammond to Dr. Moore's surgery, at 50, St. Leonard's Road, for a powder. Deceased soon after having the powder given her went to bed, and complained of headache. About seven o'clock next morning her father found her dead in bed, and it was discovered that the powder which had been administered to her was composed of hydrochlorate of morphia.

Frederick Albert Hughes, a lad of thirteen, after being cautioned, stated that he was employed by Dr. Moore, and was accustomed to serve in the shop. Whenever persons called and asked for poisonous drugs he told them, in the absence of the assistant, to call again. A girl called about twelve o'clock on Tuesday, and stated that she wanted a powder for a child of five years. Witness took a bottle from a shelf and handed it to the assistant's wife, who, after placing some of the contents in a paper, handed it to the girl and charged her twopence for it.

Frederick M. Henbeck, L.S.A., assistant to Dr. Moore, said that at the time of the sale of the powder he was out visiting. When he returned the boy told him what had been given to the girl, and witness, finding that the powder had been taken from the bottle in question, exclaimed, "Good God, you have poisoned the child." Witness, not knowing the address of the parents, placed the matter in the hands of the police. The amount of morphia administered was six grains. Witness had repeatedly told Hughes not to serve in the shop. The bottle was labelled "Poison," and was identical in appearance with others on the shelf.

The boy Hughes (recalled) said that he did know what the contents of the bottle were. He admitted having been told not to serve, but on some occasions he was called upon to do so.

The assistant denied that his wife, who was unable through illness to attend and give evidence, served the powder as alleged by Hughes, and although the girl Hammond was called, she could give no positive evidence on the point.

Hughes insisted that the assistant's wife served the powder, and that he merely handed her the bottle.

Dr. Rugg gave evidence, to the effect that deceased died from the effects of the poison; and, after a lengthened inquiry, the jury returned a verdict of death from misadventure, at the same time expressing their opinion that there had been gross neglect on the part of those whose duty it was to attend to the management of the drugs. —*Daily Telegraph.*

The Sale of Vermin Killer.

On Monday, January 5, Mr. L. R. Rowbottom, the Wigan Borough Coroner, held an inquest at Scholes, touching the death of Lucy Fortune, the wife of a compositor, who had committed suicide by swallowing a quantity of vermin killer. After evidence had been given as to the circumstances attending the taking of the poison—

Francis Robert Dawson, registered chemist and druggist, King Street, Wigan, said he knew the deceased by sight. She had been an occasional customer of his, but he did not know of his own knowledge where she lived, or her name. On Wednesday evening last she came to his shop between six and seven o'clock, and asked for a sixpenny packet of Battle's Vermin Killer. He told her he had not got one in stock, but that he had threepenny ones, and she said she would have a threepenny one. He inquired what she wanted it for, and she said destroying rats. He entered the particulars in the poison book, and she signed it. Since Saturday he had weighed a threepenny packet, and previously he had weighed several. The one he weighed on Saturday was thirteen grains, that being the heaviest he had weighed. Some time before he weighed a similar parcel, and it only weighed six grains.

The Coroner: Then there was a difference of seven grains in one of these packets?

Witness: Yes.

The Coroner: You did not know that this woman was a married woman, and of your own knowledge you did not know where she lived. Would you have gone to 105, Scholes?

Witness: I would if I had wanted to find her.

The Coroner: And if you had not found her there, what then?

Witness did not answer.

The Coroner: Why did you not insist on that woman bringing in a witness when you sold her the poison?

Witness: Because it is not the custom of the trade.

The Coroner: Well the sooner it is the custom of the trade the better it will be. If you do not comply with the provisions of the Act of Parliament you will find yourself convicted in heavy penalties which will take the profits off the poison. You knew of your own knowledge that there was sufficient poison in one of these packets to kill anybody?

Witness: I did.

The Coroner: Why did you not insist on the woman bringing a witness?

Witness: If the person had been an absolute stranger I should have insisted on it.

The Coroner: You say you did not know her name, or where she lived. Do you call that knowing a person?

Witness: I knew her as an occasional customer. She had a very respectable appearance, and I knew her by talking to her.

The Coroner: The fact of the woman being a woman of respectable appearance does not prove your knowledge of her. Because she was an occasional customer you considered she was known to you?

Witness: I did.

The Coroner: That is your interpretation of the Act of Parliament?

Witness: It is.

The Coroner: On the 31st December I see you sold poison to other persons—did you know them?

Witness: I knew one of them by sight.

The Coroner: I suppose you take it for granted that if you know a person by sight and he makes a statement that statement is true?

Witness: If I have some knowledge before.

Dr. White said on Saturday morning he made a *post mortem* examination of the body of the deceased. There were no external marks of violence. The body was well nourished and the organs were generally healthy, excepting the vascular state of the stomach and old adhesions on the lungs showing pleurisy. The brain was healthy excepting the vascular state of the base of the brain and the spinal marrow. He had heard the evidence of George Fortune, senior, Mrs. Hodge and Mr. Dawson, and he had come to the conclusion that the woman died from taking poison. Battle's vermin killer, on the authority of Dr. Turner, consisted of flour, Prussian blue, sugar, and strychnia—the latter in the proportion of 23 per cent. Taking the average weight of one of the threepenny packets at 9 grains there would be very nearly 2 grains of strychnia in one. Half a grain of strychnia would be sufficient to cause death.

Mr. Dawson added that on Saturday he analysed a 13 grain packet of Battle's vermin killer and found 2½ grains of strychnia.

Dr. White said he knew the deceased was a very quiet, respectable woman and very anxious to get on.

This closed the evidence, and the Coroner proceeded to sum up. In the course of his observations to the jury he said there were very few Acts of Parliament through which it was impossible to drive a coach and four, and it seemed that the druggists were driving a coach and four through the Sale of Poisons Act. A registered chemist and druggist was entitled to sell poisons under certain restrictions, and one of those restrictions was that he was not to sell it to a person whom he did not know unless he had a witness with him. In this case the deceased was only an occasional customer, he did not know her name, he did not know where she lived, in fact he knew nothing about her, and yet he sold her sufficient quantity of poison to kill a dozen people. It seemed to him that Mr. Dawson had acted very carelessly, for if the woman had given a wrong address there would have been no means of tracing where she got the poison from. He (the coroner) did not believe that the Act of Parliament ever intended that druggists should be allowed to act in that manner. Mr. Dawson had been extremely negligent.

A Juryman: He deserves a good censure.

The Coroner: It is not for me to prosecute him; it is the duty of some other party if they think he has contravened the provisions of the Poisons Act.

The jury, after a short deliberation, returned a verdict to the effect that the deceased committed suicide while in a state of unsound mind.

Dr. White said the question might be asked how it was the contents of the woman's stomach were not submitted to a chemical analysis. He ought to tell the jury that poisoning by strychnia left very slight traces, and he did not think it worth his while to go to the trouble, seeing that there was no doubt as to the cause of death. He condemned the system of selling poisons to persons comparatively unknown to the vendors by chemists, and pointed out the restrictions that were imposed on surgeons in the use of poisons by the Vivisection Act. Something more should be done to limit their sale by other than medical men in view of the facilities that at present existed for obtaining them by people who wished to put an end to their existence.

The Coroner said he fully concurred in the observations of Dr. White, and several of the jurymen expressed similar opinions.—*From the Wigan Observer.*

Reviews.

THE NATIONAL DISPENSATORY, containing the Natural History, Chemistry, Pharmacy, Actions and Uses of Medicines, including those recognized in the Pharmacopœias of the United States and Great Britain. By ALFRED STILLÉ, M.D., LL.D., and JOHN M. MAISCH, PH.D. With Illustrations. London: J. and A. Churchill, New Burlington Street. [Philadelphia, printed.] 1879. Large 8vo.

This is a very bulky volume of 1628 pages, closely printed, and may well have cost its compilers the "years of labour" they claim to have devoted to its preparation. For they have aimed to produce a digest of all that is of practical importance, not only in pharmacology strictly so called, but also in the medical domain of therapeutics. Clearly their difficulty has been to determine what to exclude without injury to the volume as a book of reference.

As is usual in "Dispensatories" the dictionary plan is strictly followed; every article, crude drug, or preparation being placed alphabetically by its first word. It is probable that this has been found by experience to be the most convenient mode for pharmacists. It would be an improvement to have a copious system of cross references; but this is to a considerable extent supplied by a very full index. For this is a very comprehensive book, and includes a vast number of substances. Besides the official drugs and preparations of the British and American Pharmacopœias, most of those of the German one and of the French Codex are included, and in addition a great number of non-official medicines more or less used find a place either as separate articles or as "allied drugs" under more important or better known substances. Probably the book may be fairly regarded as the most comprehensive of its class and as forming a very full dictionary of the materia medica of to-day. Information especially with regard to many of the drugs at present chiefly or entirely employed in America will be acceptable to English pharmacists.

As an example of the method of treatment the first article may be taken, *Absinthium*. There we find, after the pharmaceutical, botanical and vernacular names, a reference to figures of the plant and a short description, and then follows an account of the chemical constituents. A short description of other allied species of *Artemisia* comes in next, and then we have the pharmaceutical preparations, and an account of the physiological actions and the medical uses of the drug. *Mutatis mutandis* other articles are treated in a similar way or with even greater fulness. Thus the second article, *Acacia*, gives also accounts of the collection and commerce of gum arabic, of its alterations and substitutions; and of numerous other varieties of gum. In the case of mineral substances, of course much attention is necessarily given to the mode of production or preparation, to impurities and adulterations and the tests for them.

The nature of the work does not afford scope for much original matter, but the authors have thoroughly digested their mass of material, and present their *résumé* to the reader well and clearly. In the case of many native American plants somewhat full descriptions are given. Special care seems to have been taken also in the descriptions of the external characters of drugs. A rather striking feature in the book is the absence of all special references to other works, with the exception of the occasional quotation of a figure; much space has been gained by this, at some cost it must be allowed. Scattered through the text are about 200 selected woodcuts of small size and unequal value; some of the microscopic ones are very good.

The prominence given to the physiological actions of drugs is a somewhat novel feature in works of this class. This portion of the subject seems to us also to be particularly well done, the results of the most recent observations being given with brevity and clearness and in a manner which exhibits a full acquaintance with modern research in this important branch of medical science. In connection with the section on the medical uses of drugs is a very full therapeutical index, where drugs are placed under the headings of the various diseases and morbid states in which they are employed. An appendix contains tables of maximum doses of important drugs, of weights and measures and a list of reagents.

The treatment of substances having a definite chemical composition is remarkably good. The authors by no means restrict themselves to the consideration of those occurring in the various Pharmacopœias, but, as far as we can judge, no chemical having any kind of use in medicine or possessing general interest for the pharmacist is omitted.

The processes for their manufacture are clearly and accurately described. In those cases in which any practical difference exists between the processes in the British Pharmacopœia and in that of the United States, both are given in full, and the respective merits of each are impartially discussed.

As a matter of fact, it frequently happens that methods adopted in practical manufacture, on the large scale, differ very materially from those suitable for use by the pharmacist. When this is the case the authors do not fail to give a very readable account of one or more manufacturing processes. Such accounts generally contain a very fair amount of detail without being tedious, and are accompanied by explanatory and critical remarks, which are to the point.

Occasionally, however, exceptions here and there occur. Thus, the description of the preparation of glycerine is very meagre, and this is the more surprising since that body plays a very important part in American pharmacy. We may remark that Tilghman only is mentioned in connection with the manufacture of glycerine by the decomposition of fats by the action of water at an elevated temperature.

Tilghman's process certainly was the first which was applied for this purpose; but it served chiefly to lead up to the method by which nearly all the pure glycerine of commerce is now prepared, viz., the distillation process, first patented by Wilson and Payne in 1854.

The arrangement of matter is not always perfect. For example, under the head of "Properties" we find, in some cases, a description not only of the physical characters of a chemical, but its reactions, the tests for its purity and the methods for its volumetric or gravimetric estimation. In others this matter is divided under the separate heads of "Properties," "Tests," and 'Tests of Purity." Again, under tests may be included the ordinary analytical reactions which take place between the substance and various reagents; or, as is generally the case, a list is given of reactions which the body should *not* undergo in order to prove its freedom from certain impurities.

These are very slight blemishes and, speaking generally, we are bound to state that the articles on the various chemicals in use in medicine and of pharmaceutical interest are as interesting as they are accurate and instructive.

Amid so much excellence it may seem ungracious to point out any of the very few minor errors which occur, but it is impossible to pass without remark the fact that the formula of oxide of glyceryl is given as $C_3H_5O_3$, and those of stearin or tristearin, and of olein or triolein, $C_3H_5O_3$, $3\,C_{18}H_{36}O_2$, and $C_3H_5O_3$, $3\,C_{18}H_{34}O_2$, respectively.

Again, in commenting on the process in the British Pharmacopœia for the preparation of ferri phosphas, it is stated without qualification that the phosphates of iron are insoluble in acetic acid, and no account is given of the means suggested in this country from time to time for wholly precipitating the iron as phosphate. In describing the means adopted in the British Pharmacopœia for the estimation of red and pale bark, the process is said to be the same as for yellow bark, the authors forgetting to mention that chloroform is substituted for ether.

Pharmacy is perhaps the weakest part of the entire contents of the volume.

It must not be inferred from this that we consider the treatment of that subject wholly bad, but we mean that the character of the portion of the book devoted to pharmacy is by no means equal to the high-class quality of the remainder. The general article on pills, for instance, contains no matter that would be of any value to a pharmacist of any experience, while at the same time there is such an absence of detail as to render the article quite useless to a beginner. It would have been far better to have had no general article on the subject, and to have simply discussed the individual merits of each pharmacopœial pill mass.

The book is remarkably free from typographical errors, and the type itself is bold and clear.

The first edition of this work has already been exhausted and a second is being issued. We most heartily congratulate the authors on their well-deserved success, for we can cordially recommend this new 'Dispensatory' as a very valuable work of reference for the medical practitioner and pharmacist.

Year-Book of Pharmacy, comprising Abstracts of Papers relating to Pharmacy, Materia Medica and Chemistry, contributed to British and foreign journals, from July 1, 1878, June 30, 1879, with the Transactions of the British Pharmaceutical Conference at the Sixteenth Annual Meeting, held in Sheffield, August, 1879. London: J. and A. Churchill. 1879.

The Year-Book for 1879 has now, presumably, been issued to most of the members of the Conference, and no doubt most of the readers of this Journal will have already made an examination of the volume. It is not quite so thick a volume as that for 1878, which is due to the first portion, consisting of the introduction and the abstracts of papers published during the year only extending to 310 pages, instead of 390. It may be remarked, however, that the editor, in his Introduction, states that the majority of the abstracts in the present volume will be found to be more condensed than those in most of the previous volumes, although it is claimed that in no case has this abridgment been carried so far as to make the reader unduly dependent on the original article. This statement is fairly confirmed by an examination of the volume, and taken in connection with the evident careful selection of subjects may explain the limitation to the smaller number of pages. The Year-Book for 1879 is marked by the excellencies to which Mr. Siebold has accustomed us in former years, and also, we are bound to say, by the defective arrangement of subjects to which we have before now adverted. But it may be granted that since this is persisted in it is probably intentional, whilst the editor's *résumé* and the index will help to lessen any resulting inconvenience.

The 'Transactions' section of the volume consists of the usual lists of members, followed by the papers read at the meeting at Sheffield, and the discussions upon them, with which the readers of this Journal will be already familiar.

Obituary.

Notice has been received of the death of the following:—

On the 2nd of December, 1879, Mr. George Atkinson, Chemist and Druggist, Wolverton Station. Aged 35 years.

On the 13th of December, 1879, Mr. Samuel Hamand, Chemist and Druggist, Stoke, Devonport. Aged 70 years.

On the 14th of December, 1879, Mr. Robert May Rew, Chemist and Druggist, Regent Street, W. Aged 50 years. Mr. Rew had been a Member of the Pharmaceutical Society since 1870.

On the 20th of December, 1879, Mrs. Susan Trumper. Aged 71 years. Mrs. Trumper was elected an Annuitant on the Benevolent Fund in 1876.

On the 22nd of December, 1879, Mr. John Oates Clayton, Pharmaceutical Chemist, Lowerhead Row, Leeds. Aged 48 years. Mr. Clayton had been a member of the Pharmaceutical Society since 1854.

On the 23rd of December, 1879, Mr. Henry Charles Lowe, Chemist and Druggist, Brooks Bar, Manchester. Aged 57 years.

On the 26th of December, 1879, Mr. John Fegan, Pharmaceutical Chemist, High Street, Exeter. Aged 31 years. Mr. Fegan had been a Member of the Pharmaceutical Society since 1871.

On the 26th of December, 1879, Mr. George Allen, Chemist and Druggist, Congleton. Aged 35 years.

On the 27th of December, 1879, Mr. William Smith, Chemist and Druggist, Nottingham. Aged 45 years. Mr. Smith had been a Member of the Pharmaceutical Society since 1872.

On the 28th of December, 1879, Mr. John Wortley, Pharmaceutical Chemist, Market Place, Durham. Aged 47 years. Mr. Wortley had been a Member of the Pharmaceutical Society since 1856.

On the 31st of December, 1879, Mr. Thomas Haffenden, Chemist and Druggist, Dyke Road, Brighton. Aged 40 years. Mr. Haffenden had been an Associate in Business of the Pharmaceutical Society since 1868.

Correspondence.

"Cream of Tartar."

Sir,—By this time, one might have expected that the very absurd prosecutions in regard to "cream of tartar" would not again crop up. Why, may I ask, are public analysts so fond of making themselves ridiculous? Hardly one has escaped the lash of censure, and not one has proved himself worthy of that confidence which, as a good and worthy member of society, we should place in him. He is too keen, he wants more making-up, he seems ignorant of the good old knowledge hidden in the works of Thomson, Brande, Pereira and others. His new-fangled ideas when put to the test do not stand, and he is too proud to learn, although every facility is now afforded.

In regard to the recent case of prosecution of Mr. Smith, of Titchfield, let me ask, what are the special qualifications of the analyst, Mr. Arthur Angell? Did Mr. Angell consult any authority of note before giving his certificate? and if not, by failing to do so, he has indirectly sanctioned a prosecution which has only proved a police disaster.

I look upon the whole police business, in regard to the Sale of Food and Drugs Act, as a complete and ridiculous farce. The history of such adventures supports such an opinion, and I am laconically reminded of the sentiments of Paracelsus by these repeated prosecutions of cream of tartar vendors. I hope the police and public analysts have not experienced the sensations of Paracelsus when he bestowed the following invective on cream of tartar:—"It is called tartar because it produces the oil, water, tincture and salt, which burn the patient as hell does."

Thomson well says:—"According to him it is the principle of every disease and every remedy, and all things contain the germ of it."

I have no doubt the police and public analysts who have so conspicuously figured of late in these prosecutions have, by a kind of intuition unknown to their honoured personalities, drifted into Paracelsus's views. How otherwise are these puerile prosecutions to be accounted for?

Thomson says:—"All the specimens which I had an opportunity of examining, contained rather more than 5 per cent. of tartrate of lime."

Pereira says:—"As found in commerce it contains 2 to 5 per cent. of tartrate of lime."

Stillé and Maisch say:—"The amount of tartrate of calcium contained in crude tartar varies between 5 and 15 per cent."

In the purified salt, by careful management, it may be reduced to 3 per cent.

But this would enhance the price of cream of tartar so much as to positively crush it out of the market entirely.

A little calcium tartrate, in a medicinal point of view, can do no harm. I have not met with a single case of injury, and I cannot place my hand upon one which has been recorded.

The small quantity of barium sulphate is also innocent; and, even if it could be converted into a soluble or absorbable salt of barium the amount is so small that it could do no harm to the human system.

In the case of cream of tartar when no adulteration is intended, surely no fraud is meant or designed. Calcium tartrate is a constituent of grape juice, and it is soluble in water containing tartrates. In pure water it is almost insoluble.

The presence of a small, nay, a fractional part of barium sulphate, is not worth notice. Thus, we have got the Adulteration Act dragged through the mire, and the last absurd prosecution only shows how honest, upright men are paraded before benches of magistrates, as if it were a crime to act honestly and trade honourably, while quacks and charlatans, with all kinds of show and tomfoolery, base lying and deceit, escape police supervision. Truly, the laws of this country, and its law officers, are not in keeping with our generation, or boasted civilization, justice and probity.

Northallerton. Henry Brown.

"*Inquirer.*"—*India Rubber Cement.*—Probably the following, which has already appeared in this Journal, would answer your purpose:—One part of shellac to ten parts of liq. ammon. fort. (sp. gr. ·880), to be placed in a wide-mouthed bottle in a warm place and frequently shaken during three or four weeks. The mixture first forms a transparent mass, but afterwards becomes liquid.

J. Hicking.—Very much would depend upon the nature of the substance designated by the name. See upon this subject a paper by Mr. Martindale and subsequent correspondence, *Pharm. Journ.*, [3], vol. vii., pp. 471, 507 and 528.

"*Gwendolin.*"—(1) *Lolium perenne, β aristatum.* (2) Not sent. (3) *Holcus lanatus.* (4) The frothing is due to the presence of saponin.

"*Minor.*"—Recipes for preparing transparent glycerine jelly will be found in the number for November 30, 1878, p. 463, and elsewhere.

A. T. Smith—We would recommend you to apply to some medical authority for advice on the subject.

C. E. W.—See the 16th section of the Pharmacy Act, 1868.

Communications, Letters, etc., have been received from Messrs. Jackson, Reynolds, Wilkinson, Dewson, Jones.

CONTRIBUTION TO THE CHEMISTRY OF GURJUN BALSAM.

BY EDUARD HIRSCHSOHN, MAG. PHARM.

In my work, 'Contributions to the Chemistry of the more important Gum Resins, Resins and Balsams,'* will be found experiments which were made with a liquid sold as gurjun balsam. The sample I examined did not solidify on heating, showed a slight fluorescence, and did not give with nitric and sulphuric acids the violet coloration mentioned by Flückiger.† As no sample of the balsam described by Flückiger was at my disposal, I was unable at the time to determine whether any difference, other than the above-mentioned, could be detected between the two specimens by means of the reagents I had employed in the quoted work. Last year Professor Flückiger presented a sample of the balsam he had examined to the Museum of the Pharmaceutical Institute of this town, and the experiments made with this specimen, kindly placed at my disposal by Professor Dragendorff, and a sample of gurjun purchased at a neighbouring chemist's, yielded the following results.

Both samples showed a strong fluorescence in green, and formed on standing a deposit consisting entirely of crystals, the quantity of which in the last-named sample was small in comparison to that received from Professor Flückiger.

On heating in a test tube, the balsam from Professor Flückiger became quite solid, so that the tube could be inverted without any fear of the contents running out, while with the second sample a solidification appeared only after heating for a considerable length of time, and even then it did not become so thick as the first-named sample.

Alcohol (95 per cent.) dissolved both samples with the exception of a white residue.

Ether (*pure*) dissolved also incompletely. The cloudy mixture became on the addition of an equal volume of alcohol nearly clear, and the greater part of the deposit was taken into solution.

Ether and Alcohol (equal volumes) gave an opalescent solution.

Chloroform dissolved, forming a clear liquid.

Solution of Bromine (1 part of bromine in 20 parts of chloroform) added to the chloroformic solution of the balsam (3 drops balsam, 1 c.c. chloroform and 5 drops bromine solution) produced at first no appreciable alteration, but after a time the mixture became intensely green-coloured and retained this colour tolerably long.

Bisulphide of Carbon gave a cloudy solution with the balsam and the reagent recommended by Flückiger produced a deep violet coloration, which in Flückiger's sample was permanent for hours, whilst in the second sample it disappeared in the course of a short time.

Alcoholic Solution of Acetate of Lead (a saturated solution of acetate of lead in 95 per cent. alcohol) produced in the filtered alcoholic solution no change.

Alcoholic Solution of Ferric Chloride (10 per cent. in 95 per cent. alcohol) coloured the alcoholic solutions of the balsam darker.

Concentrated Sulphuric Acid dissolved the balsams with yellowish brown colour, and this solution with five to ten volumes of water gave a white milk; with three to five volumes of alcohol, a flesh-coloured mixture passing into violet.

Alcoholic Hydrochloric Acid (*i.e.* 95 per cent. alcohol saturated with gaseous HCl.) yielded with the balsam a yellowish red tincture, which on the addition of alcohol became violet.

Petroleum Spirit dissolved incompletely.

*Chloral Reagent** coloured both balsams, as well as the residue left on evaporating the petroleum spirit solution, deep green.

To allow of an easy comparison of the reactions previously, and those now obtained, I have tabulated the results as follows.

	Flückiger's Gurjun Balsam.	Gurjun Balsam (*Archiv. d. Pharm*, vii., 6, 1877).
Ether	Solution incomplete.	Incomplete.
Alcohol	" "	"
Ether-Alcohol . .	" opalescent.	Perfectly clear.
Chloroform . . .	" clear.	Incomplete.
Solution of Bromine.	Green coloration.	Yellowish coloration.
Chloral Reagent . .	Green.	Green.
Flückiger's Reagent.	Violet coloration.	Bright yellow coloration.

As will be seen from the above table the two samples of true balsam now examined differ from the one previously experimented upon: (i) in the Flückiger reaction; (ii) they are completely soluble in chloroform, and (iii) give with solution of bromine a green coloration. The slight difference between Professor Flückiger's sample and that from a chemist in this town is due, I am convinced, to the presence of alcohol in the latter, for if it be freed therefrom by distillation the two give identical reactions.

The true gurjun balsam differs from copaiva balsam:—

(i) in the violet coloration produced by Flückiger's reagent in the bisulphide of carbon solution;

(ii) in the incomplete solubility in ether (copaiva balsam gives a clear solution);

(iii) in the negative behaviour of acetate of lead to the alcoholic solution. (Copaiva balsam gives a cloudiness which on warming disappears.)

Dorpat, Russia.

* *Archiv der Pharmacie*, vii., 6, 1877.

† Flückiger proceeded as follows:—One drop of the balsam is dissolved in twenty drops of bisulphide of carbon, and one drop of a previously cooled mixture of concentrated sulphuric and nitric acids added and the whole well shaken. 'Jahresbericht für Pharmacognosie, etc.,' 1876, p. 220.

* *Archiv. der Pharmacie*, vii., 6, 1877.

THE FUNCTION OF CHLOROPHYLL.

The following is a more detailed abstract of the very important communication recently referred to in *The Month* as having been made to the Berlin Academy of Sciences, by Dr. Pringsheim, which appears to throw considerable fresh light on the function of chlorophyll in the life of the plant.

Having been led by previous researches to the conclusion that important results might be obtained by the use of intense light, Dr. Pringsheim contrived an apparatus by means of which the object under view should be brightly and constantly illuminated by a strong lens and a heliostat. If in this way an object containing chlorophyll—a moss-leaf, fern-prothallium, chara, conferva, or thin section of a leaf of a phanerogam—be observed, it is seen that great changes are produced in a period varying from three to six or more minutes.

The first and most striking result is the complete decomposition of the chlorophyll; so that in a few minutes the object appears as if it had been lying for some days in strong alcohol. Although, however, the green colour has disappeared, the corpuscles retain their structure essentially unaltered. The change then gradually extends to the other constituents of the cell; the circulation of the protoplasm is arrested; the threads of protoplasm are ruptured and the nucleus displaced; the primordial utricle or ectoplasm contracts and becomes permeable to colouring substances; the turgidity of the cell ceases, and the cell presents, in short, all the phenomena of death.

That these effects are not due to the action of the high temperature to which the cell is exposed under these circumstances, is shown by the fact that they are produced by all the different parts of the visible spectrum. The result is the same whether the light has previously passed through a red solution of iodine in carbon bisulphide, through a blue ammoniacal solution of cupric oxide, or through a green solution of cupric chloride. If the carbon bisulphide solution of iodine be so concentrated that only rays of a greater wave-length than 0·00061 mm. can pass through it, these effects are not produced, although about 80 per cent. of the heat of white sunlight is transmitted. On the other hand, if the ammoniacal solution of cupric oxide be so concentrated that the whole of the waves of a less wave-length than 0·00057 mm. are absorbed, a rapid and powerful effect is produced, although the amount of heat that passes is very small. It is thus shown that the phenomena in question are not the result of heat.

The next point determined by Dr. Pringsheim is that the effects are not produced in an atmosphere devoid of oxygen. This was the case whether the oxygen was replaced by pure hydrogen or by a mixture of hydrogen and carbon dioxide; while the removal of the carbon dioxide from atmospheric air was altogether without effect on the phenomena. The conclusion drawn is that the decomposition of chlorophyll in the living plant is a process of combustion, which is influenced and promoted by the action of light, and which is not related to the decomposition of carbon dioxide by the plant. When the green colour of the chlorophyll-grains has been partially destroyed, it cannot be restored, even though the cell continues to live; from which it is inferred that the result is not a normal physiological, but a pathological effect. No substance was found in the cells which might be regarded as the product of the decomposition of the chlorophyll, nor was any oil or starch detected in the etiolated cell, nor any formation of grape sugar or dextrin. The assumption is therefore that the products of decomposition are given off in the gaseous form.

The conclusion is drawn that the decomposition produced in the protoplasm and in the other colourless cell contents is the direct effect of the photochemical action of light. That it is not due to the injurious influence of the products of decomposition of the colouring matter of the chlorophyll is shown by the fact that it takes place equally in cells destitute of chlorophyll, such as the hairs on the stamens of *Tradescantia*, the stinging hairs of the nettle, etc. It is, on the other hand, dependent on the presence of oxygen, or is a phenomenon of combustion.

The result of a variety of experiments leads Dr. Pringsheim to the important and interesting conclusion that the chlorophyll acts as a protective substance to the protoplasm against the injurious influence of light, diminishing the amount of combustion, or, in other words, acting as a regulator of the respiration.

He then proceeds to investigate what are the substances which become oxidized in the process of respiration. In every cell, without exception, that contains chlorophyll, Pringsheim finds a substance that can be extracted by immersion in dilute hydrochloric acid for from twelve to twenty-four hours, to which he gives the name *hypochlorin* or *hypochromyl*, and which he believes to be the primary product of the assimilation of the chlorophyll. It occurs in the form of minute viscid drops or masses of a semi-fluid consistency, which gradually change into long red-brown imperfectly crystalline needles. It is soluble in alcohol, ether, turpentine, and benzol, but insoluble in water and in a solution of sodium chloride. It becomes gradually oxidized on exposure to an imperfectly crystalline resinous substance. It is probably an ethereal oil and an invariable accompaniment of the colouring substance of chlorophyll, and even more universally distributed than starch or oil. It has not yet been detected in those plants which do not contain true green chlorophyll, such as the Phycochromaceæ, Diatomaceæ, Fucaceæ, and Florideæ. Starch and oil appear to be reserve substances, produced by the oxidation of the hypochlorin under the influence of light; it being the most readily oxidizable constituent of the cell, more so even than the chlorophyll itself.

That the hypochlorin is present in variable quantity in every chlorophyll grain under normal circumstances, and is subject to continual increase and decrease, may be proved without difficulty. All comparative observations on chlorophyll grains in younger and in older conditions point unmistakably to the conclusion that the collection and increase of the starch enclosed in the ground-substance of the chlorophyll goes on *pari passu* with a decrease of the hypochlorin. In dark the hypochlorin, which does not take any direct part in the transport of food materials, is more permanent than starch; and this again is in agreement with the conclusion that its transformation in the cell into more highly oxidized bodies is hindered by the increased respiration in light.

In the facts here described and the conclusions derived from them, Dr. Pringsheim believes that an entirely new light is thrown on the cause of the well-known fact that assimilation takes place only in those cells of the plant which contain chlorophyll, and only under the influence of sunlight. This substance acts universally as a moderator of respiration by its absorptive influence on light, especially of the red rays, and hence allows the opposite phenomena of respiration and elimination of carbon dioxide to go on in those cells which contain it. A more detailed account of the experiments and results is promised by the author in a future paper.

THE ELECTRIC LIGHT IN AMERICA.

The following interesting letter upon this subject, dated New York, December 30, appeared in the *Times* of Monday last:—

Within the past two weeks Mr. Edison, the inventor, has stumbled upon something which at last bids fair to solve the problem of the illumination of dwellings with electricity. Up to the present winter the efforts of Mr. Edison have been dead failures. All the startling announcements made in his behalf have been premature. None of them have been justified by the facts. They indicated what the inventor hoped to accomplish, not what he had actually accomplished; and as, latterly, it had gradually been making itself known that Mr. Edison had failed, there was beginning to be great scepticism in the public mind as to his ever accomplishing anything important in this field of experiment. About two months ago Edison abandoned his platinum lamp altogether and began to experiment with carbon. He has now hit upon something by accident which not only astonishes the public, but more especially himself and the men in his shops. The most astonished man is certainly Edison himself.

The shops at Menlo Park, a flag station on the Pennsylvania railroad, sixty minutes' ride from New York, were established four or five years ago. They were devoted to the manufacture of electrical apparatus, the perfection of the telephone, the phonograph, the motor, etc. In the summer of 1878 experiments began to be made with the electric light. Edison supposed at first that the whole battle was won when he had found a plan to divide the electric current. He adopted for a lamp a coil of platinum wire, and endeavoured to perfect a regulator of the current which would allow the coil to become luminous without becoming so hot as to melt. He laboured diligently to perfect this device until about two months ago. About 17 feet of fine platinum wire were used in his coil. His first trouble grew out of the tendency of the current to form a voltaic arc between adjacent parts of the coil. Every time that an arc was formed his wire melted and disappeared in a flash of sparks. To insulate the coil with some material which would also become luminous was his constant effort. Zinc was tried and other materials. Wire made of iridium and other hard metals and various minerals were used, but all without success. Then the idea of enclosing the wire in a globe of glass from which the air had been exhausted occurred to him. Weeks and months of costly experiment with this idea followed. The vacuum was useful, as it economized force. The radiation of heat was not so great in a vacuum, and a larger proportion of the energy of the current was saved for maintaining the luminous incandescence of the wire. The experts foresaw failure long before Edison did; and, finally, Edison himself reluctantly came to the conclusion last fall that he was on the wrong track entirely. The man wore himself out very nearly, and the disappointment almost sent him to his grave.

About two months ago the inventor resolved to test the utility of carbon. He was determined not to surrender until that had been done. What inspired him to make this departure was a trivial incident. One day he was busy with some lamp-black and tar, with which he was making some wafers for a telephone. Happening to rub some between his fingers, he found he could draw it out into a thread. The thought came into his mind, "Why can I not make a carbon wire for an electric lamp?" After a little consideration, he began a series of experiments in this direction. He found that he could easily make a carbon wire, as had occurred to him, and that a burner for a lamp could be made from it. After several weeks of effort, he found that a carbon wire, enclosed in a hermetically sealed glass globe, from which the air had been exhausted, would do well for a short time. It made a good light, and was satisfactory in that respect, but it was not durable. Invariably it was soon consumed. He then thought of the idea of taking a simple cotton thread, carbonizing it in a retort, and making coils out of that. All sizes of thread and twine were tried. But even this material would not do. The texture of the carbonized thread was too loose. The material was better than lamp-black and tar, but was not good enough. Then Edison tried common paper. He cut out thin strips of various kinds of paper, which he carbonized as before, by laying them between sheets of tissue paper, enclosing them between cast-iron plates, and subjecting them to intense heat in a muffle furnace. The slips were cut out in the form of a horseshoe. One of these slips, made from Bristol board, was enclosed in a vacuum (if that be a proper expression) in a glass globe; the electric current being conducted to and from it by means of platinum wires. This was three or four weeks ago. The lamp thus made was tried. The horseshoe of carbonized paper became incandescent, and gave a beautiful mellow light, equal to that of one gas burner. It did not consume, and it lasted very well during the first day of experiment. Next day the same lamp was tried again. It behaved beautifully, somewhat to the surprise of Mr. Edison and his assistant. Both men now became very much interested. They instructed their glass-blower to make several lamps with great care; the pump perfected by Crook and Sprengel was used to exhaust the air from the globes; and particular attention was paid to the matter of sealing the stems of the globes (which was done with a blow-pipe). About two weeks ago experiments began with these lamps. They all behaved well, and a few days more served to show that a valuable invention had finally been evolved from the busy brain of the philosopher of Menlo Park. In fact, the lamp appeared to be complete.

A whole crop of new questions now sprang into view, one of them being the durability of the new style of incandescent carbon under a strong current. This question was readily disposed of. One lamp was raised to a power of thirty gas burners with perfect safety, and the capacity of the paper carbon to withstand an intense current appeared to be proved. As it is not the intention of Mr. Edison to make lights for dwellings of greater power than one or two gas burners, he considers that this part of the problem is disposed of. If a burner can be made to give the light of thirty gas burners with safety, it can surely be relied upon to give the light of one or two. Then came up another question. Ten lights could be maintained in the laboratory with the expenditure of one horse power, or eight net in a dwelling. In practical use the current would be turned off and on suddenly. Would not the sudden turning on of a current of electricity, equal to one-eighth of one horse power, rupture the carbon in time? One-eighth of one horse power will drive several sewing machines, and when administered in the form of a blow is all a man would ever wish to have applied to his person. One of the men in the shops was detailed to turn on and off the current of electricity at one of the lamps. The man did this 5000 times, which would be about the number of times that a lamp would be lighted in a dwelling in the course of ten or twelve years. The lamp withstood this test perfectly. Various other questions came up and were promptly solved in the same manner by actual experiment. The state of feeling which reigned in the shops at Menlo Park as these experiments went on, and as it was found that the lamps sustained every test, can better be imagined than described. Every man, from Mr. Edison down, was first astounded and then exhilarated. They have had so many failures that they can now scarcely believe their senses.

There are now forty-five lamps lighted every evening at Menlo Park, and the number is being increased as fast as the lamps can be made. Two or three of the dwellings in the village have been supplied with them, and a dozen or more street lamps along the road leading to the railway station have also been furnished with them. The others are in the shops. One of the latter has now been in use day and night for fifteen days, and is as good as when first put into operation.

The invention of this new lamp has not produced any very striking effect in regard to gas stocks here yet. Scepticism in regard to Mr. Edison's achievements is too strong yet. But a very decided effect has been produced with reference to the stock of Mr. Edison's Electric Lighting Company. There are 3000 shares in the capital of the company, the par value of each being 100 dollars. This stock was down to 20 dollars a share last summer, and a large number of the present holders bought at that price. The rise in value during the last two weeks has been enormous. The Hon. Roscoe Conkling, United States Senator from New York State, bought several shares this past week, and paid 3000 dollars apiece for them. August Belmont, the banker, has bought during the past week at 3500 dollars a share, and will take all that are offered at that price. Drexel, Morgan and Co., bankers, who are already large holders, and, in fact, the principal owners, are also buying at similar prices. There has been nothing like it in the history of stocks in New York city. Very few large holders of shares in the Edison Company are now willing to sell at 3500 dollars; and the majority of the small proprietors are demanding and waiting for 5000 dollars a share. The stock may never go to that height, because experiment may develop defects in the new lamp not yet observed; but the feeling in the company now is one of perfect confidence that the problem of household illumination has been solved, and higher quotations are predicted by them. The company is composed of merchants and bankers of high standing, and few of them are willing now to sell out except for very great inducements.

Mr. Edison himself does not indulge in extravagant assertions. I had a long talk with the inventor to-day, and went with him all over the shops, learning every detail of construction of the lamps and examining the generators, air-pumps, furnaces, motors, and other apparatus. Mr. Edison makes no predictions, but says that he is going on until he has one hundred and fifty lamps of the new pattern burning in the dwellings and streets of Menlo Park. It is his own test of the merits of the new lamp, the object being to develop defects. A few weeks from now he will be able to formulate a clear opinion about the merits of the invention. Wires are meanwhile to be run down to the village of Rahway, four miles distant, in order to test the difficulties of distributing the mains and lamps over a large area. Until the *data* afforded by the whole of this test are collected, Mr. Edison will not declare his final opinion about this matter. He believes, however, that the new lamp can be distributed over a large area, and houses lighted therewith, for the same price as now paid for gas, possibly less, but of the latter he is not certain. The lamps are four inches high, are simplicity itself in construction, and will cost to construct only 25 cents. apiece.

The Sawyer lamp has been left far in the rear by the new invention. Mr. Sawyer has never been able to produce a perfect vacuum, nor to produce a lamp comely enough to be a desirable part of the furniture of a dwelling. It is a straight glass tube ten inches or twelve inches long, and one and a half inches in diameter, and is filled from end to end with heavy copper coils and other apparatus. The light is produced by the incandescence of a pencil of carbon. The tube is filled with nitrogen gas, and sealed at the bottom into a copper base with wax. The light is an extremely beautiful one, mellow as the sunlight, capable of being turned up and down at pleasure, and in every respect delightful; but the apparatus is clumsy and not adapted for the interiors of tastefully furnished dwellings. The lamps will burn five hundred hours and cost 10 dollars apiece. Mr. Edison's lamp is only four inches long. It is sealed with the aid of a blow-pipe, and is thus proof against the accidents to the sealing-wax to which the Sawyer lamp is liable. The vacuum within it is almost perfect. It is comely enough for any apartment. Mr. Cyrus W. Field has lately lent his name towards the formation of a company, with a capital of 1,000,000 dollars, to take up the Sawyer lamp, and introduce it into factories, warehouses, mines, railway stations, public halls, dry docks, and hotels. It has been intended to build a factory, and go into business on a large scale. What the effect of the discovery by Mr. Edison will be on the future of the Sawyer company cannot be predicted, but it is believed that a complete reconstruction and simplification of the Sawyer lamp have now been made necessary.

The only other system which is making any headway in the United States at the present time is that of Mr. Charles F. Brush, of the city of Cleveland, Ohio. It is the one system employing the voltaic arc and automatic regulator for the illumination of large buildings which has emerged from the large crowd of its competitors, and is coming into practical use. The Brush light flickers now and then, but is steady enough for all practical purposes. An arrangement has been made by means of which any number of lights, from one up to twenty, may be run with one machine in one circuit, the power absorbed being exactly in proportion to the number of lights used. It requires fourteen horse power to maintain eighteen lights. This system has now been tried for one year, and is found to meet all the purposes of illumination in factories, warehouses, and large stores. The system is now *un fait accompli*, and it is coming into general use very rapidly. Nineteen-twentieths of all the electric lights in use in industrial establishments in the United States are those of Mr. Brush. They are employed in cotton factories, rolling-mills, printing offices, and stores. The lamps are of two thousand candle power each. They consume from one and a half inch to two inches of carbon per hour, costing about 1 cent. There are now eight hundred of them in use in the United States.

With reference to cost, the experience of the Conant Thread Mills at Pawtucket, Rhode Island, may be cited. There are 38 of the Brush lamps in those mills, replacing 500 gas-jets. The cost of the plant is 2000 dollars, with 65 dollars for each lamp. The carbons are found to cost 1¼ cent. per hour per lamp. One man spends a quarter of his time attending them, which will cost 3 dollars a week. The company finds that the total cost of running the 38 lamps is about 1 dollar 16 cents. per hour, which is a great saving of expense, because the gas formerly consumed cost 5 dollars an hour.

The Riverside worsted mills at Providence, Rhode Island, have been employing the Brush electric light since February last. The company were sceptical at first, but allowed the light to be introduced in the first instance at the expense of the Electric Supply Company. Twenty lamps were hung in the weaving-room, 110 feet long by 100 feet wide, where 110 broad Crompton looms are in operation. The porcelain globes which surround the lamps were painted white on one side, the side toward which the men look; the other two-thirds were clear glass, thus throwing the whole light on their work. The 20 lamps replaced 250 gas-burners. Since February 60 more lamps have been introduced to the mill, and the whole 80 have been subjected to the best test ever made in this country. The manager of the mills has given me the following *data* as the results of his experience with the light:—

"Cost of a 16-light machine, 2000 dollars; cost of double lamps (containing an extra set of carbons into which the current may be switched when the whole set is burnt), each, 80 dollars; number of gas-burners replaced by the 80 lamps, 1000 dollars; cost of 1000 gas-lights formerly per hour, 12 dollars 25 cents.; cost of 80 electric lights per hour, 80 cents.; candle power of the 1000 gas-jets (15×1000), 15,000; candle power of 80 electric lamps (2000×80), 160,000."

Of course, less light would answer in the factory, but the increase of illumination is very much liked. The light is strong, steady, and fine.

The Brush lamp has now taken its place in this country among the other ordinary wares of the market, the utility of the system having been fully demonstrated.

No progress is now being made with the Fuller system. The untimely death of the inventor, just as he was on the verge of success, has proved a great blow to the company.

EXPERIMENTS ON THE COMPARATIVE VALUE OF SOME EXTRACTS OF NARCOTIC PLANTS.*

BY H. BRETET.

The following account of some experiments, limited to the extracts of narcotic plants, have for their object to attract the attention of pharmacologists to the proportion of alkaloids contained in each of different extracts yielded by the same plant.

The Codex admits two extracts of these plants—the alcoholic extract and the extract of the defecated juice. Many medical men prescribe also the aqueous extract or extract prepared by infusion, which, consequently, is kept in pharmacies and is met with also in commerce. I am ignorant as to what motive has caused a preference for the juice extract, which, rationally, ought to be the least active. In fact, even with the best press, the plants retain always at least a fourth part of the natural juice; there would always therefore be a fourth part of the alkaloid lost, assuming that the whole of these were in solution in the plant juices, which is far from being the truth, and it is very evident that the exhaustion of the plant, green or dry, by two infusions and successive pressings is much more complete. The large quantity of product thus obtained has probably led to the supposition that it is produced by the addition only of inert matters to the juice, and that, weight for weight, the extract so obtained is less active; the contrary, however, is the result shown by the titrations I have made.

The only figures that I have been able to find relative to the richness in alkaloids of the extracts upon which I have worked have been published by Dragendorff.* These figures are of very great interest, but they do not allow of comparison; since for that purpose it is absolutely necessary to operate upon extracts yielded by the same plant.

My first experiments were made upon conium. 10 kilog. of leaves yielded 210 grams of extract of defecated juice. I exhausted the residue from this operation with boiling water, by means of two successive infusions, and obtained thus 500 grams of solid extract. To estimate the conia in these extracts I operated upon 10 grams of each. The extract was dissolved in 30 grams of distilled water and 2 grams of bicarbonate of soda were added to the solution. When the reaction had terminated the liquid was shaken with 100 c.c. of rectified ether every ten minutes during two hours; the ethereal liquid was then separated and the agitation was repeated with a fresh quantity of ether. The united ethereal liquids were shaken with 60 grams of water acidulated with sulphuric acid during half an hour, after which the acid liquid was treated with Mayer's reagent (iodide of mercury and potassium) in considerable excess. After twenty-four hours of contact at a temperature of about 30° C. the liquid was filtered, the residue dissolved in 93° alcohol, and this solution evaporated in a previously weighed capsule,—first in a water-bath, and then in a stove at 100° C.,—until the weight was constant.

The residue left by the extract of the defecated juice weighed 0·074 gram.

The residue of the infusion extract weighed 0·105 gram.

The double iodide of mercury and conicine contains 17·69 per cent. of alkaloid. It results from the foregoing experiment that—

* *Répertoire de Pharmacie* for December, 1879, p. 537.

† 'Analyse Chimique de quelques Drogues Actives,' 1876.

10 gr. of extract prepared from defecated juice of conium contained 0·01309 gr. of conicine;—and

10 gr. of extract prepared by infusion from the same plant, after being deprived of juice contained 0·01857 gr. of conicine.

In another comparative experiment, made with an extract prepared from the juice and one prepared by direct infusion of the fresh plant,—

10 gr. of extract from juice contained 0·0159 gr. of conicine.

10 gr. of aqueous extract contained 0·0329 gr. of conicine.

These figures, which, while differing considerably from the former, show results tending in the same direction, were obtained by the same process.

This process is imperfect in itself, when applied to conium, because the salt of conicine is rather soluble in water; therefore I give the preceding figures only as terms of comparison, but as such they have their value, because the manipulation was the same in the smallest details in all the operations.

For plants containing fixed alkaloids, —belladonna and datura,—I have completely modified the analytical method. 10 grams of extract are dissolved in 15 grams of water and 2 grams of bicarbonate of soda added to the solution. When the evolution of gas has terminated I mix the liquid with 10 grams of well-washed wood sawdust* and dry completely in a water-bath; the powder is then introduced still warm into a displacement apparatus and chloroform poured upon it. After twelve hours' contact, the lixiviation is continued with 250 grams of chloroform, and the last portions driven through with water. The chloroform solution is received in a flask containing a titrated solution of sulphuric acid corresponding to a determined volume of an alkaline solution. The chloroform being distilled, the cooled acid liquor is thrown upon a small moistened filter, the flask and the filter being rinsed with water until the united liquids measure 60 c.c. A solution of alkaloids is thus obtained, in which the acid in excess is neutralized by a titrated solution of potash, the volume used giving, by difference, the quantity of alkaloid.

When operating upon alcoholic extracts, it is necessary to modify this process still further, otherwise it gives figures much above the reality and differing among themselves for the same extract.† In estimating these extracts I do not distil off the chloroform, but agitate in the cold with the acid solution, which is afterwards separated by means of a separating funnel. The chloroform, retaining the chlorophyll, is again shaken with distilled water, which is afterwards added to the first solution. The titration is then made as in the other extracts.

I analysed by this method a certain number of extracts of belladonna and datura from various sources; afterwards I made the following experiment:—

Two stalks of belladonna yielded 1550 grams of stripped leaves; these were divided into two equal parts, one of which was dried and yielded 122 grams of extremely dry leaves.

The 775 grams of fresh leaves were bruised and the juice was removed by strong pressure and clarified in the ordinary manner. The coagulum (A) produced by the clarification of the juice was collected carefully. While moist it weighed 20 grams; after drying in a stove its weight remained at 4 grams. It was put aside for the estimation of the atropine.

The clarified juice gave 23 grams of extract of pilular consistence (B).

* The sawdust is cleansed by long boiling in dilute caustic soda, then washed by decantation, first with pure water, next with acidulated water, and finally again with distilled water.

† I am unable at present to explain these variations except by hypotheses, which I refrain from mentioning, wishing to remain absolutely within the domain of facts.

The leaves from which the juice had been removed were exhausted with boiling water and gave 12 grams of very firm extract (C).

The dried leaves were pounded and gave 104 grams of semi-fine powder. 52 grams of this powder, exhausted with boiling water, yielded 18 grams of aqueous extract (D). 52 grams, exhausted with 60° alcohol yielded 16 grams of alcoholic extract (E).

The four extracts were titrated by the process just described. As to the coagulum, 2 grams of bicarbonate of soda were dissolved in 10 grams of water, the coagulum was suspended in this liquid, and then the whole was dried in a water-bath. The powder resulting from this operation was introduced into a displacement apparatus and treated similarly to the extracts.

The alkaline solution employed to saturate the acid contained 1·75 gram of pure and perfectly dry potash per 100 c.c.; consequently each tenth of a cubic centimetre represented 0·00175 gram of potash. The equivalent of this base being 56·11, and that of atropine 289, each division of the alkaline liquor corresponded to $\frac{0·00175 \times 289}{56·11} = 0·009013$ of atropine or daturine, the elementary composition of these alkaloids being the same.

10 c.c. of acid liquor—that is to say the quantity employed for each operation—were neutralized by 90 divisions of the alkaline liquid.

The liquid from the coagulum (A) required only 85 divisions.

The liquid from the extract of the juice (B) required only 86 divisions.

The liquid from the extract (C) required only 82 divisions.

The liquid from the aqueous extract (D) required only 82 divisions.

The liquid from the alcoholic extract (E) required only 75 divisions.

From which it results that—

		Atropine grams.
The coagulum (A) . .	contained	0·009013 × 5 = 0·0450
10 gr. of extract (B) (defecated juice)	„	0·009013 × 4 = 0·0305
10 gr. of extract (C) (leaves deprived of juice) . .	„	0·009013 × 8 = 0·0721
10 gr. of extract (D) (aqueous extract)	„	0·009013 × 8 = 0·0721
10 gr. of extract (E) (alcoholic extract)	„	0·009013 × 15 = 0·1352

From a general review of these experiments the following facts are deducible:—

1 kilogram of fresh leaves deposited upon clarification of the juice 5·16 gr. of albuminous coagulum, containing 0·0580 gr. of atropine.

1 kilogram of fresh leaves yielded 29·60 gr. of juice extract, containing 0·305 per cent., or 0·1067 gr. of atropine.

1 kilogram of fresh leaves, deprived of juice, yielded 15·50 gr. of aqueous extract, containing 0·721 per cent., or 0·1117 gr. of atropine.

1 kilogram of fresh leaves, weighed 157 grams when dried, and yielded 54·94 grams of aqueous extract, containing 0·721 per cent., or 0·3961 gr. of atropine.

1 kilogram of fresh leaves weighed 157 grams when dried, and yielded 48·54 gr. of alcoholic extract, containing 1·352 per cent., or 0·6562 gr. of atropine.

The following are the results of the titration of some other extracts from various sources:—

Alcoholic extract of datura, made in my establishment in 1877: contained 1·442 per cent. of alkaloid.

Alcoholic extract of belladonna of commerce, two samples: contained 1·081 and 1·400 per cent. of alkaloid.

Extract of defecated juice of belladonna of commerce, two specimens: contained 0·090 and 0·270 per cent. of alkaloid.

Aqueous extract of datura, made in my establishment in 1879: contained 0·451 per cent. of alkaloid.

Aqueous extract of belladonna of commerce, three specimens: contained respectively 0·721 per cent., 0·180 per cent., and no alkaloid.

En résumé, in these researches, evidently still incomplete, I have constantly found the alcoholic extract much more rich in alkaloid, which was well foreseen; next to it comes the extract by infusion which, notwithstanding the abundance of inert matters in it, always contains proportionally more alkaloid than the extract of the juice. It follows, also, from the experiment upon the fresh belladonna that the extract of the non-defecated juice, which formerly was always employed, contains more alkaloid than the extract of defecated juice, since the albuminous coagulum always contains a small quantity. Thus, in the present case, a kilogram of fresh belladonna leaves yielded 29·60 + 5·16 = 34·76 grams of extract with feculæ, containing 0·1647 gram of atropine, or 0·473 per cent. in the place of 0·305 per cent. which the Codex extract contains. This confirms the opinion of some of the older pharmacologists, who considered the extracts of Storck to be more active than the extracts of defecated juice.

PHYTOLACCIN: A NEUTRAL PRINCIPLE CONTAINED IN THE SEEDS OF PHYTOLACCA DECANDRA.*

BY EDO CLAASSEN.

The seeds of pokeberries (the fruit of *Phytolacca decandra*, L.) contain an indifferent crystallizable principle which I have named *phytolaccin*, and which is obtained in the following manner: the pulverized seeds of the pokeberries are treated several times with alcohol, the alcohol is removed from the filtrate by distillation, the residue washed with some petroleum spirit (gasoline or petroleum benzine), to remove adhering oil, then perfectly dried on the water-bath, finely pulverized and extracted by means of concentrated ether (or chloroform). The ethereal solution leaves behind, after distillation from the water-bath, a syrup-like liquid filled with acicular crystals which, after separation from the mother liquor, can be obtained perfectly white and pure by recrystallization or washing with a little alcohol. Phytolaccin is tasteless and colourless, and crystallizes in acicular silky prisms, mostly forming radiated tufts. It is insoluble in water, but pretty easily soluble in alcohol, particularly when hot; ether and chloroform dissolve the same very easily, and petroleum spirit somewhat difficultly, even when hot. Diluted acids, as well as concentrated acetic and hydrochloric acids, ammonia or a pretty concentrated solution of sodium hydrate do not dissolve it, even at the boiling point. Cold concentrated sulphuric acid, however, dissolves the same with brownish-yellow colour, turning brownish-red when the solution is heated. Concentrated nitric acid, when cold, has no effect on the phytolaccin; but, when heated, it dissolves the same, assuming at the same time a yellow colour. From a solution in alcohol (which, as I may mention by the way, is tasteless), or in ether, the phytolaccin falls down, on addition of water, as a flocky precipitate. Heated it melts, then turns brown and black and is entirely consumed. It contains no nitrogen, as the reactions for it gave a negative result.

COLD CREAM WITHOUT OIL.

Quince Seed Mucilage	10 drachms.
Almond Oil Soap	15 grains.
Stearic Acid	2½ drachms.
Glycerine	½ drachm.

Rub the stearic acid and the soap together in a warm mortar, add gradually to the mixture the mucilage so as to form an emulsion, and then the glycerine. Lastly add a suitable perfume.

* From *New Remedies*, November, 1879.

The Pharmaceutical Journal.

SATURDAY, JANUARY 17, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE ABUSE OF NARCOTICS.

SINCE the time when, on the motion of Mr. HAMPSON, the Council of the Pharmaceutical Society resolved that the General Purposes Committee should take into consideration the largely increasing sale by grocers, general dealers, and other unregistered persons of patent medicines containing scheduled poisons, attention has also been directed to a particular phase of this subject in other quarters and in a manner that may eventually lead to the adoption of some concerted action on the part of medical and pharmaceutical societies.

The object of Mr. HAMPSON's motion was to restrict the sale of such patent medicines to persons registered under the Pharmacy Act. He argued that the spirit of the Pharmacy Act implied the fitness of such a restriction as one consistent with the interests of the public, and that as a matter of justice to those registered to carry on the sale of poisons on the ground of their being specially acquainted with the nature of these articles, it should be the exclusive privilege of registered persons to deal in poisons. That this argument is reasonable does not need much demonstration, and the undoubted fact that the sale of poisons under the cover of the patent medicine stamp is a growing evil, renders the subject deserving of consideration.

On a subsequent occasion, Mr. HAMPSON, through the medium of this Journal, addressed a letter to the trade asking those who were in a position to give tangible proof that the patent medicine stamp is used to cover sales of scheduled poisons, to furnish him with particulars of such cases, and in all probability we may soon hear something of the information thus obtained.

It so happened that in the same number of the Journal that contained Mr. HAMPSON's request there was a report of a prosecution instituted by the Pharmaceutical Society against an unregistered person at Horsington, for selling laudanum not distinctly labelled, as the Pharmacy Act requires, with the name and address of the seller, and the only attempt at a defence was the statement that the bottle containing the laudanum was stamped with a patent medicine stamp. This circumstance illustrates the existence of a belief that the use of a patent medicine stamp will serve to constitute an exception to the provisions of the Pharmacy Act as regards the sale of scheduled poisons, and it is probably under the influence of this belief that the practice of selling such poisons with a patent medicine stamp attached has become so general.

It is true that the sixteenth section of the Pharmacy Act provides that nothing thereinbefore contained shall extend to or interfere with the making or dealing in patent medicines, but this reservation of rights existing at the passing of the Act does not in any way furnish a justification for the retail sale of scheduled poisons otherwise than as the Act provides in the seventeenth section.

In regard to such cases there is, therefore, no difficulty in rendering the Pharmacy Act effective in repressing such irregular sales of poisons; but in regard to patent medicines the matter is not so simple, since these are in general secret preparations, and although they may contain poisonous ingredients the Pharmacy Act declares that in patent medicines these ingredients are to be exempt from being deemed poisons within the meaning of the Act.

The door is thus left open for the grocer, the bookseller, and the co-operative stores to be the agents in distributing among the public some of the most potent articles of the materia medica, and it is a constant source of complaint by chemists and druggists that the trade in patent medicines is being taken out of their hands in this way. Some of the most popular of these secret preparations contain narcotics, and we have had occasion not unfrequently to record fatal effects that were so intimately associated with the use of such preparations as to make these appear their probable causes. Quite recently a writer in the *Times* has drawn special attention to the abuse of medicinal narcotics as being in his opinion an evil of still greater magnitude than the abuse of alcoholic stimulants. He specially instances chloral and a secret preparation—said by analysts to consist essentially of morphia flavoured with musk and other ingredients—which he describes as having an enormous family consumption, and he represents the present demand for and ignorant employment of such narcotic preparations as being in excess of all reason.

This writer uses as a signature the letters F.R.C.S., and it may therefore be inferred that, from his position and pursuits, he has had opportunities of speaking from actual observation as well as upon the strength of general experience, and, apart from certain suggestions as to the causes of a craving for narcotics, we fear there is too much reason for accepting his opinion as in the main well founded. This is also done by a physician who wrote a day or two afterwards to the *Times* on the same subject and dwelt upon the facilities existing for procuring narcotic drugs as well as the "manœuvring" by which persons contrive to obtain undue supplies of them from druggists' shops. In this writer's experience also, a patent liquid holding morphia is referred to as having been the cause of serious symptoms which for some time baffled his skill, and he points out that it is worthy of inquiry whether the sale of opium or morphia or chloral at "stores" is calculated to promote the abuse of these and other articles deemed "poison." Dr. KESTEVEN followed by expressing the opinion that the Sale of Poisons Act requires amendment and in support of this view he gave an instance of a patent medicine containing opium being purchased with suicidal intent at a druggist's shop by a patient of his. The *Times*, in a leading article, comments upon this correspondence as directing attention to a formidable social evil, though with the admission that the statements made would occasion little surprise to those having had opportunities of becoming acquainted with the extent to which the consumption of narcotic drugs has increased during the last few years. In this article attention is again called to the fact that morphia is the active ingredient of some half-dozen so-called patent medicines which are sold to any customer who may demand them, disguised under names suggestive of their virtues in affording relief from pain.

At the Clinical Society of London the same subject has been under consideration, especially in reference to chloral, and the committee appointed to inquire into it made a report last week, though without arriving at any definite result, but the *Medical Press and Circular* takes advantage of the attempt made to collect information from chemists and druggists to follow up its ill-advised and unworthy abuse of that class by condemning that attempt as "the delusion of folly," inasmuch as the chemist and druggist in the eyes of that misguided journal is solely and simply a *vendor* "interested" in the increased consumption of chloral, in "free trade in poisonous drugs," and carrying on his business so that the claims of society and humanity are subordinated to the sordid desire of gain. *Apropos* of this impudent attack there is a letter in the *Times* from Mr. BALDOCK, and written at the same time, in which he describes an instance where he declined to supply a narcotic drug, and took the trouble to warn his customer against its use, and we have reason to know that such a course is by no means unusual. In the same letter, however, he mentions the way in which the patent medicine stamp permits the sale of poisons without restriction and defeats the object of the Pharmacy Act as being the really dangerous facility for obtaining poisonous drugs.

It is to be expected that the correspondence to which we have referred and the action taken by the Clinical Society will, before long, result in some attempt to deal with the evil that has been thus exposed to public notice. It is therefore possible that the co-operation of medical men with chemists and druggists, which we last week pointed to as being desirable in another case, may soon become a reality, and that the object contemplated by Mr. HAMPSON'S motion last July may receive support from the medical profession as well as the pharmaceutical community, as being one to ensure public benefit.

In regard to some of the points touched upon in the correspondence above referred to, it is to be observed that some very mistaken ideas appear to prevail. Thus the quantity of chloral now sold cannot be a tithe of what it is assumed to be by F.R.C.S., and the President of the Pharmaceutical Society has had to correct the statement of one of the writers by pointing out that chloral is enumerated in the schedule of poisons and was included in that schedule upon the representation of the Council that it should be deemed a poison within the meaning of the Pharmacy Act.

PHARMACY IN NEW ZEALAND.

A MOVEMENT to form a Pharmaceutical Society of New Zealand, inaugurated at the commencement of last year, has we are glad to learn, progressed very favourably, so that by the end of October the number of members who had joined, exclusive of associates and apprentices, was upwards of one hundred. The head-quarters of the new Society have been fixed at Wellington, with Local Committees in Auckland, Christchurch and Dunedin, and its first President is Mr. CHARLES D. BARRAUD.

Notwithstanding the success that has been attained, a large number of chemists and druggists in business, amounting to one-third, have not yet joined the Society, and in the prospect of an attempt being made to obtain a Pharmacy Act for the colony a vigorous effort is being made to induce these to join the common cause.

In anticipation of the meeting of the colonial Parliament a Bill has been drafted, based on the Victoria Pharmacy Act, which is said to work well and which in its turn was founded on the Pharmacy Acts of Great Britain. The main provisions would render examinations compulsory in New Zealand and "introduce means for systematic technical education." There are strong hopes of passing this Bill, since the Wellington Committee has been assured that it will command the cordial support of the Legislature as a measure calculated to afford important protection to the community and as being in accord with the views of a Commission at present sitting on high-class education.

THE CHEMISTS' BALL.

As probably most of our readers are aware, next Wednesday is the day fixed for the Annual Chemists' Ball. It is to take place, as usual, in WILLIS'S Rooms, King Street, St. James's, and we hope that it will meet with a success equal to that which has attended similar gatherings in former years. Particulars as to tickets and a list of the Stewards will be found in our advertising pages.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A MEETING of this Association will be held on Thursday the 23rd inst., when a note on "A supposed Reaction of Aconitia" will be read by Mr. A. G. EVANS. A Report on Analytical Chemistry, will be made by Mr. A. F. DIMMOCK, on "Koettstorffer's Process for the Estimation of Foreign Fats in Butter."

AT a meeting of the trustees of Sir JOSIAH MASON'S Science College, Birmingham, held last week, Dr. W. A. TILDEN was appointed Professor of Chemistry in the College.

THE death is announced of Dr. WILLIAM BUDD, formerly of Bristol, whose name will long be honourably remembered in association with the investigation of the nature of typhoid fever.

Transactions of the Pharmaceutical Society.

The name of

Slater, William Martin ....Ipswich,

should have appeared in the list of Apprentices or Students of the Society elected on the 7th inst. See page 552.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The third general meeting of this Association was held in Anderson's College, 204, George Street, on Wednesday, January 7, Mr. Alexander Kinninmont, F.C.S., President, in the chair.

After the minutes of the previous meeting had been read and adopted,

The President called upon Mr. John C. Hunter to give his paper on a "Botanical Visit to Kew Gardens."

Mr. Hunter, after describing some places of interest on the way up the river to Kew, gave a short account of the early history of the gardens, and then mentioned some of the wonderful plants in Museum No. III., such as the *Rafflesia Arnoldi*, from Sumatra, and the *Welwitschia mirabilis*, discovered by the late Dr. Welwitsch in Africa, etc. Passing on to the growing plants, Mr. Hunter then mentioned some of the contents of the large Palm House with its splendid collection of palms and other tropical plants. Afterwards reference was made to the other houses containing the tree ferns, orchids, heaths, not forgetting the Victoria Regia House, and its beautiful specimen of that lily. Mr. Hunter concluded with a short account of the *hortus siccus*, or herbarium of Kew, and its appliances for the promotion of scientific botany.

A collection of some British ferns and other plants was placed on the table to illustrate some of the characters of various plants in Kew spoken about in the lecture.

After some remarks from Messrs. Brodie and Clarke,

The President asked the meeting to award a hearty vote of thanks to Mr. Hunter, which was duly given, and after election of members the meeting closed.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The annual *soirée* of this Association was held on Thursday, January 1, in the Town Hall, Birmingham.

Messrs. Southall Brothers and Barclay exhibited a number of experiments illustrating the structure and chemistry of various flames; these were arranged and shown in the different compartments of one of the corridors and included luminous and non-luminous flames; experiments showing the production of water and carbonic acid gas; singing flames, and weight experiments, the latter proving that bodies burning in air produce compounds heavier than the substances burned. In the south corridor Messrs. Harris and Co. exhibited a set of crystals in glass, illustrating the science of crystallography; an ingenious apparatus by Reichardt for regulating the temperature of the drying oven; apparatus showing the increased luminosity of phosphorus in rarefied oxygen and its total disappearance in oxygen under a pressure of one atmosphere; the electrolysis of water and of sodium chloride was also demonstrated and explained. Other tables were occupied by vacuum tubes and electric apparatus. Experiments in spectroscopy and pneumatics, and an improved apparatus for the estimation of nitric nitrogen in drinking waters must also be mentioned. The great gallery was occupied by a microscopic display by the members of the Microscopical and Natural History Society. At half-past eight, Mr. Hubert Langford gave a selection of humorous sketches, called "Studio Studies," which were highly appreciated.

During the evening a selection of operatic music was performed by the band; the amusements concluded with dancing at half-past nine. There was a good company, and a most enjoyable evening was spent.

EDINBURGH CHEMISTS' ASSISTANTS' ASSOCIATION.

The fourth meeting of the session was held on the evening of Wednesday, January 7, in the rooms of the Pharmaceutical Society, 119A, George Street; Mr. Robertson, Vice-President, occupied the chair.

The minutes of last meeting having been read and approved of,

The Chairman intimated that the subject for the evening was a debate, "Should Women be admitted as Members of the Pharmaceutical Society?"

The discussion was opened by Mr. Hill, who gave an emphatic approval of the recent action of the Council in admitting women as members.

He was followed by Mr. William Aitkin, speaking on the negative side, and the debate was continued by Messrs. Steward, Maben, Fraser, Hutton, and others, the majority of the speakers being in favour of the affirmative.

Messrs. Hill and Aitken having briefly replied, a vote was taken, resulting in a majority of one for the negative.

Parliamentary and Law Proceedings.

Another Cream of Tartar Prosecution.

At the Romsey Borough Police Court, on January 9, before Messrs. Walter E. Godfrey (chairman) and Charles Dyett, Mr. William Blissett, chemist and druggist, of Church Street, Romsey, was charged under the Sale of Food and Drugs Act, 1875, that "he did at the said borough sell to Edward Kellaway, on December 5, 1879, a certain drug, to wit, cream of tartar, which said drug was mixed with certain materials, to wit, sulphate of barium and tartrate of lime, so as to affect injuriously the potency of such drug."

Mr. Glaisyer, instructed by the Secretary of the Chemists and Druggists' Trade Association of Great Britain, appeared for the defendant.

Edward Kellaway, having been sworn, said he was the superintendent of the police for the borough. On December 5, last, he purchased in Mr. Blissett's shop $1\frac{1}{2}$ ounce of cream of tartar. He told Mr. Blissett it was for the public analyst. It was divided into three parts, one part he left with Mr. Blissett, another part he delivered to Mr. Angell, the borough analyst, and the third part was produced. On December 16, last, he received from Mr. Angell a certificate (produced) stating that the cream of tartar contained tartrate of lime 6 per cent., sulphate of barium very slight traces only, and that tartrate of lime is insoluble, not injurious to health, but is a useless ingredient in cream of tartar.

Cross-examined by Mr. Glaisyer.

Are you specially appointed under this Act?—I am.

By the borough or the county?—By both.

May I ask are you summoned here by the county or the borough authorities?—By the borough authorities.

Who instructed you to buy cream of tartar?—I do not know that I need answer that question.

Were you instructed by your chief or by the town council?—Not by the town council.

Did you buy cream of tartar at more than one place?—No.

Why did you call on Mr. Blissett instead of on some other druggist? This is the second time, you know, that Mr. Blissett has been brought before the magistrates charged with adulterating his drugs.—Why should I not call on Mr. Blissett.

Why call on Mr. Blissett only?—If Mr. Blissett had not supplied me I should have gone somewhere else.

Did the public analyst instruct you to purchase the cream of tartar?—No.

To whom was the certificate of the analyst submitted when it was received?—I received it from the analyst.

Did you issue the summons without reference to anyone else?—No.

Who then gave instructions for the summons to be issued?—I cannot answer that question.

Has the certificate been before any person who is competent to judge of the constituents of the drug in question?—I consider it has.

Did the public analyst give instructions for the prosecution?—Certainly not.

You asked for cream of tartar only?—I did.

You do not know what the constituents of cream of tartar are, I suppose?—No.

Mr. Glaisyer: Will you call the analyst, if you please.

The Magistrates' Clerk: That is for you to do.

Mr. Glaisyer: I beg your pardon, the 21st section of the Act enacts, "At the hearing of the information in such proceedings the production of the certificate of the analyst shall be sufficient evidence of the facts therein stated, unless the defendant shall require that the analyst shall be called as a witness." *Unless* the defendant shall require that the analyst shall be called, his (the analyst's) certificate shall be sufficient. I gave notice by letter to the inspector that the defendant required the analyst to be called as witness.

The Magistrates' Clerk: You required him to be present, and he is here.

Mr. Glaisyer: Then I require the prosecution to call him as a witness, otherwise I submit this case is not complete.

Mr. Angell: Before I am sworn I should like to know, with due respect to the bench, who guarantees my fees and the cost of my attendance here to-day for the purpose of giving evidence.

Mr. Glaisyer: I have nothing to say on that question.

The Chairman of the Bench: On the part of the defendant you have given notice that you would require the analyst to be present.

Mr. Glaisyer: I have given notice that I should require that the analyst should be called as a witness, but——

Chairman of the Bench: I presume then that will carry expenses.

Magistrates' Clerk: The Act distinctly says so.

Mr. Glaisyer: That is not so. The section from which I have already quoted clearly states that the analyst's certificate shall be sufficient evidence *unless* the defendant requires the analyst to be called as a witness. The defendant did require the analyst to be called as a witness.

Chairman of the Bench: It appears to me, from that, that the defendant must pay the analyst's expenses. The certificate is sufficient for the bench.

Mr. Glaisyer: I submit that it is necessary for the purpose of this prosecution that the analyst should be called by them as a witness, as the defendant has required him to be called, and consequently the analyst's certificate is not "sufficient evidence" of the facts therein stated.

Mr. Angell went into the witness box.

Mr. Glaisyer: I have not called Mr. Angell as my witness.

Magistrates' Clerk: You have given notice that he must be here.

Mr. Glaisyer: I should be glad to know whether the bench considers the case of the prosecution is complete without their having put the analyst in the box, I, on the part of the defendant, having given notice that the defendant would require that the analyst should be called as a witness?

Magistrates' Clerk: You have taken a step under the Act which you were entitled to do. You have given notice to make us bring the analyst here; that being so, you must of course pay his expenses.

Chairman of the Bench: We think the defendant is liable for the analyst's fees and expenses.

Mr. Glaisyer: Then may we have that as a point of law clearly stated?

Magistrates' Clerk: No, I think not. Mr. Angell asked a question and the magistrates have decided it.

Mr. Glaisyer: I am not prepared to call Mr. Angell as my witness.

Mr. Angell: I distinctly refuse to give evidence unless my expenses and fees are guaranteed.

Mr. Glaisyer: Then I submit the case for the prosecution is incomplete, and that I have no case to answer—as it now stands.

Magistrates' Clerk: The analyst says he will give evidence if you pay him.

Mr. Glaisyer: The prosecution have put him in the box.

Magistrates' Clerk: That is not so.

Mr. Glaisyer: But Mr. Angell is in the box.

Magistrates' Clerk: You have called him.

Mr. Glaisyer: I have not called him.

Magistrates' Clerk: Then stand down, Mr. Angell.

Mr. Angell here left the witness box.

Mr. Glaisyer: As my client's character as a chemist and druggist is at stake, I feel that I must go on with the case to prove his innocence of the charge brought against him, and to enable me to do this I will guarantee Mr. Angell's fees.

Mr. Angell again went into the box and was sworn.

Mr. Glaisyer: Have the prosecution any questions to ask?

Superintendent Kellaway: Not a word.

Mr. Glaisyer: What is your name?—Arthur Angell.

Where do you reside?—At 4, Portland Terrace, Southampton.

What is your profession?—I am public analyst for the county of Hants and for this borough.

Have you any special knowledge of the constituents of drugs?—That gained through my career only; I have never been in the drug trade.

Have you ever studied at any pharmaceutical school?—No.

For what length of time have you studied pharmacy?—I have never studied at a pharmaceutical school.

Therefore your knowledge is simply that of a chemist?—Quite so.

Did you recommend a prosecution in this case?—Certainly not.

Have you ever recommended that prosecutions should be instituted under this Act?—No. I am not allowed to give an opinion.

Do you suggest in any way articles to be purchased for analysis?—In some instances.

Did you suggest that cream of tartar should be bought?—Yes, amongst other things.

The sample on which this prosecution is based was submitted to you last month and you analysed it?—Yes.

What did you find to be present?—The only foreign materials present were the 6 per cent. of tartrate of lime and a very slight trace of sulphate of barium.

Let us have the whole of the constituents, if you please.—They are stated in my certificate.

Your certificate refers to tartrate of lime and sulphate of barium only. How did you ascertain there was any cream of tartar in the drug you analysed if you did not try to find out what was properly present?—Because upon ignition I could see it was a tartrate; we are not supposed to search all through the organic acids in an analysis of this description.

But how did you know it was cream of tartar at all?—From its appearance and flavour.

I want to know how you knew it was cream of tartar?—I think I have said I found it was a soluble tartrate.

That is not sufficient.—I knew by its flavour that it was acid tartrate of potash.

Did you judge solely by flavour what it was?—You have a chemist there, and——

Answer my question if you please.—I tested for acid and found that it was acid to test paper.

Then you consider that was enough to prove the presence of cream of tartar?—That and other tests.

What other tests? Tell me how you ascertained it was cream of tartar at all?—There were no special tests put directly for cream of tartar.

Then you did not apply any special test for cream of tartar?—There is no test for cream of tartar.

You say you found 6 per cent. of tartrate of lime present?—Yes.

How did you arrive at that result?—By the usual process of analysis.

Give details, please.—The substance was weighed out in the usual way, dissolved in hydrochloric acid, the solution filtered, separated from a trace of barium sulphate, neutralized, precipitated with oxalate of ammonia, filtered, ignited, weighed as oxalate of calcium, the precipitate dissolved and converted into sulphate, and weighed as such, the mean of the two taken.

Now you say you found traces of barium. How did you find that?—In the ordinary way, by decomposition and precipitation with sulphuric acid.

Can you give me details both as to tests and quantities found?—I employed no special test, except that of microscopical examination. I should not like to swear it was barium sulphate.

That is very important, because in your certificate you charge this man with having sold sulphate of barium mixed with his cream of tartar. How did you test for this barium?—Its insolubility in acids and its granular and opaque appearance under the microscope; it was only a very slight trace.

Is that the only substance insoluble in acids which might be present in cream of tartar?—No; but it is the only substance which would pass examination under the microscope as well.

You say in your certificate that neither the lime nor the barium are injurious.—Not in the quantity the sample contains.

Is cream of tartar used as medicine, do you know?—Yes; I do know, but simply from reading in books and so forth. I have no real knowledge on that point.

How is it obtained?—From argol.

What is argol?—Argol is the crude precipitate from wine during fermentation.

What is the chemical name for that precipitate?—It is not a chemical, it is not chemically pure, it is acid tartrate of potash with lime, and sometimes barium; at least, all samples of argol I have ever tested contain some lime.

Where does the tartrate of lime come from that is present in cream of tartar?—I have no knowledge; but I presume it is mixed in to affect fermentation.

Where does the barium come from?—I do not know.

The lime may be in the juice of the grape I suppose?—Not to the extent of the percentage in this sample.

What quantity might be there then?—Well, I should think not more than 1 per cent.

Then how is cream of tartar made from argol?—Commercially, do you mean?

How is cream of tartar made?—Argol is crude cream of tartar: this is cleansed by crystallization. I am not conversant with the process of manufacture.

Let me have it as far as you can.—As far as I can recollect the argol is boiled in water and concentrated, probably filtered, the colouring matter precipitated in some way, and the ordinary process of crystallization brought about by concentration.

Have you tested many samples of cream of tartar?—Yes; perhaps fifteen or sixteen.

Have you met with one that did not contain tartrate of lime?—Certainly not.

Tartrate of lime in variable quantities?—Yes.

Have you ever looked for lime in wine?—I have, and found it there.

How did it come there do you suppose?—It is a common practice with makers of wines to lime them.

Have you ever tested grape juice?—No; but I have sufficient knowledge of such natural products to know that no great quantity of lime could be present in the natural juice of the grape. Might I be allowed to make a statement which will justify me in giving the certificate I have given? I have no means whatever of putting before the bench a justification of my position. I am in a most invidious position, almost that of a public prosecutor, and I do not like to leave the box without making a statement.

Magistrates' Clerk: I think you may make any statement you like.

Mr. Glaisyer: Any statement by the analyst should have been made before his cross-examination.

Mr. Angell: I do not consider I have been giving evidence on behalf of the prosecution.

Mr. Glaisyer: Then please say no more on my behalf, I want nothing further from you.

Chairman of the Bench: You are brought here by the defendant.

Mr. Glaisyer: I want nothing further from him. This case is brought under the 6th section of the Sale of Food and Drugs Act.

Magistrates' Clerk: Under the 4th.

Mr. Glaisyer: Under the 4th I am told, that section states "No person shall, except for the purpose of compounding as hereinafter described, mix, colour, stain, or powder, or order or permit any other person to mix, colour, stain, or powder any drug with any ingredient or material so as to affect injuriously the quality or potency of such drug, with intent that the same may be sold in that state, and no person shall sell any such drug so mixed, coloured, stained, or powdered, under the same penalty in each case respectively as in the preceding section for a first and subsequent offence." Therefore you see that the defendant is charged with having sold a certain drug, to wit, cream of tartar, which was mixed with a certain material, to wit, sulphate of barium and tartrate of lime, so as to affect injuriously its potency. I am prepared to prove if necessary that no barium was present, and also that the tartrate of lime found in the sample is an essential constituent of cream of tartar, and that cream of tartar, as such, does necessarily contain uncertain proportions of tartrate of lime—but necessarily some—and the public analyst has stated in his own evidence that no sample of cream of tartar which has been submitted to him has been free from tartrate of lime. The process which he has described as that for the production of cream of tartar is substantially correct. The crystals are deposited from the must of the wine when the aqueous liquid changes to spirituous liquid; that deposit is dissolved in water by boiling, and the scum on this boiling liquid, "the cream" is skimmed off, and that when it is crystallized is cream of tartar, and that cream of tartar contains as a necessary constituent a certain quantity of tartrate of lime varying according to the countries from which it is imported—varying very considerably. The defendant, whom I shall call before you, will state that he purchased the cream of tartar, from which the sample supplied to Superintendent Kellaway was taken, from a most respectable house, indeed one of the leading firms of wholesale druggists in the country—Messrs. Hearon, Squire and Francis. Mr. Squire, who is in attendance here, will tell you that the cream of tartar was imported by his firm, and by them it was simply ground and sent out, and

Professor Attfield, whom I shall call—Professor of Practical Chemistry to the Pharmaceutical Society of Great Britain—analysed a sealed sample of this cream of tartar, and he will tell you that the tartrate of lime which he found in that sample is a natural constituent of all cream of tartar, and further that no traces of barium were present. While I am upon this subject I may say that the public analyst states that the very slight traces of barium which he said were found by him in this sample were wholly innocuous. Upon these facts being proved, I shall ask you to dismiss the case, if you even think now it is necessary for me to go further.

Chairman of the Bench: Have you many witnesses to call?

Mr. Glaisyer: Three.

Chairman of the Bench: I think you had better proceed.

Mr. William Blissett, called, sworn, and examined by Mr. Glaisyer.

You are a chemist residing in this town, I believe?—Yes; I have carried on business here for two years.

You have heard the evidence of Superintendent Kellaway, and it is substantially correct?—Yes.

From whom did you buy this cream of tartar?—From Messrs. Hearon, Squire and Francis, on October 1, last.

Did you sell it in the same state in which you bought it?—I placed it in stock and sold it in precisely the same state in which it reached me.

Have you ever met with cream of tartar that did not contain tartrate of lime?—Never.

Mr. William Squire, called, sworn, and examined by Mr. Glaisyer.

You are a member of the firm of Messrs. Hearon, Squire and Francis, I believe?—Yes.

Of 5, Coleman Street, London?—Yes.

In what state do you buy cream of tartar?—We either import it or buy it on the market. Generally we import it from Bordeaux; it is also imported from other places. We buy very little on the market.

Do you always analyse it when you buy it?—Yes; we invariably subject each parcel to analysis.

Is tartrate of lime invariably present?—Invariably, in greater or smaller proportions.

The certificate of the analyst charges the defendant with having sold cream of tartar containing 6 per cent. of tartrate of lime and a trace of sulphate of barium. The article in question was supplied to the defendant by your firm, I believe?—We supplied Mr. Blissett with the cream of tartar before the bench; this cream of tartar contains 6 per cent. of sulphate of lime, but no trace of barium. I have known cream of tartar to contain as much as 11 or 12 per cent. of tartrate of lime, but I have never sold any containing so large a proportion.

Do you know of your own knowledge that tartrate of lime is always present?—Yes.

Why is it present?—It is one of the natural constituents of the juice of the grape, and it is not in any way added to the cream of tartar as an adulterant. I have never yet seen a sample of cream of tartar without tartrate of lime.

Mr. Dyett: You say you have never seen cream of tartar without tartrate of lime?—I will go further than that, it is utterly impossible to obtain the ordinary cream of tartar without it. You may go to any shop in the kingdom and you will not find one sample of commercial cream of tartar that does not contain some proportion of tartrate of lime.

Professor Attfield, called, sworn, and examined by Mr. Glaisyer.

You are Professor of Practical Chemistry to the Pharmaceutical Society of Great Britain?—I am.

Author of a manual of chemistry?—Yes.

Member of the Council of the Institute of Chemistry?—Yes.

Have you frequently analysed cream of tartar?—Yes; many times for the past twenty-five years.

I have already told the bench what cream of tartar is, but you can no doubt describe it more clearly—please do so?—Cream of tartar is made from tartar. Tartar is the name of a substance deposited naturally from wine. Tartar is contained in the crust of port wine bottles; it is chiefly deposited in the manufacture of the wine. The tartar is a natural constituent of the juice of the grapes from which the wine is made.

Have you examined pure grape juice?—I have examined pure grape juice, pressed by myself from grapes, and I have found lime in that juice; moreover books by standard authors state that tartrate of lime is contained in grape juice. For instance in a book on chemistry by Gmelin, English translation, vol. x. (there are eighteen volumes of this work), page 287, under the head of tartrate of lime appears this sentence.—"Tartrate of lime occurs in many plants, especially in grapes, and mixes with the tartar."

Now please proceed with the process of manufacture for cream of tartar?—Tartar is dissolved in the juice of the grape, but it is deposited as a solid from the wine; that is because it is insoluble in the spirit of the wine produced in the course of fermentation. From that crude tartar cream of tarter is made. The crude tartar is boiled with water and the cream of tartar separates out from the clear hot liquor. That cream of tartar still contains the tartrate of lime of the grape juice. I have analysed hundreds of samples of cream of tartar. They all contain tartrate of lime. Books by standard authors also state that cream of tartar contains tartrate of lime, as for instance in the book already quoted (page 276), it states that the crude tartar contains tartrate of lime, the purified tartar constantly containing tartrate of lime to the amount, according to Vauquelin, of 5 to 7 per cent., sometimes, according to Duflos, even of 16 per cent. Therefore I say that cream of tartar is essentially and naturally a mixture of acid tartrate of potash and tartrate of lime. Pure acid of tartrate of potash is sometimes called cream of tartar, but on the other hand cream of tartar is not necessarily acid tartrate of potash, nor even, according to the British Pharmacopœia, is cream of tartar pure acid tartrate of potash.

Have you examined a sealed sample of the cream of tartar before the bench?—On January 6, last, I received a sealed portion of the cream of tartar in question which I analysed.

With what result?—As regards the presence of tartrate of lime in the cream of tartar I confirm what is stated on the public analyst's certificate.

Magistrates' Clerk: Of course your evidence is not evidence as against the certificate of the borough analyst.

Mr. Glaisyer: I beg your pardon; it is not only equally good, but it is better. It is *vivâ-voce* evidence on an analysis of the same article; it is better than any certificate. Kindly proceed, Professor Attfield.

Professor Attfield: As regards the presence of tartrate of lime I confirm what has been stated by the public analyst. I also confirm him in the proportion, but I differ from him entirely as to the conclusion he draws from the analysis. I say from my knowledge of the subject that the presence of this 6 per cent. of tartrate of lime shows that the article analysed is cream of tartar—pure cream of tartar. As to sulphate of barium I say there is no trace present, and I further say, that having heard the evidence of the public analyst, that his tests do not prove the presence of any trace of sulphate of barium. I tested for the barium——

Magistrates' Clerk: We shall take your evidence for what it is worth of course.

Mr. Glaisyer: Certainly you will, and it is worth a great deal.

Professor Attfield (continuing): I tested for the barium chemically, and also by the microscope, and also by the spectroscope, and I thus proved the entire absence of barium.

Cross-examined by Superintendent Kellaway.

What is the standard book by which you prove the purity of drugs?—There is no book that is a standard for the purity of all drugs.

Do you admit that the Pharmacopœia is an authority? —It is one of the best authorities, but only one of many.

Mr. Angell: May I cross-examine the witness?

Chairman of the Bench: I think you may. You see, Mr. Glaisyer, Mr. Kellaway is only superintendent of the police.

Mr. Glaisyer: I will raise no objection, but really the prosecution should have instructed a competent advocate to conduct their case.

Mr. Angell: In the characters and tests for the purity of cream of tartar given in the British Pharmacopœia, there occurs this paragraph, "And when neutralized by ammonia is rendered slightly turbid by oxalic acid"?—That statement does occur in the British Pharmacopœia.

Does not a slight turbidity indicate a slight contamination with lime?—That depends on the quantity you employ, and what you understand by the word "slight."

What would you understand on reading this paragraph by "slight turbidity"?—As a chemist, from that I can only infer that lime is an admitted constituent of cream of tartar.

I want your opinion, and value it very much, on this point, as to whether on reading "slight turbidity" in the British Pharmacopœia, you do not understand that the contamination with lime is also slight, independent of the quantity operated upon. Do you, or do you not, understand that the words "slight turbidity" mean that the contamination is slight?—I read the word "slight" in that paragraph in connection with the quantity taken.

Then the quantity taken is of no importance?—I say that all I am told there is this, that lime in a slight quantity is an officially recognized constituent of cream of tartar.

And do you consider that 6 per cent. of dry tartrate of lime would produce a slight turbidity only?—The test relates to lime and not to tartrate of lime. I repeat that my reading of that test is this only, that lime is a natural constituent of cream of tartar——

I agree with you that lime is a natural constituent in cream of tartar. You are Professor of Practical Chemistry, you have told us, to the Pharmaceutical Society? —I am.

Does not the Pharmaceutical Society issue the British Pharmacopœia?—Certainly not. That Pharmacopœia is written to guide medical men.

I have been misinformed on that point, then. We, as public analysts, want to know where we are to go for our standard, and I am simply trying to substantiate something that may be useful to public analysts. Did you find an insoluble residue when you examined the cream of tartar in question?—Which process do you refer to?

Did you by any process find any insoluble residue?—When boiling it with strong acid there was a very slight residue.

What did you do with that residue?—I examined it by the spectroscope and I found that it was not barium. It was silica. I am of opinion that what the public analyst thought was sulphate of barium was silica.

Did you rely entirely on the spectroscope, then?—No; I relied on chemical evidence and microscopical evidence combined with the spectroscopical evidence.

What was your chemical test which proved to you that it was silica and not barium?—That the residue was soluble in hydrofluoric acid.

That would prove it was silica, undoubtedly. You have told the bench that you found lime in grape juice? —I have.

In natural grape juice?—Yes.

When you expressed the juice from the grapes did you crush the seeds with it?—I did not.

How much lime did you find?—I did not examine it quantitatively.

Was there enough there to weigh?—Yes, but I did not trouble to weigh it; I could have ascertained very easily.

Then it does not by any means prove that in cream of tartar there might be as much as 6 per cent. of tartrate of lime?—It neither proves as much, more or less.

Mr. Glaisyer: The examination of the grape juice was not for the purpose of this particular case?

Professor Attfield: No; it was made months ago.

Mr. Glaisyer: Do the bench think it necessary for me to address them.

Chairman of the Bench: I think not.

The magistrates retired, and after a short interval re-entered the court, when the Chairman said: The magistrates have carefully considered this case and have decided to dismiss the summons, but without costs.

Mr. Glaisyer: I really must appeal to you to reconsider your decision as to costs, and I submit there are several reasons for doing so. In the first place, the charge against the defendant has not been maintained, but is proved to have been utterly groundless and frivolous. Again, this is the second time he has been brought before you within the last eighteen months on a frivolous charge which the prosecution could not maintain. The defence in these cases involves a heavy expense, which under the circumstances should be borne by the prosecution, and I may remark that the costs would not have to be paid by Superintendent Kellaway, but would be paid by the county fund. And yet again, the same question has quite lately been tried in your county, and the summons was then dismissed, in a case where the drug contained still more tartrate of lime than is found in the present instance, and since that decision the prosecution has had ample time to retire from the present proceedings. Under all these circumstances I must press for some costs to be awarded.

Chairman of the Bench: We have fully considered the matter and cannot alter our decision.

Alum in Norfolk Baking Powder.—The Conviction Quashed with Costs.

At the Cambridge Quarter Sessions, January 9 (before the Recorder, J. R. Bulwer, Esq., Q.C., M.P.), the appeal of G. and E. Warren, grocers, Cambridge, *v.* Henry Phillips, inspector of provisions for the borough, came on for hearing. It was an appeal against a decision of the magistrates who, on November 20, convicted the Messrs Warren of selling a certain article of food, to wit, baking powder, which contained a certain ingredient, to wit, alum, the same being injurious to health. The penalty imposed by the justices was a fine of 40*s.* and costs.

The appellants were represented by Mr. T. C. Blofeld and Mr. Horace Browne; Mr. Cockerell and Mr. Turner appeared for the respondent.

The notices of appeal, the sale of the powder in question, and the fact that it contained alum were all admitted, and

Mr. Cockerell at once proceeded to open the case for the respondent. He said that the proceedings before the magistrates were taken under the 3rd section of the Sale of Food and Drugs Act, 1875, for selling an article of food, namely, baking powder, mixed with an ingredient that rendered it injurious to health. The interpretation clause described "food" as every article used for food or drink by man other than drugs or water. In a case recently heard at Malton a question arose upon the words "injurious to health" under the Public Health Act, 1875, with respect to certain nuisances caused by manure works there, and it was held that it was unnecessary to make out that the said nuisances were injurious to the health of everybody, but sufficient to show that the alleged nuisance was injurious to the health of children or invalids. The case referred to was that of the Malton Local Board against the Malton Manure Company. The facts under which the conviction in the baking powder case took place were these:—Some proceedings having been taken against a baker for the adulteration of certain buns sold by him, and it being alleged by him in defence or mitigation that the adulteration was caused by the use of this Norfolk baking powder, it was thought desirable and necessary to test the validity of the sale of that powder by having an analysis made of it as sold by the dealers in Cambridge, and that analysis led to these proceedings being taken; the real defendants then and the real appellants now were the manfacturers of this powder, Messrs. Smith and Sons, of Norwich. A quantity of the powder was purchased, and it was put before the public analyst, whose certificate he handed in to the Recorder.

Mr. Blofeld said the appellants would not dispute the analysis being approximately correct, but he would hand up to the Recorder the actual analysis. There was only one thing omitted. Learned counsel then handed up the analysis to the Recorder, observing that he did not wish it to be made public.

Mr. Cockerell said, speaking roughly the quantity of alum contained in the powder was about one-third of the whole, and the question for the Recorder to decide was whether that quantity made the powder injurious to health.

The Recorder pointed out that in one of the analyses the alum was described as crystallized potash alum, and in the other as burnt alum.

The Recorder said the conviction set forth that the appellants, "did sell a certain article of food, to wit, baking powder, mixed with a certain ingredient, to wit, alum, so as to render such article injurious to health." Therefore they had first to ascertain what was the food that was mixed with the alum? The charge was "food, to wit, baking powder, mixed with a certain ingredient, to wit, alum." Therefore the "article of food" was the baking powder.

Mr. Cockerell: That is my contention.

The Recorder: But the baking powder, from the analysis you have handed to me, is not complete without the alum. The alum is a part of the baking powder. First of all before you get the thing that is mixed you must get the food.

Mr. Cockerell: The food is the baking powder. I say alum is no part of the baking powder necessarily. Baking powder ought to contain no alum.

The Recorder: But you have got the powder that the man sells.

Mr. Cockerell: It is sold as baking powder.

The Recorder: What of that? Suppose for argument that I sell chalk and arsenic mixed together and advertise it as baking powder, is it to be said that I adulterate an "article of food," chalk by the arsenic, or the arsenic by the chalk? Let us go by steps. Where is your article of food that is adulterated? The article of food becomes extinct by the adulteration. Where is your article of food without the alum? Bicarbonate of soda and other matters. Is bicarbonate of soda an article of food?

Mr. Cockerell: I say that baking powder is an article of food, commonly sold by these people and by various others; but alum is not a necessary part of that powder, which ought not to contain any.

The Recorder: Is there anything known as baking powder?

Mr. Cockerell: Oh, yes.

The Recorder: If you will give me evidence of that I will be glad. I never heard of baking powder beyond what chemists advertise as such, any more than I know of aperient draughts which may contain no one knows what. Is there such a thing known as baking powder?

Mr. Cockerell: Yes, known to the public.

The Recorder: I mean as an article of food.

Mr. Cockerell: Of course people do not eat baking powder. Everybody knows what it ought to be.

The Recorder: You can only know what baking powder is by analysing it. Suppose A sells a particular compound and calls it baking powder, which is to produce certain effects if used in cookery; B makes up a certain other mixture and calls that baking powder; while C, D, and so on, proceed in like manner. They are all called baking powder.

Mr. Cockerell asked if the word "mix" did not bring the baking powder under the section.

The Recorder: The Act says "No person shall mix any article of food." You must first of all get your food.

Mr. Cockerell: I say the alum ought not to be there, and that the powder is mixed improperly.

The Recorder: Then you are driven to the other alternative, that the bicarbonate of soda and the rest of the ingredients are an article of food.

Mr. Cockerell: When compounded as baking powder.

The Recorder: Suppose I go to a druggist's shop and ask for an aperient draught, and it is composed of rhubarb and magnesia. Is the chemist to be convicted for adulterating rhubarb with magnesia, or magnesia with rhubarb?

Mr. Cockerell: You get what you want.

The Recorder: No, I do not; I ask for an aperient draught.

Mr. Cockerell: Suppose you went and asked for a particular drug?

The Recorder: If the inspector had gone and asked for bicarbonate of soda, and they had given him the soda mingled with crystallized potash alum, there would have been a case directly.

Mr. Cockerell said the effect of the learned Recorder's construction of the Act would make it inoperative altogether.

The Recorder: No, if a baker chooses to mix some noxious compound,—mind I do not say this is,—with his bread and sells it he is liable. I am only calling attention to the matter just to have my mind clear upon it.

Mr. Cockerell said no question of this kind had ever been raised. We treat baking powder as an article of food.

The Recorder: Then I shall want you to tell me what baking powder is.

Mr. Cockerell: My medical witness will tell you what this particular baking powder is, and what baking powder ought to be without alum, but that is put in because it is cheaper. It is admitted that the powder is to be put into articles of food.

In the course of further argument the Recorder said even if the powder became injurious to health when put into food it was not an article of food.

Mr. Cockerell also said that the rice flour was an article of food.

The Recorder: I do not know know what evidence will be given upon it, but I should have thought the rice was only a medium or padding.

Mr. J. W. Knights, public analyst for the borough and county of Cambridge, F.C.S., etc., deposed that he was of opinion that when mixed with the flour the baking powder rendered the gluten of the flour and the soluble phosphate contained in the flour insoluble. When a teaspoonful of the powder was mixed with a pound of flour and water added, it would liberate the carbonic acid gas and render the soluble phosphates contained in the flour insoluble, by forming phosphate of alumina, which is insoluble. It would render the phosphoric acid insoluble. He believed an adult in health required 50 grains of phosphoric acid per day. Phosphoric acid was derived from bread and other articles of consumption; in some cases chiefly from bread. Bread made with this powder, as directed, would give less soluble phosphoric acid than there should be by 7-10ths. 7-10ths of the phosphoric acid would be rendered unavailable and he should presume the bread would be less nutritious. With children the effect would be the same, but to a greater degree. It would impair digestion.

Cross-examined by Mr. Blofeld: As to rendering the phosphoric acid insoluble, what authority have you for stating that a man in health requires 50 grains of phosphoric acid in the twenty-four hours?—I saw it so stated in a medical work. Parkes's 'Treatise on Practical Hygiene.'

Are you aware that the body rejects as much as from 75 to 100 grains of phosphoric acid per day?—A very large quantity.

May I take it that which the body rejects is what the body does not require to assimilate?—Certainly not, but I am not a medical man. When the bicarbonate of soda and alum are mixed with water effervescence takes place and carbonic acid gas is given off. The residuum from the alum is hydrate of alumina, that from the soda is sodic sulphate or sulphate of soda.

So that when the bread is made with this powder there is no alum in it and no bicarbonate of soda; they both cease to exist?—Yes.

By the Recorder: This change takes place when water is added. In the presence of flour the case is somewhat different. The bicarbonate of soda and the alum effervesce in the dough, and there is a residuum from each, but the hydrate would become phosphate.

By Mr. Blofeld: When mixed with the flour and moisture I should say the phosphate of alumina is formed immediately, and not hydrate first, but I cannot say that positively. It is necessary, to change the hydrate of alumina into phosphate, that there should be actual contact between the hydrate and the phosphoric acid in the flour.

How is the little hydrate of alumina there would be in a 1-pound loaf to come into contact with all the grains of phosphoric acid to be found in the dough, so as to form it into phosphate of alumina?—Because it is mixed in a dry state. Phosphate of alumina is perfectly well known to be insoluble in water. I believe phosphate of alumina is not soluble in the gastric juices, but that is a question for a physiologist and not a chemist. It is perfectly insoluble in acetic acid. It is soluble in hydrochloric acid, and the gastric juice is supposed to contain that. I do not believe the gastric juice is practically a weak solution of hydrochloric acid. I have heard that no hydrochloric acid exists in the gastric juice in a free state. I forget where I read that, but it was not in a newspaper. I have no authority for the assertion that the gastric juice is not equivalent to hydrochloric acid. The injurious effect of this baking powder does not depend upon the assertion that phosphate of alumina is insoluble in the stomach.

If it is soluble in the stomach what harm could it do?—It would probably have an astringent effect.

The Recorder: Does a minute quantity of alum in bread make it injurious to health—I have heard that it rather improves it?—I think it is no improvement. However small the quantity there is a corresponding quantity of phosphoric acid rendered insoluble.

By Mr. Blofeld: Cannot cite any case where injury has been done to health by the use of a small quantity of alum.

By the Recorder: Alum is very little prescribed except for use externally and as a gargle.

The Recorder: How long would it take to kill a man if he ate an ordinary quantity of bread daily made with this baking powder?—A man in health and with good digestion would possibly live some time.

The Recorder: He would live for ever? Have you ever heard an instance of anybody having a fit of indigestion from eating bread made with this powder and clearly traceable to it?—No. I have come into contact with no case, but I should judge, from my chemical knowledge, that indigestion would follow. The effect of either hydrate or phosphate of alumina would be to harden the gluten. Baking powder can be made with many other ingredients besides bicarbonate of soda and alum.

As a chemist, in how many ways could you make baking powder?—Four or five ways probably. By combining an alkali with an acid, baking powder is formed. Only three or four ways would be unobjectionable.

There is no such thing as baking powder, is there, beyond the fact that a man fancies the name and gives it to what he makes?—There is no recognized formula for making baking powder.

You might make it as you would make an aperient draught?—Yes; it is not known in the British Pharmacopœia. It is what men choose to call it. It might be termed "Substitute for yeast powder," or "Norfolk dumpling powder."

Mr. Matthew Moncrieff Patteson Muir, prælector of chemistry in Caius College, Cambridge, then gave the effect of an experiment that he had made with a mixture like that contained in the baking powder with phosphate of soda instead of flour, and said he found insoluble phosphate of alumina. He also made an experiment with half a pound of flour free from alum, treated it with water, and found the water contained a large quantity of phosphoric acid. He also mixed half a teaspoonful of the baking powder with half a pound of flour, treated it as before, and found the water contained very small quantities of phosphoric acid. Witness was about to give the result of experiments made with bread in which was mixed the Norfolk baking powder and bread made with another baking powder, but Mr. Blofeld objected to a comparison between baking powders. Witness then described an experiment he had made with the Norfolk baking powder when made into bread according to directions, and said he found about $1\frac{1}{2}$ grains of soluble phosphoric acid to the pound of flour used in the bread. In an experiment he had made with yeast bread he found about 3 grains of soluble phosphoric acid to the half-pound of flour, or, in round numbers, four times the quantity. He tested the bread with hydrochloric acid of $\frac{2}{10}$ths per cent. strength at a temperature of 100° F., with the results he had given. The reason for taking that particular kind of hydrochloric acid was because that was taken as the average strength of the hydrochloric acid in the gastric juice. He then stated that he composed a mixture like the baking powder prepared, a quantity of gluten from flour, digested it with half a litre of $\frac{2}{10}$ths per cent. strength hydrochloric acid for fifty hours, and found that there was 20 per cent. less of the gluten dissolved than there was in a similar quantity heated without alum, soda, etc. Then he made a further solution with a mixture of dextrine—a modified form of starch which might be taken to represent the starchy matter in flour—with water, and added a solution of alum and a solution of phosphate of soda. The phosphate of alumina which was precipitated carried with it the greater portion of the previously soluble dextrine. In experimenting with a loaf made of the same powder he determined the quantity of phosphate of alumina existing was 25 grains per 4-pound loaf; that was about 5 grains to the $\frac{1}{2}$-pound loaf. Witness then corrected himself, and said he made a mistake in his calculation, he should have said about 3·03 in the $\frac{1}{2}$-pound loaf. From these experiments he should say the effect of this baking powder made into bread was that the alum in powder was wholly decomposed, with the production of phosphate of alumina and sulphate of soda. This phosphate of alumina, he added, rendered the gluten and the dextrine less soft.

By the Recorder: I could form no idea of the effect of a man eating an ordinary quantity of bread for a year made with this baking powder because I have no medical knowledge.

Dr. J. B. Bradbury, Linacre lecturer in physic at St. John's College, F.R.C.P., and one of the physicians at Addenbrooke's Hospital, deposed that from what he had heard from the experiments of the last two witnesses, he should say the effect of the powder used in bread would be to rob the dietary of a certain amount of soluble phosphate which was essentially necessary to nutrition. He agreed with the other witnesses as to the amount of phosphoric acid required for a healthy adult every twenty-four hours, and as to the amount contained in a pound of flour. In answer to the Recorder, the witness said that people suffered from indigestion who did not eat bread. They got their phosphoric acid from meat, milk, etc. Baking powder produced the same effect as aerating the bread, which was done by forcing carbonic acid into the dough by machinery.

Bread made with yeast disagrees with some people. Practically speaking, is there any fault to be found with bread made with this baking powder?—I should say people might partake of it occasionally with impunity, but if they were to eat it constantly, and especially if they were to live upon it, it would have a deleterious effect. It would produce indigestion even in a man who led a regular life.

How long has this baking powder been in use?

Mr. Blofeld: Thirty-nine years, and many millions must have eaten bread, etc., made with it.

Dr. Bradbury: It leaves no record how many people have died. There are many diseases one cannot fathom. Stone is very common in Norfolk, and it is not very easy to fathom the cause of it.

The Recorder: Baking powder does not produce stone, does it?—Indigestion does.

The Recorder: I should have thought the water of Cambridge would have produced more.

Cross-examination continued: A man eating bread made with this baking powder would be the worse for it at the end of five years.

Is bread made with this baking powder anything like so indigestible as new cheese?—New cheese would suit one person who would not suffer at all, while others would suffer.

Your evidence with respect to this baking powder is founded on the assumption that the phosphate of alumina is insoluble in the stomach?—Not altogether, but chiefly.

And if I satisfy you that the phosphates are not insoluble in the stomach your opinion would be altered or modified?—It would.

In answer to questions by the Recorder, witness said that 50 grains of phosphoric acid were excreted by a healthy man in twenty-four hours, and these had to be supplied, and that if a man were deprived of the component parts of the phosphoric acid he would be injured to that extent.

Dr. Paget, Regius Professor of Physic in the University of Cambridge, F.R.S., F.R.C.P., etc., deposed that having heard the evidence of Messrs. Knights and Muir, and assuming that their experiments were correct, the effect of a person in ordinary health eating an ordinary quantity of bread made with this baking powder would be that in the course of time digestion would be impaired. Going on the experiments of Mr. Muir, that it has the effect of rendering less soluble the dextrine and the gluten of the bread, he should certainly be of opinion that it would render them less digestible, and so far injurious to health. In children the effect would be more marked, and with persons who had weak stomachs and were troubled with dyspepsia or feeble digestion it would be positively injurious. Questioned on the amount of phosphoric acid required to be taken into the system by a person in good health every twenty-four hours, the professor stated that to keep a person in health he must take as much of an ingredient, if it were a constituent of the body, as went out of him, and assuming it to be correct that 50 grains of phosphoric acid went out daily, he required to have a like amount introduced.

Mr. Blofeld: Do you imagine that the loss of $2\frac{1}{2}$ grains of phosphoric acid through eating $1\frac{1}{2}$ pound of bread would be injurious to any man's health?—Not if a man got other food. If a man were to get $2\frac{1}{2}$ grains of phosphoric acid less every day than passed out of him it would very soon be a serious matter.

If I neutralize $2\frac{1}{2}$ grains of phosphoric acid which I should otherwise get should I be one whit the worse off than before?—Probably not; probably you take more phosphoric acid every day than is good for you.

Mr. Blofeld: I hope you confine your remarks to phosphoric acid. But take anyone else in this court; would any man eating this bread be sensibly injured?—I hope not, because I should hope everybody gets as much food as would compensate him for the loss of the phosphoric acid he requires. If he gets meat, cheese, eggs, milk and other things in fair quantities the loss of that small amount of phosphoric acid would be of very small moment indeed. The articles I have mentioned contain phosphoric acid, as do fish and cheese in very large quantities, and vegetables in less quantities. At this moment I cannot think of any article of food that does not contain phosphoric acid. My opinion that bread made with this baking powder is injurious is based upon the fact spoken to by Mr. Muir that it renders less soluble the gluten and dextrine of the flour.

The Recorder: Would you say in the words of the Act of Parliament that bread made with this baking powder was an article of food injurious to health?—I would not venture to say it except in the case of persons of weak digestion. We have not sufficient exact experience I think in regard to persons in ordinarily good health to give an opinion on the matter. There is experience of alum in bread being injurious to health.

Is alum always injurious?—Taken repeatedly I should say it would be. I should say if any practical physician were asked if he would allow any person to take even a few grains every day of his life for a time he would not only advise to the contrary, but would say probably it would cause some disorder of the stomach before long. It is scarcely ever prescribed except externally.

Mr. Blofeld then addressed the Court on behalf of the appellants, and called—

Mr. Fras. Sutton, F.C.S., F.C.I., public analyst for Norfolk and other places. He deposed that when the baking powder was mixed with the alum it became hydrate of alumina. He did not believe that in bread made of this baking powder phosphate of alumina was found, and it was a very difficult thing to prove that it was. If it were so formed it was believed that it would be soluble in the gastric juice. Alumina found in bread might neutralize a certain amount of phosphoric acid in the bread; but the fluids of the stomach decomposed that phosphate of alumina, and the result would be that the person would be none the worse for it. He had made two 4-pound loaves, one with yeast and the other with the Norfolk baking powder. The yeast bread on treatment with cold distilled water gave 3·04 grains of phosphoric acid dissolved by the water. The bread made with baking powder gave 2·32 grains, being a difference of 72-100ths of a grain in a 4-pound loaf, or $17\frac{1}{2}$-100ths of a grain in a 1-pound loaf.

It is said that the use of baking powder hardens the gluten and the dextrine?—My opinion is that it has no such effect in bread. I have tried an experiment to see if it did by mixing phosphate of alumina with gluten, but I have made no experiment with dextrine. I do not agree that phosphate of alumina renders the gluten less soluble from the experiments I have made. My experiments was to mix the phosphate with the gluten in a very large excess. In one of the boxes produced I have got gluten without phosphate, and in the other the same quantity of gluten with phosphate added in five times the proportion that would be found in the baking powder, and the condition is not altered in the least.

The Recorder: Have you tested its solubility?—No, I did not think it was fair to make such a test with hydrochloric acid. It is not soluble in water, but it is soluble in the juices of the stomach.

By Mr. Blofeld: Hydrochloric acid has not got the salivary fluids or the pepsine in it. Hydrochloric acid is only one of the ingredients, and is but a feeble reproduction of the gastric juice. It is like the gastric juice, leaving out the most important parts. The salivary fluids are particularly necessary for the digestion of all kinds of food, like bread and so on.

You would not be surprised to find that Mr. Muir's experiments were correct, and yet that if the phosphate got into the gastric juice it would do no harm?—Not at all. I may also say that a very high authority, Mitscherlich, of Berlin, states that compounds of gluten with alumina are perfectly soluble in the juices of the stomach.

Will you tell us the result of the experiment you have recently made with two pigs?—Two healthy pigs, of about five stone weight each, were purchased and placed in a pen with a boarded floor to prevent them getting earth, which contains alumina. For eight clear days they were fed upon bread made with this Norfolk baking powder in proper proportions mixed up with warm water to a very soft, sloppy consistence, so as to give the best chance for the formation of phosphate of alumina. They consumed in the eight days 91 pounds of flour, and at the end of twenty-eight days I went and saw them killed. The pigs had thriven well during that time, and their internal appearances were perfectly healthy. I had the stomach removed and the whole of the bowels, and had them tied up and sent to my laboratory, where I examined them. I opened one stomach where the pigs were killed, and they had the mixture of the powder then in a sloppy condition. I removed separately the contents of the upper portion of the bowels, the second stomach, and also the contents of the lower bowels, or rectum. I took equal portions from the two sets of bowels for each pig, keeping the two uppers separate and the two lowers separate. I then dried down these separate portions of fæces in platinum vessels, and then burned off the organic matter, with the addition of small quantities of nitrate of potash to prevent the reduction of the phosphoric acid; the result would be the ash, in fact, of the fæces, and would contain the whole of the phosphoric acid and other mineral matters present. I then made an analysis of the ash to find the ratio between the alumina and the phosphoric acid. The analysis of the upper bowels showed, phosphoric acid, 7·24 per cent., oxide of iron, 1·08, alumina, 3·68, lime, 0 9, magnesia, 0·4, sulphuric acid, 0·274, the remainder was unconsumed carbon, alkalies, etc. In the case of the lower bowels the proportions were, phosphoric acid, 2·43, oxide of iron, 1·18, alumina, 4·91, lime, 1·13, magnesia, 0·54, sulphuric acid, ·343. On the assumption that the whole of the phosphoric acid is combined with the alumina, the excess of alumina in the upper portion of the bowel was 2·07 per cent., and in the case of the lower bowel 3·15 per cent. But it is an open question whether the whole of the phosphoric acid is combined with the alumina, because the other things present, which are stronger bases, keep it entirely to itself. The inference to be drawn from the experiment is that the gastric juice in the stomach takes all the phosphoric acid it requires, and if the phosphate of alumina is there at all the gastric juices absorb the phosphoric acid out of it if it is required, leaving the hydrate of alumina in the bowel to be rejected with the fæces.

By the Recorder: That experiment is a guide to what goes on in the human stomach, and I look upon it as an analogous case.

By Mr. Cockerell: Is alum in bread injurious?—*Per se*, I do not think it should be allowed, because it opens up a way for fraud. Apart from that, I do not think a little of it used would be injurious. I do not think 40 grains in a 4-pound loaf would be injurious. That is my private opinion; I am not giving a medical opinion on that point. Chloride of alumina would be objectionable in a large quantity.

The Recorder: I suppose you might evolve poisonous things out of a mutton chop?—Oh, yes.

By Mr. Cockerell: Mr. Muir produced his phosphate of alumina in conjunction with the gluten; mine was produced the same way as it would be in the bread. I extracted the gluten from the flour in a pure state. The effect of hardening the gluten in any way would be to make it tough like leather. It is of no use my making experiments that do not go on in the stomach. Those made by Mr. Muir were merely a waste of time and nothing more.

By the Recorder: I do not dispute the accuracy of Mr. Muir's experiments as he made them. My opinion of Mr. Muir's experiments as a chemist is a very high one, and I think he is a very admirable experimenter.

Re-examined: I have used this baking powder for years for all kinds of pastry, cakes, etc.

By the Recorder: I have had no reason to complain of its having given dyspepsia, indigestion, or anything of the kind, nor have my wife or family.

The Recorder asked if there was any need to go further after what this gentleman had said. This was a penal enactment, in which the first offence rendered a person liable to a penalty of £50, and the second to imprisonment, with hard labour, for a period not exceeding six calendar months. Could he be expected to confirm this conviction when a skilled witness like Mr. Sutton (for whose opinion he had the highest esteem) declared upon his oath that there was nothing injurious to health in the use of this baking powder, raising the question even upon the merits, without the question as to whether the case came within the statute?

Mr. Blofeld said he should like to call Dr. Thudicum and Dr. Tidy in fairness to Messrs. Smith and Sons.

The Recorder assented, and

Dr. J. L. W. Thudicum, F.C.P. Lond., F.C.S., and Fellow of several other learned societies, deposed: I have been frequently consulted on these questions by the Government and by Boards of Health.

Mr. Blofeld: You have been present throughout this trial, and, having heard all the evidence that has been given, and the experiments that have been made by Mr. Muir and those of Mr. Sutton, and his experience of this baking powder, is there in it in your opinion anything that is injurious to health?—In my opinion there is nothing injurious in the use of this baking powder.

Assuming that phosphate of alumina is formed in the stomach, would it or would it not be decomposed in the gastric juices in the stomach?—It would be entirely decomposed by the gastric juices in the stomach.

Do you admit that there is phosphate of alumina there?—I merely assume that there is for the purpose of this argument.

Is it your opinion that there is or is not?—It is not proved that there is.

By the Recorder: The decomposition would take place without any extra effort of the gastric juice. The difference it would make by its presence would be inappreciable.

By Mr. Blofeld: The hydrate of alumina in the bottle produced is perfectly harmless.

The Recorder (to Mr. Sutton): How much do you say you produced from a 2-pound loaf?—6 grains.

Dr. Thudicum: That rests upon the evidence of Mr. Sutton, and I coincide with it. It is perfectly harmless.

Mr. Blofeld: Dr. Beverley may have taken 20 grains?—He might.

You have heard a good deal said about the diminution of the phosphoric acid absorbed into the system by the use of this baking powder, will you give us your opinion?—The diminution of phosphoric acid in the human body by the use of this baking powder would be quite inappreciable, and would be of no consequence whatever to the body.

You heard Mr. Sutton give his evidence as to the experiment he made with the two pigs and the conclusion he came to. Do you agree with the conclusions he drew?

—I agree with them, and think they are physiologically stronger than he put them.

The Recorder: You think the experiment was a satisfactory one?—Very so.

Mr. Cockerell, addressing the Recorder, said he took it that he had decided the case, and as he (Mr. Cockerell) did not apprehend he should be able to alter the Recorder's view of the matter it would be absurd for him to take up more time.

The Recorder said it was satisfactory to find that there was not so much difference between the gentlemen on the one side and on the other. No one disputed the accuracy of the experiments made, but upon the one side hydrochloric acid was used, and on the other side it was said by a very able gentleman that this acid was only one of the component parts of the gastric juice, and the experiment he made was strictly analogous to what took place in the human system.

Dr. Charles Meymott Tidy, M.B., F.C.S. (Professor of Chemistry and of Forensic Medicine at the London Hospital, Medical Officer of Health for Islington, and late Deputy-Medical Officer of Health for the City of London, etc.), was next sworn and examined by Mr. Blofeld.

The first question is as to phosphate of alumina being formed. Do you agree that it is formed in bread by the use of this baking powder, or is it an open question or not?—I think it is very improbable that the phosphate of alumina is formed at all, because in order to form phosphate of alumina you must have actual contact between the phosphoric acid and the alumina, and I cannot see how that can be brought about under the ordinary conditions of digestion, and even granting that it occurs—and I do not think it makes the slightest difference in the case—even supposing that it does occur, I know, as a matter of fact, that the phosphate of alumina is soluble in the gastric juices in weak acid solutions, and I know that when phosphate of alumina is in solution of that nature with the membrane between and the alkaline blood on the other side the whole of the phosphoric acid filters through into the blood. I know that as a laboratory experiment, and I know if that occurs as a laboratory experiment it occurs much more rapidly in the living tissue.

Can you see anything in the use of this baking powder which can be injurious to health?—No; most certainly not. I should like to say, in giving my opinion with respect to this powder, that I do not wish to express any opinion about alum in bread as a means of fraud. I conceive alum ought not to be used in large quantities, as it is not on the question of injury to the health, but for the reason that bread holds a larger quantity of water and bakers can use a very inferior quality of flour. I am only giving my opinion of this baking powder and not of the alum in bread-making.

Mr. Cockerell: Nor of the use of alum at all?—I do not give it, but simply as alum leads to fraud.

The Recorder: You think there is nothing injurious in this powder?—No, in the proportions in which it is possible to use it. It might be said, "Couldn't you put in a large quantity of this powder?" but this could not be done, as it would spoil the bread entirely. Therefore, it is utterly impossible, to my mind, that this powder could be used for the purpose of fraud from the point of view from which I put alum forward and from which alum is occasionally used.

Mr. Blofeld said he had Dr. Beverley here, but he did not think, after the evidence that had been given, it was necessary to call him. That was his case.

The Recorder, in giving judgment, said: It is unnecessary for me to express any opinion upon the legal point as to whether this case falls within the Act of Parliament; but if my opinion is worth anything to anybody, I still adhere to the opinion I have already expressed, that it does not come within the Act for reasons some of which I have already given. I decide this case upon its merits and upon the evidence. After the evidence we have just heard I do not think this baking powder is an article of food, or that bread made with it becomes an article of food injurious to health, and, as a matter of fact, I find in favour of the appellants.

Mr. Blofeld: I have to ask for costs.

Mr. Cockerell: I never heard of any costs being given against the magistrates. We come here to uphold the decision of the magistrates.

The Recorder: Who is the respondent?

Mr. Cockerell: Mr. Phillips, the provision inspector.

The Recorder: Who put the law in force?

Mr. Cockerell said proceedings were taken against the sellers of this powder in Cambridge in consequence of a conviction that took place there of a man for selling buns made with this powder. The magistrate threw out a hint that proceedings should be taken against the sellers of the powder.

Mr. Blofeld said the buns in question could not have been made with this baking powder.

The Recorder also said that they could not have found alum in the buns if they were made with this powder.

Mr. Cockerell: They did not say it was alum.

Mr. Blofeld: They did say so, and here is the conviction to prove it. (Conviction handed in.) The persons who started these proceedings were a committee connected with the corporation, and not the magistrates.

The Recorder: I should be loth to make an order for costs, and especially against Mr. Phillips, a public officer put forward by the corporation to look after the health of the town, but if the conviction were sustained I see that the costs Mr. Phillips would have received from Messrs. Warren would have been £10 1*s*. Ordinarily speaking, I should not think of giving costs against the magistrates nor against a public officer, but I should like to know the circumstances under which this prosecution was instituted.

Mr. Cockerell said he had stated the circumstances.

The Recorder: Where will the costs come from?

Mr. Cockerell did not know.

Mr. Horace Browne said they would come out of the corporation. His learned friend, Mr. Cockerell, was being instructed by the Town Clerk.

After further opposition on the part of Mr. Cockerell,

The Recorder said: I do not see why the usual results should not follow upon a successful appeal. I quash the conviction, with costs.

The costs allowed amounted to £100.—*Norwich Argus.*

Review.

THE ART OF PERFUMERY, and the Methods of Obtaining the Odours of Plants; the Growth and General Flower Farm System of Raising Fragrant Herbs; with Instructions for the Manufacture of Perfumes for the Handkerchief, Scented Powders, Odorous Vinegars and Salts, Snuff, Dentrifices, Cosmetics, Perfumed Soap, etc. To which is added an Appendix on Preparing Artificial Fruit Essences, etc. By SEPTIMUS PIESSE, Ph.D., F.C.S. Fourth Edition, rewritten and enlarged. London: Longmans and Co.

The great development of this art within comparatively few years renders it necessary to manufacturers, to chemists and druggists, and others commercially interested in this industry, that from time to time a comprehensive *résumé* of the improvements and discoveries relative thereto should be published in the form of a manual of reference. Such works hitherto published in England have been written in a vein rather too "popular," and although general processes have been briefly described, and the formulæ of many fashionable compounds given, yet both these and the American works by Christiani and Snively fail to give to the manufacturer a summary of all the facts relating to improved processes, the detection of adulterations, the botanical nature and culture of the plants used, and the researches in organic chemistry which have an important bearing on the subject. Undoubtedly such a work would be voluminous, but not more so than those relating to other industries, and if historical chapters (already most ably worked out by another author), quotations from Scripture and from the poets were omitted, there would be more space for extracting, from such useful works as Guibourt, Gerhardt, Gmelin and others, the essence of all that relates to the subject, and in fact, render the book more suitable to practical men than to antiquarians and young ladies. Still, the treatise now under notice is a great improvement over the old editions. It contains additional illustrations and a few useful cultural notes, etc. (mostly reprinted from a series of papers contributed by Mr. Piesse to the *Garden* during the last half of 1877), but improvements in the main processes are unnoticed. To take, for instance, the process of maceration. It is described precisely as in the French edition of 1865, *i.e.*. the employment of a pan suspended *en bain-marie*. No mention is made of Piver's plan of dividing a long macerating tank into about seven compartments, connected by pipes leading from the top of one to the base of the next. In this system a metallic basket containing the vegetable substance to be extracted is suspended in each compartment, a kettle on the left supplies the fat, heated to the proper temperature, which circulates from left to right through the tank, in which a constant temperature of 65° C. is maintained by means of a steam pipe. The basket at the left contains the substance which has passed through all the compartments, it is raised from time to time, filled with fresh substance and then attached to the right, the other baskets being moved to the next compartment to the left. In this way the fresh substance has to traverse each compartment from right to left, while the fat flows slowly from left to right, and, saturated with the perfume of the substance, collects in the tank on the extreme right.* This process enables the operator to effect complete exhaustion of the substance operated upon. (It was described by Turgau in 'Grandes Usines de France,' iv., p. 132.)

Neither is any mention made of Piver's enfluerage process. This consists of two upright chambers fitted with shelves of perforated metal, or trays, upon which the flowers and grease are placed; these two chambers, otherwise air-tight, communicate by a pipe at the base, and a bellows on the top of each chamber, worked by a lever, causes the air to circulate to and fro from one chamber to the other, and the grease absorbs the odour much more rapidly and with less liability to become rancid than by the old method of piling up the frames or *châssis*: this process was, however, described in Mr. Piesse's French edition of 1865. In a few lines Piver's other invention, termed the "pneumatic" process, and Millon's process of extraction by ether are briefly described. Whilst on the subject of processes, why should Mr. Rimmel's "myrogène" be omitted? It at least created some interest at the Paris Exhibition, and now promises to become of great practical value.

Not a word is said of the artificial formation of vanilline by Haarmann from coniferin (patented in 1874) and by Tiemann from oil of cloves (patented in 1876); neither is mention made of the equally interesting papers by Tiemann and Herzfeld on the artificial formation of coumarin.†

Mr. Piesse gives the formulæ of several of the specialities prepared by his firm, such as lignaloe, and opopanax bouquets, but it is remarkable that psidium is overlooked; this is said to be prepared from the flower of the pomegranate, although that flower is odourless. With regard to opopanax, the odour of the gum-resin is compared by eminent writers on drugs to that of bruised ivy leaves, ashweed (*Ægopodium Podagraria*) and garlic,—in Christiani's formula for his bouquet there is no opopanax whatever—either the gum-resin or the oil. The section devoted to soaps, hair-washes, preparations for the skin, etc., contains much valuable information, in fact appears to be the best written portion of the book, which, although it lacks in many points, is superior in some respects to the American works above quoted.

In conclusion we may remark that throughout the book the personal and possessive pronouns recur with unpleasant frequency and keep the name of the author continually in the mind of the reader,—an inelegant fault which a good writer should never be guilty of (except for advertising purposes).

* 'Proc. Am. Pharm. As.,' 1876, p. 274.
† *Deut. Chem. Ges. Ber.*, x., 63, 233.

Notes and Queries.

[638]. CLEANING OF PAINTINGS.—H. W. asks the method, mode of application, and the manner in which peroxide of hydrogen acts in cleaning oil paintings.

The picture had better first be sponged with cold water and allowed to dry, then apply the solution of peroxide of hydrogen with a clean sponge in successive lines, not going over the same surface twice, and again allow to dry. If the solution is sufficiently strong the painting is now tolerably clean; if not, a second or third application is necessary.

Peroxide of hydrogen (hydroxyl or hydrogen di-oxide (H_2O_2)), owing to the readiness to part with half its combining weight of oxygen, is a powerful bleaching agent; but the way in which it serves to clean oil paintings is accounted for thus:—Sulphuretted hydrogen, which is present in the atmosphere, especially in the neighbourhood of towns, attacks the lead in the paint and forms lead sulphide, which is readily soluble in peroxide of hydrogen, water and lead sulphate being the result.

$$PbS + 4H_2O_2 = PbSO_4 + 4H_2O_4$$

J. T. C. WILLIAMS.

[638]. CLEANING OF PAINTINGS.—In reply to H. W.'s query, the discoloration of paintings is due to the carbonate of lead contained in the paint becoming converted into black sulphide of lead (PbS) by the H_2S present in the atmosphere.

When the peroxide of hydrogen is applied, the black sulphide is oxidized to the white sulphate and so the colour of the painting is restored. J. T. LLOYD.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

RUSA GRASS OIL.

Sir,—Permit me to correct a mistake which occurred at the Pharmaceutical Meeting on November 7. The Rusa grass oil which I presented to the museum was not distilled from the grass which I sent for identification, but from undoubted *A. schœnanthus*, Lin., obtained from the grass distilling districts. The grass sent, which really has an odour of fresh ginger, is a rather rare grass found about old wells near Bombay, and not at all like *A. schœnanthus*, which I consider has no claim to the name of ginger grass.

Bombay. W. DYMOCK.

PETROLEUM ACT, 1879.

Sir,—It will be noted that the schedule of the Petroleum Act, 1879, which you recently published in your columns, contains no description of the "lead-line or pendulum" referred to in the directions for applying the flashing test.

Professor Abel has, however, informed me, in reply to a letter pointing out the oversight, that "a pattern pendulum or lead-line, as a guide for the length of pendulum to be used in connection with the petroleum test, has been deposited at the Standards Office, Old Palace Yard, with a label upon which is specified that the pendulum is two feet in length, from the point of suspension to the centre of gravity of the weight."

Where a large number of samples have to be tested I would recommend the use of a metronome, such as is used in teaching music, adjusted to beat synchronously with the pattern pendulum, the distinct sound emitted at each oscillation forming, in my experience, a better guide than the noiseless swing of the lead-line.

Boverton Redwood,
Chemist of the Petroleum Association.

Fewness of Candidates for the "Bell Scholarship."

Sir,—As wonder has been expressed more than once at the small (1) number of candidates who compete for the "Bell Scholarships," and as no answer has yet been recorded, I beg to offer the following thoughts towards the solution of this problem.

It is improbable that a boy gains the knowledge of French and Latin requisite for that examination during the three years that he is engaged in the profession of pharmacy; but he rather acquires a knowledge of pharmacy, chemistry and botany, and forgets most of what he knew in classics, mathematics and modern languages.

Now a boy, having—at the close of his school days—a little better knowledge of classics, mathematics and modern languages than is requisite for the Bell Scholarship would not feel greatly tempted by the prospect of being allowed to compete—after a three years' apprenticeship—for a scholarship worth £30 and instruction for one year, if he knew that there lay within reach scholarships of greater pecuniary value, and leading to more lucrative professions than that of pharmacy. Thus the average value of the six hundred scholarships at the colleges in Cambridge is £240 each; whilst from the statements of my friends in the University of Oxford, I gather that the scholarships there are of greater value; and in both universities a man may hold more than one scholarship.

Therefore a boy, whose education was of this standard, would not enter the profession of pharmacy unless that—(1) he had a father in the profession; or (2) he had a dislike to further study; or (3) he was ignorant of other openings, and over-estimated the value of this; or (4) he had a decided liking for pharmacy; all of which causes may combine with others that are unknown to

Manchester. A. H. Jackson.

Late Hours and Sunday Trading.

Sir,—I have with interest perused all letters regarding late hours which have appeared in your Journal since September 6, when the subject was first raised by Mr. J. K. Nicol. The discussion certainly must have done good since it has been clearly proved by the statistics given by Mr. T. H. Powell and statements by other gentlemen that the root of ill-health is long hours of business.

Now that we have hit upon the evil we must try to remedy it. Several methods have been suggested and among others one is prominent and perhaps pugilistic, that is, for assistants to hunt in couples and bully the employers, to overawe if possible, and make them give their signature to the early closing movement. This will not do; it has been too often tried without success. The secret lies entirely with the assistants themselves; they must either adopt the plan of mechanics who, when they require more pay or shorter hours, simply go out on strike, or make up their minds to take a good round salary from those over zealous employers who try to usher two days' work into one. Regarding Sunday trading, I think it a most degrading thing of men holding a position in society as chemists, as a rule, are expected to do, to try and make gain on that day which above all others is set aside as a day of rest. Is it not possible that chemists living at a distance from their shops could allow their brethren in trade who live next door to their shops the power of dispensing any prescriptions which may be urgently required on the Sunday?

This surely might be done quietly without throwing the shop open for regular trade. I would consider a business not worth having if it did not pay after getting due attention for six days in the week. Employers generally say in defence of Sunday closing that they get a large number of prescriptions on that day and should they close their shops customers would go elsewhere and probably not return; but let them take into consideration the large number of those prescriptions which could have been got on Saturday or remained till Monday, because invariably a great many are old prescriptions requiring to be repeated; and most assuredly chemists instead of being deserted by the public merely for closing their shops on Sunday would be countenanced and admired for their stability. W. S. T.

Patent Medicines and the Sale of Narcotics.

Sir,—Your articles on "patent medicines" and the sale of narcotics have greatly interested me. An experience of fifty years induces me to offer a few remarks thereon.

I think it will be admitted by the public and the medical profession, that those who have had a special education and a practical examination as to their knowledge of the properties, doses, mode of preparation, and action of medicines on the human frame, are best qualified to vend them, and are thereby able to answer any questions respecting them and their adaptability to the case for which they are wanted.

I need not say how often the chemist prevents a serious result by inquiring for what purpose the article asked for is required. Although a patent medicine is a secret remedy, the chemist generally knows the basis of it, *e.g.*, he knows that most rheumatic and gout medicines contain colchicum, and cough medicines opium or its salts or chloral. I consider the trade has acted unwisely in aiding the proprietors of patent medicines by circulating counter bills, but it is the bold and continuous advertisements backed by house to house circulation of almanacs and pamphlets which has brought them so prominently before the public.

My suggestions are—

Let every chemist keep prepared a simple remedy for ordinary ailments, and retail it as required, giving only a few doses in each bottle, and recommending the applicant, if not relieved to apply to his medical man or go to parish doctor, dispensary or hospital.

Sell patents at full prices; but give no encouragement to their sale, and cease to circulate their counter bills. And, as you justly observe, medical men are equally interested in bringing about some regulations for restricting the sale of nostrums, many of them containing scheduled poisons; they should cease when practicable to act as apothecaries, and thus let the chemist have the dispensing of their prescriptions. By so acting they would do away with a good deal of counter prescribing, which many of us cultivate, simply because we are deprived of our legitimate business. Now I think if this were brought before medical men by the principal chemists of a locality, the higher class of them would soon fall in with the suggestion, thus placing each section of the profession in its right position and producing that unity and co-operation which is so desirable.

Senex

H.—An unregistered person is not liable, as such, to a penalty for selling sweet spirit of nitre of any strength. The pill mentioned would contain a scheduled poison, and would therefore come under the provisions of the Pharmacy Act with respect to the dispensing of poisons.

B. T. Kimber.—The article on gelatine will be found on p. 148, of vol iv., 3rd series.

J. H. Aldridge.—The information is given in Payen's 'Industrial Chemistry,' art. Coal Gas.

"*Sigma.*"—We are not acquainted with a work devoted to the manufacture of cocoa and chocolate, but a lecture on the subject delivered before the Society of Arts, by Mr. J. Holm, was reported in vol. iv. of the present series of this Journal, pp. 804, 843, 885.

E. W. Hurley.—The insertion of queries as to price, similar to yours, always fail to evoke useful information, so much being dependent upon the nature of the business and neighbourhood in which the dispenser is engaged.

T. W. L.—Respecting the making of suppositories containing green extracts see the Dispensing Memorandum on p. 949 of vol. ix. (1879).

Communications, Letters, etc., have been received from Messrs. Wallis, Mee, Martin, Summers, Deck, Evans, Sons and Co., Sanklan J. H.

NOTES ON INDIAN DRUGS.

BY W. DYMOCK.

(*Continued from page* 463.)

SOLANUM NIGRUM, *Linn.*, SOLANACEÆ. *The plant. Vernacular.* — MAKOI (Hind.), KAMUNI, GHATI (Bomb.), MANATTAK-KALI (Tam.), KÁKMÁCHI (Beng.).

History, Uses, etc.—The plant is called Kakamáchi in Sanskrit works and is described as having tonic, alterative and diuretic properties. Mahometan writers, under the name of Anab-us-thalib, describe several kinds of *Solanum*, of which *S. nigrum* is probably one, but the fruit imported into Bombay from Persia under the name of Anab-us-thalib appears to be that of *Solanum dulcamara*. In India the juice of *S. nigrum* is given in doses of from 6—8 ozs. in the treatment of chronic enlargements of the liver, and is considered a valuable alterative and diuretic. The juice after expression is warmed in an earthen vessel until it loses its green colour and becomes reddish-brown; when cool it is strained and administered in the morning. It acts as a hydrogogue, cathartic and diuretic. Mr. M. Sherriff, in his Supplement to the 'Pharmacopœia of India,' speaks very favourably of it when used in this way.

Description.—An erect annual or biennial plant, with spreading or diffuse branches, 1—3 feet high, glabrous or pubescent with simple hairs, without prickles, but the angles of the stem sometimes raised and smooth or rough with prominent tubercles. Leaves petiolate, ovate, oblong, attenuated at both ends, 1—3 inches long, entire or repandly toothed. Flowers small and white, in little cymes contracted into umbels on a common peduncle from very short to nearly an inch long. Calyx 5-toothed or lobed to the middle. Corolla deeply lobed, 3—4 lines in diameter. Anthers very obtuse and short, opening in terminal slits often, at length continued down the sides. Berry small, globular, usually nearly black, but sometimes yellow or dingy red.

Chemical Composition.—The alkaloid solanine was first obtained in 1820 by Desfosses, of Besançon, from the berries of this plant. The same alkaloid was afterwards found in *S. dulcamara*. Winckler in 1841 observed that this alkaloid could only be obtained in an amorphous condition from the latter plant, and that it differed from the solanine of the potato. In 1858–59 Zwenger and Kind discovered that solanine, $C_{43}H_{69}NO_{16}$, was a compound of sugar and a crystallizable alkaloid, solanidine, $C_{25}H_{39}NO$. The latter under the action of strong hydrochloric acid parts with water and becomes converted into an amorphous basic compound, solanicine, $C_{50}H_{76}N_2O$.

Commerce.—The dried fruit known as Anab-us-salib in Bombay comes from Persia. Value Re. ¼ per pound.

S. nigrum is a common weed everywhere in cultivated ground.

GEN.? Sp.? SOLANACEÆ. *Local name*, SANIPÁT.

The drug consists of the plant in fruit broken up into small pieces. The fruit is a globular dry papery mucronate capsule, firmly attached to the calyx; the upper part of the capsule to which the placenta is attached is double. The placenta, which is large and oblong, is supported upon a thick peduncle and occupies the centre of the capsule; to it are attached numerous straight six-angled wedge-shaped seeds, which are packed closely together and fill the remaining space. The calyx is 5-partite, the upper segment very large and extending over the fruit like a hood. Leaves ovate, leathery, about 1 inch long, with short blunt hairs, margin much lighter in colour than the rest of the leaf. Seed straight, wedge-shaped, with six prominent longitudinal ridges. Testa tubercular, each tubercle minutely granular. The stems, which are numerous, are woody and covered by a thin grey bark; the central pith is very large. The drug has a slightly bitter somewhat tea-like taste, and is prescribed in the condition known in Sanskrit as Sanipát (typhoid symptoms). It is said to come from Northern India.

EMEX, Sp.? POLYGONACEÆ. *The herb. Vernacular.*— SHUKÁI (Hind., Bomb.).

History, Uses, etc.—This drug is described in Mahometan works as the Akraniki or Afsharniki of the Greeks. Other Arabic names given are Shaukat-ul-baida, Shaukat-ul-Arabiya and Kathir-ul-rakab. The Latin name is said to be Atrakias. Some say it is the same as the Bádaward of the Persians. Muhammad Husain very truly denies this, but admits that it is somewhat like it. He says the Persian names are Charchah and Kangar-khár, and describes two varieties: one with a white flower and more slender stems than the other, which has purple flowers and is the kind generally used. "The latter," he says, "has triangular stems the size of a man's finger or less, and thick small triangular downy leaves, terminating in thorns; the seeds are small, triangular and of a greyish colour. The whole drug is of a yellowish-white colour and sweetish taste. The root and fruit are generally used, but the root is to be preferred. Shukái is more drying and astringent than Bádaward; it is attenuant and deobstruent," etc. ('Makhzan-ul-adwiya,' article "Shukái.")

Description.—The drug, as met with in Bombay, consists of all parts of the plant broken up; but very little of the root is present. The portions of the stem are of a greenish-yellow colour, round, crooked, channelled, with numerous branches springing from the axils of the leaves; the external surface of the stem is silicious, hard and pubescent, internally it is full of soft pith. The petioles of the leaves are stem-clasping, the lower ones completely so. The lower leaves are of considerable size, with a triangular midrib, channelled on the upper surface, and short thick spinous lobes, which vary much in shape. The plant has a gummy, rather disagreeable taste. The fruit is occasionally found mixed with the drug in considerable quantity. It is a woody nut, ¼ of an inch long, formed by the fusing together of the different parts of the perianth and ovary, somewhat triangular in form; at the base are spines formed by the calycine segments; at the apex the perianth forms a number of tooth-like processes, which surround the top of the ovary. The seed is ovoid, horny, and has a terebinthinate odour.

Commerce. — Shukái is imported from Persia. Value Re. ¼ per pound.

RUMEX VESICARIUS, *Linn.* CHUKA (Hind., Beng., Bomb.), CHUKRA (Sans.).

This is cultivated all over Asia and is used just as sorrel is in Europe; excellent *potage à l'oseille* may be made with it. The plant is doubtless one of the kind of Hamáz mentioned in Arabic works, and is much esteemed for its medicinal properties. The juice is said to allay the pain of toothache, and by its astringent properties to check nausea, promote the appetite and allay morbid craving for unwholesome substances. The herb also is considered very cooling and of use in heat of stomach, and externally as an epithem to allay pain, especially that caused by the bites or stings of reptiles and insects. The seeds are said to have similar properties and are prescribed roasted in dysentery, and as an antidote to scorpion stings. The root is also medicinal.

Description.—The fruit sold in the shops as Gulhamáz is reddish-brown, about $\frac{2}{10}$ of an inch long, and consists of three fringed leaf-like expansions, each furnished with an oblong glandular body and attached at the base to a short thick pedicel; they enclose a triangular polished dark brown seed.

ACALYPHA INDICA, *Linn.*, EUPHORBIACEÆ. *The plant. Vernacular.*—KUPPI, KOKLI (Bomb.); KUPPAI-MENI (Tam.).

History, Uses, etc.—I have not met with any description of this plant in native works on materia medica, although it appears to be well known to the herbalists. Ainslie gives "arittamunjayrie" as the Sanskrit name and "shwet-basanta" as the Bengali; he has the following notice of the plant. "The root, leaves and tender shoots are all used in medicine by the Hindoos. The powder of the dry leaves is given to children in worm cases, also a decoction of them with the addition of a little garlic. The juice of the same part of the plant, together with that of the tender shoots, is occasionally mixed with a small portion of margosa oil, and rubbed on the tongues of infants for the purpose of sickening them and clearing their stomachs of viscid phlegm."

The Hakeems prescribe the koopamaynee in consumption. It would appear from Rheede's account of this plant, that on the Malabar coast the root is supposed to have a purgative quality; his words are, "Radix trita, et cum aqua calida assumpta, cathartica est; folia trita et cum aqua epota ventrem laxant; illorum decoctum auribus immissum mitigat dolorem." He calls it "cupameni" ('Mat. Indica,' vol. ii., p. 161). In the 'Phar. of India' (p. 205) the following reference to this plant by Dr. G. Bidie, of Madras, will be found. "The expressed juice of the leaves is in great repute, wherever the plant grows, as an emetic for children, and is safe, certain, and speedy in its action. Like ipecacuanha it seems to have little tendency to act on the bowels or depress the vital powers, and it decidedly increases the secretion of the pulmonary organs. The dose of the expressed juice for an infant is a teaspoonful." Dr. Æ. Ross speaks highly of its use as an expectorant, ranking it in this respect with senega; he found it specially useful in the bronchitis of children. The purgative action of the root noticed by Rheede ('Hort. Mal.' x., p. 161, t. 81) is confirmed by Dr. H. E. Busteed, who has used it as a laxative for children. In Bombay the plant has a reputation as an expectorant, hence the native name Kokli (cough).

Description.—Stem erect, from 1–2 feet high, branchy, round, smooth; leaves scattered, petioled, ovate-cordate, three-nerved, serrate, smooth, about two inches long and one and a-half broad. Petioles as long as the leaves. Stipules small, subulate. Spikes axillary, generally single, peduncled, erect, as long as the leaves, many flowered, crowned with a body in the form of a cross, the base of which is surrounded with a three-leaved calyx; the arms of the cross are tubular, with their mouths fringed; from the base of the cross on one side issues a style-like thread, with a fringed stigma. The body of the cross contains an ovate seed-like substance. Male flowers numerous, crowded round the upper part of the spike. Calyx four-leaved, leaflets cordate. Filaments minute, numerous. Female flowers below the male, remote. Involucre cup-formed, with an opening on the inner side, striated, smooth, toothed, from 2–4 flowered. Calyx three-leaved (Roxb).

In Bombay *A. Indica* is not nearly so abundant as *A. ciliata*, Willd., which is one of the commonest roadside weeds towards the end of the moonson.

POKLI-MIRI. PIPERACEÆ.

These are abortive pepper-corns and have long held a place in the Hindu materia medica. Garcia d'Orta notices the drug under the name of Canarese pepper, and observes that it never finds its way to Portugal, but that it is valued as a medicine by the natives to purge the brain of phlegm, to relieve toothache and as a remedy for cholera. I am inclined to think that this drug must be the aborted produce of the female vines of *P. trisicum* mentioned by Roxburgh ('Flora Indica,' i. 153).

MYRICA SAPIDA, *Wall.*, MYRICEÆ. *The bark. Vernacular.*—KAIPHAL (Hind., Bomb., Beng.); MARUDAM-PATTAI (Tam.).

History, Uses, etc.—This is the Katphala of Sanskrit writers, who describe it as hot and stimulant, and recommend it in catarrh and affections of the chest. It is also used by the Hindus as an external stimulant application in cholera, etc.

Under the names of Dar-shishaán, Kandool, and Aod-ul-bark, Mahometan writers tell us that the bark is resolvent, astringent, carminative and tonic; that it cures catarrh and headaches. With cinnamon they prescribe it for chronic cough, fever, piles, etc.; compounded with vinegar it strengthens the gums and cures toothache; an oil prepared from it is dropped into the ears in earache. A decoction is a valuable remedy in asthma, diarrhœa and diuresis; powdered or in the form of lotion, the bark is applied to putrid sores; pessaries made of it promote uterine action. The usual dose for internal administration is about 60 grains. Duhn-ul-kandool, an oil prepared from the flowers, is said to have much the same properties as the bark.

Description.—Bark half an inch thick, externally scabrous, pitted from the separation of pieces of suber, of a mottled rusty-brown and dirty-white colour; suber warty; substance of bark and inner surface of a deep dull red colour; when soaked in water it produces a deep red solution. Taste strongly astringent.

Microscopic Structure.—Within the suberous layer is a remarkable stratum of stony cells; the parenchyma is loaded throughout with red colouring matter, and permeated by large laticiferous vessels, from which a gummy latex exudes when the bark is soaked in water.

Chemical Composition.—The bark yields its colouring matter freely to water and alcohol. Water also extracts the gum. The watery extract evaporated to dryness yields a brittle highly astringent substance of the colour and taste of kino. No chemical examination of these substances has been made.

Commerce.—The bark comes from the hilly districts of Northern India. Value, Rs. 1-2 per maund of 41 pounds.

(*To be continued.*)

THE TESTING OF PEPSINE.*

BY A. PETIT.

Recent investigation having directed attention to the ferments which preside over the transformation of the various alimentary matters, it appeared to me that it would be useful to define the present state of this interesting question, and particularly to state the method of testing most convenient to be adopted for these ferments, of which the medical employment is becoming more and more common.

In commencing this study I would recall that all the facts relative to the action of pepsine and diastase have been explained with the greatest clearness by M. Mialhe. Upon reperusing the memoirs of 1845 and 1846 it will be seen that his opinions, sharply discussed at the time when they appeared, are now accepted by all investigators occupied with the phenomena of digestion. On the present occasion I will deal only with certain facts connected with the transformation of nitrogenous foods by pepsine.

These substances,—albumen, fibrin, casein, etc.,—submitted to the combined action of pepsine and an acid, are transformed at first into a compound, named caseiform albumen by M. Mialhe and more recently syntonine; then into another substance,—the ultimate product of the stomachic digestion of albuminoid matters, —the albuminose of Mialhe, or the peptone of Lehmann. According to their source, these peptones, although they are very probably isomers, differ from one another by their action upon polarized light.

M. Henninger thinks that the peptones are formed by the hydration of albumenoid matters, and as they combine indifferently with acids and bases he considers them as weak acid amides. M. Meissner divided the products of transformation of albuminoid matters into parapeptones, metapeptones, dyspeptones and peptones α, β, and γ; but these divisions can no longer be accepted in the present state of science.

The essential characters of peptones are those of not being precipitated by saturation of the acid liquids holding them in solution, or by nitric acid, or by ferrocyanide of potassium added to acetic acid. They are mostly soluble in water, even after having been precipitated from their aqueous solution by excess of alcohol.

The test by nitric acid has a prime importance, as will appear subsequently. It permits, in fact, of ascertaining rapidly whether the transformation is more or less advanced. When nitric acid added drop by drop to a peptic solution of albumen no longer gives a precipitate it may be concluded that all the albumen is transformed into peptones.

The report upon pepsine presented in 1865 by M. Guibourt to the Société de Pharmacie did not sufficiently bring out the importance of this reaction. M. Guibourt thought that the solution of the fibrin was sufficient, and it appears (p. 102) that 1 gram of pepsine prepared by the Commission, in presence of 8·40 grams of lactic acid and 20 grams of water, very incompletely modified 12 grams of fibrin after heating for twelve hours at 40 to 45° C. The solution was in fact semigelatinous and was strongly precipitated by nitric acid. Certainly, at the present time, such a pepsine would be considered to be of mediocre quality.

Rapid solution indicates that the pepsine is of good quality, but between this phenomenon and that of transformation the difference is essential.

Let us now examine the various methods of testing that have been proposed for pepsine and see which is most suitable for adoption.

1. *Test by coagulation of milk.*—This process ought to be rejected. M. Guibourt had, in 1865, come to the conclusion from experiments made on rennet, that the principle in rennet which produces the coagulation of milk is not that which dissolves and transforms fibrin. I have observed also that a pepsine, twelve times more active than another prepared from calves' rennet, was much less active than the latter in respect to the coagulation of milk. It is probable that this special action is due to a particular ferment.

2. *Test by coagulated white of egg.*—This test is universally adopted in England and in Germany. I have made some experiments to determine—

(*a*) The temperature most favourable to solution;
(*b*) The action of various acids;
(*c*) The acidimetric strength which it is advisable to give to the liquors.

With respect to temperature, experiments were made at from 30° to 80° C. Even at elevated temperatures the action of acidified pepsine is produced, but the maximum occurs at 50°.

With liquors containing 2 to 15 per mille of acetic or butyric acid, I have been able to convince myself that in the presence of these acids pepsine is without action upon coagulated white of egg. Tartaric, lactic, and especially hydrochloric acids, on the contrary, facilitate the action of pepsine.

The solution of tartaric acid ought to be of the strength of about 10 grams, and that of lactic acid from 8 to 12 grams per litre. With hydrochloric acid, the digestion of white of egg takes place very well in liquors containing from 1 to 3 parts per 1000 of real acid, the most favourable acidity being $1\frac{1}{2}$ parts per 1000.

In the study of similar phenomena it ought never to be forgotten that the digestion in the stomach goes on at a temperature of about 40° C. It is therefore especially at this temperature that the test of artificial digestions should be made. It might happen, in fact, that an acid solution, acting on albumen at 50° or 60° C., would be less active at 40° C. This is what takes place with lactic acid, which at a concentration corresponding to 2 or even 3 per 1000 of real hydrochloric acid leaves white of egg in great part undissolved at a temperature of 40° C., whilst hydrochloric acid of 1 per 1000, in the same conditions of time and temperature, dissolves and transforms all the albumen.

In these facts is found the experimental demonstration that the free acid of the gastric juice is hydrochloric acid. This is a fact, moreover, gained to science by the remarkable researches of M. Richet, who has proved that the acidity of the gastric juice is about 2 per 1000; that it is due solely to hydrochloric acid, and that if lactic acid is found there it is the product of a special fermentation which the food has undergone in the stomach.

The more that artificial digestions are studied the more evident becomes the similarity which exists between these phenomena and those of the stomachal digestion. No doubt, the stomach absorbs during the digestive period a portion of the liquids and of the peptones they contain, and this, according to Schiff, favours digestion considerably. The movements in the food which this initiates facilitate the action of the gastric juice, the secretion of which is uninterrupted; but it is no less true that in experiments *in vitro it is easy to equal and even to surpass the digestive power of the stomach.*

We know that the activity of the gastric juice is always maintained within certain limits, the secretions of the stomach rapidly re-establishing an equilibrium when this is more or less destroyed. The specific action recognized in hydrochloric acid throws light on the rationale of certain medicines and the troublesome influence exercised by some substances upon the act of digestion. As has been justly remarked by M. Richet, in the case of abnormal fermentations there is produced a great excess of lactic, acetic and butyric acids. Hydrochloric acid is no longer secreted, but instead, a less active acid, lactic acid, or inactive acids, acetic and butyric. The utility will hence be understood of employing in such a case alkalies, which in saturating the free acids induce a fresh secretion of hydrochloric acid and thus restore to the gastric juice all its digestive power. It

* *Journ. de Pharm. et de Chimie,* 5th ser., vol. i., p. 82.

will be understood also that to attain the same object sometimes solutions of hydrochloric acid and sometimes of the alkaline bicarbonates have been given with success. It is necessary, besides, in this case, that the acetates and butyrates should be eliminated by stomachal absorption; otherwise they would be decomposed and the inactive acids again set free by the hydrochloric acid secreted normally or administered as medicine.

To return to the testing of pepsine by coagulated white of egg, one objection that may be brought against it is that it does not establish a sufficient gradation in the transformations. However this may be, the method of operating is as follows:—

An egg is kept in boiling water during half an hour, and the very coherent white is then passed through a moderately fine strainer. 5 grams of this coagulated albumen, put into contact at 40° C. with 25 grams of hydrochloric acid containing 1·50 of HCl per litre, ought to be dissolved in four to five hours by 0·10 gram of pepsine of good quality. It is necessary to agitate the flask every half-hour.

Test by fibrin.—This appears to me to present great advantages over the preceding. The phenomena are very distinct and very comparable. Whatever may be the origin of a ferment, in the same conditions of time, temperature and acidity of the menstruum, its exact equivalence can be determined by relation to other specimens. The following are the conclusions I have arrived at with respect to the best conditions for the transformation of fibrin.

The temperature of 50° C. is that of the maximum. The same pepsine is about four times less active at 40° than at 50° C.

The acid most favourable to the transformation is hydrochloric acid. In order to approach the action of this acid it is necessary to employ relatively large quantities of lactic or tartaric acids, about 25 to 30 grams per litre. With lactic acid in the proportion of 20 grams per litre the action is five times less than that which corresponds to a 3 per 1000 solution of hydrochloric acid. With hydrochloric acid the most favourable action is obtained with a solution containing between 2 and 5 grams of real HCl per litre.

To recapitulate, it appears that the acidity of the gastric juice does not exceed 2 to 3 grams per litre of acid expressed as HCl, which would give 5 to 7·5 grams of acid expressed as lactic acid, whilst the action would be much weaker in the presence of the latter solvent.

I would also remark that the acidity of the 1 per 1000 in HCl, which is favourable to the solution of coagulated albumen, is not sufficient for the easy transformation of fibrin. In order to approach physiological conditions I would propose therefore to employ 1·50 gram of real HCl per litre in the testing with coagulated white of egg and 3 grams per 1000 for testing with fibrin.

It may be asked whether it is not possible to render the testing of pepsine more practical by diminishing the time of operating. Nothing is more easy. In heating during six hours instead of twelve about twice as much pepsine is required for the transformation. Again, in heating during six hours at 40° C. instead of twelve hours at 50° C., nearly eight times the quantity of pepsine is required to obtain the same result.

This great influence exercised by temperature renders it necessary that a standard for operating should be fixed in an exact manner. The Commission of 1865, in recommending to heat to from 40° to 45°, was not sufficiently precise upon this important point.

I have stated that there is an essential difference between the solution of fibrin and its transformation; the following experiments demonstrate this very clearly:—

A pepsine prepared in my laboratory, which dissolved and transformed in twelve hours at a temperature of 50° C. six hundred times its weight of fibrin in a liquor containing 4 per 1000 of real HCl. dissolved in the same conditions:—

1,200	times its weight of fibrin in	1 hour.
2,400	” ” ”	1 hour 10 minutes.
4,800	” ” ”	1 hour 15 minutes.
9,600	” ” ”	1 hour 45 minutes.
19,200	” ” ”	2 hours 10 minutes.

It was not thought necessary to carry the experiment further.

An identical experiment was made with lactic acid in the proportion of 0·40 gram to 25 c.c. or 16 grams per litre. Although the same pepsine transformed in these conditions only one hundred times its weight of fibrin, instead of six hundred times, as in the preceding experiment, it was found that it dissolved—

1,200	times its weight in	30 minutes.
2,400	” ”	1 hour 15 minutes.
4,800	” ”	1 hour 30 minutes.
9,600	” ”	4 hours.
19,200	” ”	5 hours.

It is necessary to add that in flasks differing from the others only in the absence of pepsine no liquefaction took place.

To test a pepsine, therefore, I should take of hydrochloric acid of the strength of 3 grams of HCl per litre 25 c.c.; then 5 grams of moist fibrin strongly dried, and add to several flasks so prepared quantities of pepsine ranging from 0·10 to 0·60 gram. These should be heated to 50° C., for it has been seen that four times as much pepsine would be required at 40° C., which would be an useless waste. Agitate every half-hour until the complete solution of the fibrin, and then every hour.

A good pepsine ought not to give a precipitate with nitric acid after twelve hours' heating in flasks containing 25 to 30 centigrams, and after six hours in those containing 50 to 60 centigrams. The nitric acid should be added drop by drop to 10 c.c., for example, of the solution, and not the slightest turbidity should be produced in the liquor at the moment of adding it.

In these experiments I have for some time used a fibrin of mutton washed until it has become white and preserved in pure glycerine. When required for use it is washed with plenty of water.

In subsequent communications I shall show the action which a number of bodies exercise upon the peptic and diastasic ferments.

THE ALKALOID OF THE BAPTISIA TINCTORIA.*

BY FRANCIS V. GREENE, M.D., U.S. NAVY.

In the volume of the *Amer. Jour. Phar.* for the year 1862, there appears at page 310 an article on the "*Baptisia tinctoria*," by B. L. Smedley, in which he claims to have isolated the alkaloid of this plant. The process given is as follows:—The root was boiled with water acidulated with hydrochloric acid, and to the strained decoction milk of lime added in slight excess. The copious precipitate produced was collected, washed with distilled water, dried and treated with boiling alcohol. On evaporating the alcohol from the filtered solution there remained an extract of a light yellow colour, which was treated with hot water slightly acidulated with sulphuric acid. The solution thus obtained was agitated with animal charcoal, filtered and set aside to crystallize; it yielded perfectly transparent crystals, in plates, similar to those of potassic chlorate. It was further stated that by adding ammonia in slight excess to the above liquid a white, feathery precipitate of the alkaloid was obtained.

A later investigator, Mr. J. A. Warner, (*op. cit. supra*, 1871, p. 251), after repeating the above process, and ascertaining that the crystalline salt of the first writer was composed entirely of calcium sulphate, announced the following method, by which he had separated what he supposed to be the chloride of the alkaloid of this

* From the *American Journal of Pharmacy*, December, 1879.

plant. A concentrated tincture of the root, after being rendered slightly acid by the addition of sulphuric acid, was evaporated to a small bulk, a large quantity of water added and the precipitated resin separated by filtration. To the clear filtrate solution of potassio-mercuric iodide was added in slight excess, the precipitate collected, suspended in water, decomposed by sulphuretted hydrogen and the sulphide of mercury removed by filtration. The filtrate, which was supposed to contain the alkaloid in solution in the form of an iodide, was then concentrated, carbonate of ammonia added in slight excess and the syrupy liquid shaken with chloroform. On separating and evaporating the chloroform solution there remained an amorphous mass, which was dissolved in water acidulated with hydrochloric acid. This solution was treated with animal charcoal, filtered and concentrated to one-third its bulk, when it yielded long, needle-like crystals.

It will be seen from the above process that the opinion in regard to the presence of an alkaloid in this plant was based solely upon the formation of a precipitate when Mayer's test solution was added to an acidified aqueous solution of its root, and consequently, as the crystals obtained in the above manner were not afterwards so treated as to yield the uncombined alkaloid, the results of this examination have not been accepted ('Prac. Pharm.,' Parrish, 1874, p. 475) as conclusively establishing the existence of such principle in this root. The following experiments, while rendering it doubtful whether the base of the salt obtained as above was really an alkaloid, prove conclusively that the root of the *Baptisia tinctoria* does contain such a substance.

A few ounces of the powdered root were exhausted by percolation with distilled water, the percolate filtered, calcined magnesia added and the mixture evaporated to dryness. The magnesia mass was then extracted with absolute alcohol. On evaporating the alcohol from this solution there remained a light yellow amorphous mass, a small portion of which was placed on a piece of reddened litmus paper, and moistened with a drop of distilled water, when a deep blue coloration was produced. A small quantity of the mass was then dissolved in a little distilled water, and the filtered solution placed under a bell-glass over sulphuric acid. On the evaporation of the liquid no crystals could be discovered in the residue. It was therefore re-dissolved in slightly acidulated water, and again evaporated over sulphuric acid, when the mass was still found to be amorphous. It was finally dissolved in distilled water, and the acid solution tested with the various reagents for alkaloids, with the result of giving very decided precipitates with potassio-mercuric iodide, iodine in iodide of potassium solution, potassio-cadmic iodide, phosphomolybdic acid, phosphotungstate of soda, and tannic and picric acids. The whole of the light yellow amorphous mass was then dissolved in a small quantity of distilled water, a little calcined magnesia added, the mixture evaporated to dryness, when it was successively agitated with the different simple solvents with the following results. On evaporating the benzol that had been shaken with the mass, and adding a little distilled water to the small amount of residue, no blue colour was communicated to reddened litmus paper, and no precipitates were formed by the acidified solution with the above-mentioned tests. Absence of the blue colour and of the precipitates was also noticed when benzin and chloroform, that had been agitated with the mass, were treated in a similar manner. Ether, on the contrary, dissolved the alkaloid from the magnesia mass; the residue therefrom, when moistened with distilled water, staining the reddened litmus paper a deep blue, and when dissolved in acidulated water affording precipitates with the above-named reagents. Hence, it will be seen that we have for this alkaloid solubility in water, alcohol and ether, and insolubility in benzol, benzin and chloroform. From the insolubility of this alkaloid in chloroform it will be evident that the crystals obtained in the process used by the last-mentioned experimenter could not have been those of the chloride of this alkaloid, which, although undoubtedly present in an uncombined state in the concentrated solution, after treatment with carbonate of ammonia was not removed from it by the use of chloroform.

A larger quantity (8 troy ounces) of the powdered root of the *Baptisia tinctoria* was subsequently percolated as before, and the filtered solution evaporated to dryness with calcined magnesia. The dried mass was extracted with 95 per cent. alcohol, and this solution evaporated to a small bulk. Distilled water was added in large quantity, and the liquid filtered to remove the deposited resin. A solution of tannic acid was then added to the clear filtrate as long as a precipitate was formed. When the precipitated tannate had subsided it was transferred to a filter, washed with distilled water, and while still moist removed to a mortar, intimately mixed with finely pulverized oxide of lead, and the mass thoroughly dried in a capsule, after which it was extracted with ether. On evaporating the ether there remained a considerable quantity of the same yellowish, semi-transparent, gummy mass that had been obtained in the first experiment. A small portion of this mass, ignited on platinum foil, left no inorganic residue.

In order to separate the alkaloid from the foreign matter contained in this mass it was determined to resort to the use of oleic acid, in the manner lately recommended by L. Wolff (*Am. Jour. Phar.*, January, 1878, p. 8). A small quantity of the pure acid was added to the mass contained in a capsule, the contents heated over a water-bath, the oleic acid, containing the alkaloid in the form of an oleate, poured off, and benzin, which dissolves both the acid and the oleate, added to it. The benzin solution was then agitated with distilled water slightly acidulated with hydrochloric acid, and, after the complete separation of the two liquids, the aqueous solution was drawn off. After concentrating this solution it was placed aside to crystallize, and in a few days acicular crystals were formed. The amount of the chloride obtained in this manner proved merely sufficient to establish that this alkaloid is soluble in ammonia, and to determine its character by the precipitates afforded by it with the usual reagents for this class of substances.

Lastly, about 2 troy ounces of the finely powdered root were thoroughly moistened with a solution of bicarbonate of soda, the mass placed in a porcelain capsule, heated to dryness on a water-bath, then powdered, transferred to a small percolator and extracted with ether. After evaporating the ether from the percolate, which was of a light yellow colour, distilled water was added to the residue and the liquid filtered to separate a yellowish-white resin that had subsided. This aqueous solution of the alkaloid, which was still of a pale yellow colour, was then concentrated, carefully neutralized with very dilute hydrochloric acid, repeatedly agitated with successive portions of ether as long as this menstruum removed any colouring matter, and then placed aside, when, after a few days, it yielded crystals, some of which presented the form of perfect octahedra.

APIOL.*

BY H. C. WHITNEY.

The seed of *Apium Petroselinum* has variously been made the subject of research and analysis by different parties; prominent amongst them Messrs. Joret and Homolle, of Paris, who claim to have found therein, besides a crystallizable fatty matter, pectine (the apiin of Braconnot), chlorophyll, tannin, colouring and extractive matters, lignin, various salts, volatile oil, and a peculiar oily substance for which they proposed the name of apiol.

* From *New Remedies*, January, 1880.

This is said to be a yellowish oily liquid, non-volatile, heavier than water, of a peculiar and tenacious odour, distinct from that of the plant, and of an acrid, pungent taste. They also claim it to be inflammable, insoluble in hot or cold water, very soluble in alcohol, and entirely dissolved by ether or chloroform. It is analogous to the fixed oils, but is not chemically changed by the alkalies.

The process given by them for obtaining the so-called apiol is as follows:—They exhaust the seed with alcohol, treat the tincture with purified animal charcoal, distil off three-fourths of the alcohol, treat the residue with ether or chloroform, evaporate the solution thus formed, mix the residuary liquid with an eighth of its weight of litharge, allow the mixture to rest twenty-four hours, and then filter through a thin layer of charcoal.

I found, in reviewing this process, that the alcohol dissolves from the seed the apiin, essential oil, resin, and the supposed apiol.

After the treatment with ether or chloroform, the oil, resin, and apiol are separated from the pectine, and being mixed with an eighth of its weight of litharge for the purpose of removing what fat oil it may yet contain, besides the saponifiable resin, it is allowed to stand for a certain length of time and filtered, and the product thus obtained is what they named apiol. After the apiin is separated by ether or chloroform and the fatty oil and resin by litharge, the mere act of filtering through charcoal certainly cannot separate the essential oil from the peculiar oily substance which they want to obtain, but must pass through the filter with it, so that what they obtain as pure apiol can only be an impure essential oil obtained by the absorption process as lately proposed.

To substantiate this idea, I took freshly powdered parsley seed, subjected it to repeated distillations with water until the latter passed entirely clear, obtaining thereby water strongly impregnated with the volatile oil of parsley seed. The oil at the bottom thereof being separated therefrom, the water was subjected to cohobation from a solution of sodium chloride, yielding the entire quantity of oil contained in the seed; which in this instance amounted to 4·27 per cent. The oil so derived corresponded closely to the so-called apiol of Joret and Homolle, with the exception of its being lighter in colour and evidently purer than theirs.

The residue of the distillation was strained while hot, separating the (by distillation) exhausted seed; the liquid yielding upon being filtered, a large quantity of apiin on cooling. The residuary seed, being treated with petroleum benzine, gave 9·114 per cent. of a green fatty oil and liquid resin. Being subsequently subjected to the action of ether, gave 2·734 per cent. additionally of fatty oil and resin; the latter being separated, as in the former case, by shaking it with alcohol. The fatty oil, being entirely freed from resin, amounted to 7·239 per cent. The different portions of alcohol containing the resin, dissolved from the fatty oil, gave upon evaporation a greenish-brown oily liquid, lighter than water and readily saponified by the fixed alkalies, with a peculiar odour distinct from that of the essential oil, which in all but the latter respect differs from the apiol of Messrs. Joret and Homolle.

Of late, Mr. E. V. Gerichten (*Berichte der Deutschen Chemischen Gesellschaft*, Nos. 16—17)* claims to have found during his researches and investigations in parsley seed a body for which he proposed the name of apiol, or parsley-camphor, and asserts that it is the only substance which is entitled to that name.

He finds that it is obtained during the distillation of the oil of parsley seed from the seed with water; which would be at a temperature not much above 212° F., whereas he subsequently claims for it a boiling point of 300° C.

How this occurs is to me not exactly comprehensible, since I failed, during a number of experiments therewith, to discover any separation of the fine needles of the parsley-camphor which he claims to have found. He further gives a method for obtaining the same by a direct process, which, after all, does not materially differ from that of Messrs. Joret and Homolle, and which certainly, as I have conclusively proven above, does not yield anything else than the impure essential oil as obtained by the absorption process.

The apiol or parsley-camphor of Mr. E. V. Gerichten must have been derived by a different process than described by him in his paper. It makes but little difference, however, for the apiol of Mr. E. V. Gerichten can be of little more than chemical interest, while the article of that name by Messrs. Joret and Homolle is that which is so much valued for its emmenagogue properties and which alone finds therapeutical application. As the latter article is certainly nothing but a complex body, not saponifiable by fixed alkalies, which does not congeal at a temperature of 32° F., and, contrary to the statement of Messrs. Joret and Homolle, comes over almost entirely at a temperature of 212° F., I am safe to say that it is principally composed of the essential oil of parsley seed intermixed with small quantities of a soft resin, which latter is in such minute quantities that I can readily infer the emmenagogue properties to be contained in the volatile oil, and would suggest, therefore, that the apiol of the present be superseded by the term, oil of parsley seed, from which the medical profession no doubt will receive the same emmenagogue effect; or, if such is not the case, that the soft resin, which is one of the constituents of the apiol of old, be separated by the process I have above indicated, and employed for the purposes which apiol has been used for until now.

* *Pharm. Journ.*, [3], vii., 693.

"PUNCH" ON POISONING BY PATENT.

(*A Little Tragedy of the Statute Book.*)

SCENE.—*A Chemist's Shop—Legally Disposed Proprietor and three suffering Customers discovered discussing the "Sale of Poisonous Drugs Act."*

Legally Disposed Proprietor. Well, you can't have it. There!

First Suffering Customer. There—indeed! Why the child has kep me up, without a blessed wink of sleep, these five nights! You might make us up a 'aporth of laudanum? Come, now.

Legally Disposed Proprietor. Can't do it, my good lady. Law is law.

Second Suffering Customer. Just so. But my case is very different. I want something just to quiet this neuralgia. Now, I'm told that a little opium——

Legally Disposed Proprietor. No use, sir; we daren't let you have it. Get a doctor's order.

Third Suffering Customer. But, really, it is preposterous. Here, I come for something to allay violent symptoms of incipient coma, and do you mean to tell me you can give me nothing calming of any kind?

Legally Disposed Proprietor. Oh, yes, I can do something for you in the patent way. Have you ever tried Deadman's Somnolent Elixir?

Suffering Customers (*all together*). No! Is it strong?

Legally Disposed Proprietor. Strong? Why, it would send an elephant off like a top (*produces it*), and it's only one-and-three-ha'pence. We sell a good deal of it.

First Suffering Customer. Give me a bottle.

Second Suffering Customer. Here, I'll have one.

Third Suffering Customer. So will I.

Legally Disposed Proprietor. That is the article (*hands small packet bearing Government Label to each*). But mind the directions, because it *is* strong. (*Smiling.*) It is what we call *a powerful narcotic.*

[*Exeunt three Suffering Customers, with three bottles of powerful narcotic, to make arrangements for three Coroner's inquests, as Curtain falls.*

The Pharmaceutical Journal.

SATURDAY, JANUARY 24, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

MISREPRESENTATION OF THE PHARMACY ACT.

THE position of chemists and druggists in regard to the popular abuse of narcotics, which has been lately commented upon by medical journals and the daily press, is one which does not appear to be generally understood, and even those who have written upon this subject manifest defective acquaintance with the provisions of the Pharmacy Act that are intended to serve for the protection of the public against accidental poisoning. In like manner the functions of the Pharmaceutical Society in respect to the carrying out of that Act have been incorrectly construed, and a letter recently written by the coroner for Doncaster furnishes a striking illustration of this fact.

In that letter reference is made to a fatal case of the misuse of "soothing syrup," in which an infant, three months old, was "doctored" by its mother with two teaspoonfuls of a syrup stated to contain opium and purchased from a person who is described as an "unregistered druggist." The coroner justly remarked that it was clear the Pharmacy Act had been infringed in this case, and he adds that there was reason to expect an example would be made by the punishment of the offender. So far there is no exception to be taken to the remarks of the Doncaster coroner; but he goes on to say that shortly afterwards a paragraph appeared in a local newspaper stating that the seller of the syrup of poppies had paid to the Solicitor of the Pharmaceutical Society the sum of five pounds as a penalty for breach of the Pharmacy Act, and then he comments upon this fact as indicating that an offence of a grave nature had been privately condoned, arguing at the same time that such a proceeding showed the Pharmacy Act was defective and required amendment.

If there were any kind of justification for the inference that a breach of the Pharmacy Act had been "condoned" by the Pharmaceutical Society, the argument of the Doncaster coroner would have had some weight. In such a case there would have been some reason also for the objection raised by the *Daily News* to the Pharmacy Act "allowing chemists to compound with the Pharmaceutical Society," and for the statement made in the London letters of various provincial papers that an infringement of the Pharmacy Act had been "squared" for five pounds paid to that institution.

But there is no foundation for any of these suggestions, which have originated solely from ignorance of the Pharmacy Act and its provisions, and as pointed out by the President of the Pharmaceutical Society in the *Times* of the 21st inst., the Doncaster coroner, as well as those who wrote under his inspiration, have failed to make themselves acquainted with the powers conferred upon the Society by the Pharmacy Act. It is thus that they have failed to perceive that in the Pharmacy Act provision is made for dealing with two distinct offences, one of which, viz., the selling of poisons otherwise than in conformity with the Act and with regulations made in pursuance of it, the Pharmaceutical Society is specially empowered to take cognizance of by suing for penalties. This it does as a public duty, and any penalties recovered are under the control of the Commissioners of Her Majesty's Treasury. The other offence of selling poisons without proper labels is one that renders the sellers liable to prosecution by any person before justices of the peace in England or the sheriff in Scotland, and upon summary conviction renders them liable to a penalty.

As pointed out in the *Times* of last Thursday, by Messrs FLUX, SLADE and Co., the Solicitors to the Pharmaceutical Society, there is no trace in the Pharmacy Act of legislative intention that the Society should become public prosecutor for carrying out the provisions of the seventeenth section of the Act, under which a policeman or any other person could prosecute an offender against it. The prosecution referred to by the Doncaster coroner was not instituted under that section of the Act, but under the fifteenth section, above referred to as relating to the special duty of the Society according to the Act, and, as the Solicitors point out in their letter to the *Times*, defendants are at liberty to exercise their undoubted right to pay the penalty before judgment so as to avoid a trial of the action.

Under such circumstances there is no foundation for the charge that the Pharmaceutical Society or its Solicitors have privately condoned offences of grave nature involving the destruction of human life, and the strictures of the Doncaster coroner, as well as the comments in the newspaper press to which they gave rise, are devoid of any meaning. The fact that the seller of the soothing syrup had been subjected to a penalty under the fifteenth section of the Pharmacy Act did not in any degree relieve him from liability to a further penalty under the seventeenth section, and if, as Messrs. FLUX and SLADE point out, there was, in the fatal case referred to by the Doncastor coroner, an offence of so grave a nature as to involve the destruction of human life, it still remains to be explained why a verdict of manslaughter was not found.

The circumstances above narrated serve to show very forcibly the ignorance that prevails concerning the Pharmacy Act and the powers that it confers, and the facilities with which it may be used for repressing irregular sales of poison. If, for instance, the Doncaster coroner had taken the trouble to communicate with the Secretary, or the Solicitors of the Society, or if he had referred to the Pharmacy Act itself, there is every reason for believing that his accusation would never have been made.

THE NEW WEIGHTS AND MEASURES ACT.

In other trades besides that of the chemist and druggist the new Act appears to be causing inconvenience, and one of the most recent illustrations of the fact is mentioned in the *Daily News* of last Thursday. The trade in oil has hitherto been carried on with the aid of a measure recognized as the five gallon measure, and oil is exported to a very large extent in five gallon tins. Some few wholesale firms in London are alone said to export no fewer than a million gallons of oil annually in such tins, independently of the Liverpool trade and that of other places. This five gallon measure, however, is not comprised among the secondary standards sanctioned by the Board of Trade, and as a consequence two well-known wholesale firms have been proceeded against under the new Act for using in their trade a measure of which there is no recognized Board of Trade standard, although it is the measure which by common usage of the trade has always been adopted.

A letter from Messrs. McIntyre and Sons, the manufacturers of graduated glass measures, which appears at page 600, will give some idea of the trouble and perplexity that chemists and druggists may have to encounter from the local inspectors' varied interpretation of the new Act. We think that it will not require much sagacity to perceive in the statements made by Messrs. McIntyre ample grounds for regarding this subject of weights and measures as one of special importance to chemists and druggists. It would, we think, be very unwise to look upon the Act in its bearing upon apothecaries' weights and measures as being likely to remain a dead letter, though we are aware this is believed by some persons to be possible. For this reason we have deemed it our duty to mention the subject from time to time so as not to lie open to the charge of having failed to furnish desirable information.

At the last meeting of the Council the preponderance of opinion was in favour of memorializing the Board of Trade in regard to the practical working of the Act as it relates to chemists and druggists' weights and measures, and we have reason to believe that a definite understanding is likely to be arrived at.

THE CHEMISTS' BALL.

The Fourteenth Annual Ball, held at Willis's Rooms on Wednesday last, far from showing any signs of flagging interest, surpassed nearly all its predecessors in the number attending it, three hundred and seventy having been present. Although the company was so large, the excellent arrangements of the Committee were so admirably carried out by the Honorary Secretary, Mr. Arthur L. Savory, and his colleagues, as to secure the comfort of all. As on previous similar occasions only one toast was given, "Success to the Chemists' Ball," coupled with the Health of the Ladies. In proposing it, Mr. G. F. Schacht, Vice-President of the Pharmaceutical Society, remarked that it might add to the pleasure already experienced by those present to know that, in consequence of the success of the gathering, their attendance on that evening would probably provide the means of alleviating to some extent the distress of other members of the craft who had not been so fortunate as themselves.

THE CONSUMPTION OF CHLORAL.

Some of our readers probably have observed in the medical journals a disposition to ascribe the misuse to which it is believed chloral is very largely put to undue facilities offered by chemists and druggists for its purchase. We would therefore suggest that a useful purpose would be served by the communication of observed facts as to the demand for chloral and the conditions under which it is procured by purchasers, as well as information of any cases in which its use has been attended with fatal results. The Committee of the Clinical Society of London has already taken some steps in this direction.

FIRE AT NEWCASTLE.

A very destructive fire broke out, on Saturday last, in the warehouse of Messrs. Mawson and Swan, as the consequence of breaking a bottle containing some volatile inflammable liquid. The whole block of buildings, extending back from Mosely Street, has been destroyed, together with the contents, and the damage done is estimated at something like fifteen thousand pounds.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The Annual Dinner of this Association will be held at the Holborn Restaurant on Wednesday evening, January 28, at 8·30 p.m. precisely; Professor Redwood in the chair.

We observe that Mr. Robert Gibson, medicated lozenge manufacturer, entertained over two hundred and forty friends and workpeople to dinner, in the Hulme Town Hall, Manchester, on the evening of January 15, in celebration of his silver wedding.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

At a meeting of the Board of Examiners for England and Wales, held in London on Wednesday, January 1, 1880, the report of the College of Preceptors on the examination held on January 6, was received.

Three hundred and three candidates had presented themselves for examination, of whom *one hundred and seventy-one* had failed. The following *one hundred and thirty-two* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

(Arranged alphabetically).

Ansell, Alfred ....Birkdale.
Arden, Lawrence....................Bourne.
Baker, Walter James ....Dorking.
Baldwin, Harry ....Nawton.
Banks, Alfred ....Stratford-on-Avon.
Bannerman, James Murdoch...Edinburgh.
Barlow, Ernest Silas ....Oldham.
Batterbee, Robert Henry ......Lynn.
Batty, George Arthur............Great Driffield.
Baugh, Richard ....Carnarvon.
Beck, William ... .Bristol.
Beckett, Frederick Lloyd ......Heywood.
Begg, Arthur ....Bolton.
Brooker, Alfred William ......London.
Browne, William Ernest ......West Cowes.
Brownlow, John ....Gainsboro.
Burnet, George Maxwell ......Ashton.
Burns, William ....London.
Bury, James Edward ....Evesham.
Buxton, Thomas ....Belper.
Cairns, James Wallace ....Edinburgh.
Carnaby, Francis William ......Blyth.
Carter, Charles Frederic.........Leicester.
Chapelow, Thomas Henry ......Southampton.
Chapman, Ingram William ...Crowle.
Chell, Frederick ....Buxton.
Chippendale, John Richard ...Preston.
Coates, William Henry ....York.
Connellan, John Dart............Penzance.
Cookson, Joseph ....Lytham.
Cooper, Frederick Clement ...London.
Corder, Edmund Herbert ......London.
Coulter, Charles ....Walthamstow.
Cox, Edward James English...Warminster.
Cox, George Frecker ....Guernsey.
Dadley, Edwin....................Nottingham.
Darroll, William Burwell ......Warminster.
Davies, James Griffith ....Rowston.
Davison, Albert Ernest ....Glasgow.
Denham, Frederick John ......Exmouth.
Dick, James....................Lochgelly.
Dines, William....................King's Lynn.
Doig, John ....Dundee.
Duckworth, Arthur...............Rochdale.
Evans, John Richard ....Dowlais.
Evans, Richard David ....Dowlais.
Evans, Rowland O ....Pontypridd.
Fairbanks, William John ......London.
Ferriman, Herbert ....Rugby.
Flint, Francis Bramwell.........Leek.
Forbes, Alexander ....Fraserburgh.
Forbes, Edward ....Bolton.
Foulkes, Edward James.........Whitchurch.
Franklin, John William.........Gloucester.
Fuller, Arthur Edward ....Cambridge.
Gasson, William ....Crawley.
Gautby, George ....Hull.
George, Alexander Cosgrave ...Rusholme.
Gray, Arthur Underwood ......Rothwell.
Hall, Albert Edward ....Warrington.
Hall, Reuben ....Bath.
Harrison, Tom Henry............Barnsley.
Heggs, William Francis.........West Bromwich.
Hopkins, John Henry............Leicester.
Hunt, John Osbaldeston.........London.
Hutchinson, Dennison S.........Blackpool.
Hyslop, Samuel James ....Newcastle, Staffs.
James, Tom Arthur...............Mansfield.
Jones, Evan ....Waenfaur.
Jones, John Hughes ....Llangollen.
Jopling, William ... .Bishop Auckland.
Kerr, James ....Aberdeen.
Kirkness, Robert ....North Shields.
Latham, Thomas ....Manchester.
Laurence, Thomas Gentle ......Glasgow.
Lawrence, Thomas ....Clifton.
Liverseege, John Francis.........Nottingham.
Lloyd, James Clement............Lewes.
Long, Alex. John Temlett ......Bristol.
MacGillivray Finlay ....Nairn.
McGregor, John ....Aberfeldy.
Marshall, Robert Hay............Old Aberdeen.
Martin, Alexander ....Leslie.
Mason, Arthur Thomas .... Bolton.
Matthew, John.................. ...Fraserburgh.
Mayor John Beecham............Manchester.
Moore, George Francis Joseph..Lincoln.
Morris, John....................Neath.
Neil, John....................Glasgow.
Nicholson, Thomas Tanner......London.
Oldfield, Herbert ....Chesterfield.
Orange, Frederick Charles ......Southsea.
Parkinson, Joseph, junr. ....Preston.
Parry, Thomas ....Sandgate.
Paton, Richard Thomas ... .Berwick-on-Tweed.
Phillips, George Henry ....London.
Porter, Andrew Bower ....Leven.
Porter, Thomas Wilson ....Louth.
Price, Charles Cleaver............Bristol.
Pridham, Frederick John ......Llanelly.
Rae, Robert Sanders...............Annan.
Riddoch, James....................Huntly.
Robertson, William ....Grantown-on-Spey.
Robins, Harry Hollies ....Dudley.
Rubbra, Francis Edmund ......Brockley.
Sandys, George John ....Bexley Heath.
Sewell, George William ....Darlington.
Simpson, James ....Peterhead.
Smee, Walter Wallis ....Axminster.
Smith, John Frederick............New Basford.
Smith, Robert Gibson ....Newport (I. of W.).
Spencer, William ....Market Rasen.
Spurway, Edgar ....Kidderminster.
Stacey, Ernest Lloyd ....London.
Stanley, Edward Elijah ....Walsall.
Stevenitt, Charles Edward ......Sleaford.
Sugden, Stephen Hall ....St. Annes-on-the-Sea.
Suttar, John ....Peterhead.
Thomas, Joshua James ....Neath.
Thornton, William ....Curdworth.
Tucker, Percy ....Exeter.
Vaillant, Henry ....Plymouth.
Wakeham, Horace Norton ......Helston.
Wallis, Phillip James ....Wellingborough.
Walton, Samuel Archibald ......London.
Watt, George....................Bonnington.
White, Francis William ....Launceston.
White, William Everard.........Bottesford.
Whyte, Peter....................Fraserburgh.
Wilcock, James William.........Brighouse.
Wright, Christopher...............Catterick.
Wrigley, Samuel Ernest ....Fairfield.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates. Exam-ined.	Passed.	Failed.		Candidates. Exam-ined.	Passed.	Failed.
Aberdeen	9	9	...	Jersey	1	...	1
Birmingham	20	8	12	Lancaster	5	4	1
Brighton	3	1	2	Leeds	11	2	9
Bristol	13	7	6	Lincoln	13	6	7
Cambridge	2	1	1	Liverpool	10	2	8
Canterbury	2	1	1	London	45	17	28
Cardiff	8	5	3	Manchester	23	15	8
Carlisle	4	...	4	Newcastle-on-T.	9	2	7
Carmarthen	3	2	1	Northampton	4	2	2
Carnarvon	5	2	3	Norwich	8	2	6
Cheltenham	3	1	2	Nottingham	13	6	7
Darlington	4	2	2	Oxford	1	...	1
Dundee	5	2	3	Peterborough	4	1	3
Edinburgh	20	8	12	Sheffield	3	1	2
Exeter	13	5	8	Shrewsbury	4	2	2
Glasgow	8	3	5	Southampton	8	3	5
Guernsey	2	1	1	Truro	2	2	...
Hull	6	2	4	Worcester	2	1	1
Inverness	2	1	1	York	5	3	2

The questions for examination were as follows:—

Time allowed: Three hours for the three subjects.

I. LATIN.

1. Translate the following passages into English:—

A. Id ne accideret magno opere sibi præcavendum Cæsar existimabat. Namque omnium *rerum quæ* ad bellum usui erant summa erat in eo oppido facultas, idque natura loci sic muniebatur ut magnam ad ducendum bellum daret facultatem, propterea quod flumen Alduasdubis ut circino circumductum pæne totum oppidum cingit; reliquum *spatium*, quod est non amplius pedum DC qua flumen intermittit, mons continet magna *altitudine*, ita ut radices montis ex utraque parte *ripæ* fluminis contingant.

B. Multo denique *die* per exploratores Cæsar cognovit et montem a suis teneri et Helvetios castra movisse, et Considium *timore* perterritum quod non vidisset pro viso sibi renuntiasse. Eo die quo consuerat intervallo hostes sequitur, et *milia* passuum tria ab eorum castris castra ponit.

2. Parse the words in Italics in the above extracts.

3. Decline the nouns *res*, *flumen* and *opus*, and give the first person singular of the present and perfect indicative, the present infinitive, and the supine of the verbs *sequitur*, *daret*, *contingant* and *moveri*.

4. Translate the following sentences into Latin:—
   (i.) The town is surrounded by a broad river.
   (ii.) The mountain is held by the forces of the enemy.
   (iii.) The scouts report to Cæsar that there is great abundance of everything in the town.

II. ARITHMETIC.

[The working of these examples, as well as the answers, must be written out in full.]

5. A gentleman's income last year was £685, out of which he saved £274 7*s*. 6*d*. What was his average daily expenditure?

6. Multiply the sum of $\frac{3}{5}$ and $\frac{5}{6}$ by their difference, and divide the product by $8\frac{3}{5}$.

7. Reduce $6\frac{1}{2}$ guineas to the decimal of £5.

8. If the carriage of 60 cwt. for 20 miles cost £14 10*s*., hat weight can be carried 30 miles for £5 8*s*. 9*d*.?

9. What is a *metre*,. a *litre*, and a *gramme*? What is the proportion between a litre and a gallon? Reduce 2 *miles* 3 *furlongs* 15 *yards* to metres, etc.

III. ENGLISH.

10. Define what is meant by an Adjective, a Verb, an Adverb, and a Preposition.

11. The words *after* and *before* may be used as *adverbs*, as *prepositions*, and as *conjunctions*. Give sentences illustrating each of these uses.

12. Correct the following sentences, giving your reason in each case:—"I do not know who to blame." "He is older than her." "Nor want nor cold his course delay." "John as well as Thomas are to blame."

13. Parse fully each word in the following sentence:—
"Words are like leaves, and where they most abound,
Much fruit of sense beneath is rarely found."

14. Write a short composition on one of the following subjects:—"Intemperance," "Fashion," "The Drama," "Great Cities," "The Endowment of Research," "Universities."

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The fifteenth conversazione of the Liverpool Chemists' Association was held at the Royal Institution on Thursday evening, January 15.

The proceedings opened with a very excellent musical entertainment, kindly undertaken by Mr. Charles Sharp, after which the meeting adjourned to the museums, where microscopic and other objects of scientific and general interest were exhibited, manufacturing processes conducted, and scientific demonstrations given.

The following members of the Microscopical Society of Liverpool and other gentlemen exhibited objects of interest by the aid of powerful microscopes:—

T. F. Abraham, Animal Sections, etc.; H. C. Beasley, Sections of Igneous Rocks; G. F. Chantrell, Low Forms of Animal Life; M. Conroy, F.C.S., Arrowroot and other Starches; J. H. Day, Sections of Wood, Coal and Fossil Wood; E. Davies, F.C.S., Vegetable Sections and Coal; A. E. Fletcher, F.C.S., Crystals under Polarized Light; I. Fisher, Volvox Globator; Dr. Hicks, the Circulation in a Frog's Foot; A. H. Mason, F.C.S., Physiological Specimen of Human Eye, Lung of Snake, Microphotographs, etc.; Dr. Symes, Acari in Powdered Cantharides; J. Vicars, Diaptomus Castor (alive).

The following exhibits and demonstrations were held in the various spacious rooms of the building at intervals during the evening:—

The Manufacture of Artificial Fruit Essences practically illustrated, by Michael Conroy, F.C.S., Hon. Sec.; Process for Continuous Extraction, in Operation, Dr. Symes; Works of Art, in Repousse Silver and Bronze, and also of Cloisonné Enamel of their own and Japanese Manufacture, Messrs. Elkington and Co.; a collection of Cinchona Barks, and a series of Alkaloids and Salts prepared therefrom, Mr. Thos. Whiffen, London; a "Dehne" Laboratory Filter Press in Action, Messrs. Van Gelder and Apsimon; a New Illuminating Apparatus, Messrs. Chadburn and Son; Photographic Transparencies, Mr. Jas. A. Forrest; a collection of Artificial Fruit Essences, Messrs. Evans, Sons and Co.; Complete Set of the Elementary Bodies, Dr. J. Campbell Brown; a series of Food Products, illustrating their different constituents, etc., Messrs. Southall, Brothers and Barclay; Views of Ancient Liverpool and Novelties in Photographic Art, Messrs. Brown, Barnes and Bell; Engraving and Lithographic Printing, etc., Messrs. Blake and Mackenzie; Glass Blowing, practically illustrated, Mr. Topham; the Manufacture of Cardboard Boxes, practically illustrated, Messrs. Ayrton and Saunders; Exhibition of a series of Tubes illustrating some of Mr. Crookes's researches on Radiant Matter, Dr. Symes, President; Exhibition of Geissler's Vacuum Tubes, illuminated, Mr. Alfred H. Mason, F.C.S., Vice-President; Melde and Lissagon's

Pendulum Curves, Mr. Alfred E. Fletcher, F.C.S.; Graphoscopes, Stereoscopes, etc., Messrs. Chadburn and Son; Graphoscopes, Stereoscopes, etc., Messrs. Knott and Co.; Graphoscopes, Stereoscopes, etc., Mr. Marr; Transformagoria, Mr. Boulding; Jewel Kaleidoscopes, Mr. J. Hallawell, jun. The Edison Loud Speaking Telephone was exhibited by the Edison Telephone Company and worked in connection with different parts of the town. Mr. Edison's representative was in attendance.

At 8·30 the chair was taken in the lecture theatre by the President, Dr. Symes, when Mr. Edward Davies, F.C.S., F.I.C., etc., delivered a popular lecture on "Gases and Vapours."

Mr. Davis delivered the lecture in his usually lucid and instructive manner, and delighted his hearers by many beautiful and rare experiments; those bearing upon the influence of pressure on vaporization, the spheroidal state of water, and freezing water in a red hot crucible, being very successfully shown.

After the lecture,

Mr. James Birchall exhibited, by means of the oxyhydrogen light, nearly fifty photographic views of town halls, churches, and other buildings of historical interest, in the chief cities of Belgium, including Liége, Ghent, Bruges, Louvaine, Ypres, Courtrai, etc., accompanying each with an interesting brief description.

During the evening the band of the First Lancashire Artillery Volunteers, by permission of Major Grayson, attended and played several selections.

Refreshments were served in the library and the committee-room.

The whole of the proceedings passed off in a very satisfactory manner, and the meeting broke up at half-past ten.

NORTHAMPTON PHARMACEUTICAL ASSOCIATION.

A supper in connection with the above Association was held on Wednesday evening, January 14, at Franklin's Restaurant, Guildhall Road. The Chairman of the Society, Mr. J. Lewis; the Vice-Chairman, Mr. G. C. Osborne, and all the members with some friends were present.

After supper, the first toast the Chairman proposed was, "The Health, Happiness and Prosperity of the late Chairman, Mr. G. C. Druce," who had during the past year left the town. This was drunk with enthusiasm, all present feeling that they had lost, not only an able chairman, but an efficient and willing conductor of various classes. The next toast was "The Prosperity of the Northampton Pharmaceutical Association," to which the Vice-Chairman responded. In the course of his remarks he stated that the attendance at, and the interest taken in, the Botany Class which he himself conducted, had been fairly good, and he expressed the hope that the classes would be kept up in full vigour till the end of the session. The Chairman then proposed "The Healths of the Conductors of the Chemistry and Materia Medica Classes, namely, Messrs. Hayllar and Slater, both of whom briefly responded. Various other toasts, songs and recitations followed and an enjoyable evening was spent.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, January 15, Mr. Warren De La Rue, President, in the chair. The following certificates were read for the first time:—A. Lloyd, P. Mathews, G. H. Morris, H. F. Pasley, A. G. Salamon, E. Wilcock, W. H. Wood.

The following papers were read on—

The Effects of the Growth of Plants on the Amount of Matter removed from the Soil by Rain. By J. H. Prevost. —The soil used was taken from a plot of ground which had been richly manured with stable manure and ashes in October, 1878. It was placed in two glazed earthenware pans, the depth of soil being 3 inches; the surface exposed was 17 inches in diameter. The drainage water was collected and muslin covers tied over the pans. Each pan contained 4300 grms. of soil. In one was sown 4 grms. of white clover seed, the other was left blank. The seed was sown on July 21, and the two pans exposed till October 4. The clover plants had grown up, but had not flowered. The drainage from the clover soil contained 48·125 grains per gallon; that from the blank pan amounted to 220 grains per gallon. These residues were analysed. The author states that it is impossible from the meagre data in hand to draw any definite conclusions except that the results do not very widely differ from those Dr. Voelcker obtained with the drainage from a wheat crop; the principal points of interest being that rain removes much more matter from a soil containing no plants than from one which is cropped, and that the proportions in which the salts are removed do not greatly differ. Further researches are promised.

Mr. Warington said that the method of investigation just described was at one time much used in Germany. It was, what might have been anticipated, that the loss on a cropped soil would be much less than on an uncropped soil. This had been abundantly proved by the experiments of Rothampstead. Many striking results had been obtained during the past wet season. The best advice to give to farmers was that if they wished to prevent loss of the constituents of the soil, they should always keep a crop on it. He had noticed that Dr. Prevost had found phosphoric acid in the drainage. This was exceedingly unusual, as in most cases all was retained. It might be accounted for by the small depth of soil. The soluble organic matter required much investigation.

Mr. Wynter Blyth then described a simple apparatus for the treatment of substances in open dishes by volatile solvents. It consisted of a circular cast-iron pan of suitable size, open at the top; the bottom was not flat, but pushed up in a dimple like the bottom of a wine bottle. The evaporating dish was placed inside and covered by a glass bell jar, the edge of which rested in the circular trough formed by the projecting dimple. Mercury is poured in until the edge of bell jar is covered and thus an air-tight mercury joint formed. To the upper end of the bell jar is fitted a condenser, which may be vertical and return the condensed liquid to the dish or horizontal if evaporation is desired. The author had used such an apparatus with great convenience for more than twelve months, the escape of vapour being thus completely prevented. The apparatus was exhibited.

The next paper was read by Mr. W. H. Perkin on—

Dibromanthraquinones.—Graebe and Liebermann give two processes for the preparation of dibromanthraquinone; one by brominating anthraquinone; the other by oxidizing tetrabromanthracene. These processes yield, however, two different products, which are isomeric; they are named by the author α and β dibromanthraquinone. The α body is prepared by heating bromine with anthraquinone; it crystallizes from naphtha in flat needles; it is nearly insoluble in alcohol and fuses at 245° C. The β isomer is prepared by boiling tetrabromanthracene with chromic acid, dissolved in a large excess of glacial acetic acid, for some time. On recrystallizing six or seven times from naphtha, the body was obtained in needles fusing at 275° C., quite different from the crystals of the isomeric α substance. The substance is soluble with difficulty in alcohol. The author then studied the action of caustic alkalies on these two substances. In both cases alizarin (identified by its dyeing properties, its spectrum and by analysis) was obtained. The decomposition of the α body furnished, besides alizarin, a colouring matter somewhat resembling alizarin; it dissolves in alkalies with a blue-violet colour, and its alkaline solution is precipitated by lead acetate. It has, however, no dyeing properties. Its absorption spectrum gives two weak bands. It is not quinizarin nor anthrapurpurin, and may be a dioxyanthraquinone with the hydroxyls in the same position as the bromine in the dibromanthraquinone. A small amount of another colouring matter seems to be present, dyeing mordants. The author is at present engaged in the study of these substances, the quantity prepared in the present research being too small for a complete investigation. The author then discusses the formation of the same dioxyanthraquinone from the two isomeric dibromanthraquinones. In the case of the β compound, as no secondary colouring matter seems formed, the reaction is:—

$$C_6H_6\genfrac{<}{}{0pt}{}{CO}{CO}\!>C_6H_2\genfrac{<}{}{0pt}{}{Br}{Br}+2KHO=$$

$$C_6H_6\genfrac{<}{}{0pt}{}{CO}{CO}\!>C_6H_2\genfrac{<}{}{0pt}{}{HO}{HO}+2KBr.$$

In the case of the β isomer, probably bromomonoxyanthraquinone is first formed, the further action of potash produces bromalizarin with the liberation of hydrogen, which attacks the bromine and removes it as hydrobromic acid, and thus alizarin is formed. Probably, too, a certain amount of destruction takes place between the potash and the alizarin, some hydroanthraquinone being formed. At the end of the paper the author states that he has recently examined Auerbach's original paper on isopurpurin, and concludes that that substance, from the properties given, is a mixture of flavopurpurin and anthrapurpurin; the former substance preponderating. Isopurpurin is not, therefore, identical with anthrapurpurin as has been stated by the author of the present paper.

The Secretary then read a paper on—

The Melting and Boiling Points of Certain Inorganic Substances. By T. CARNELLY and W. CARLETON WILLIAMS.—The authors have determined the melting points of various substances by the specific heat method (*Chem. Soc. Jour.*, 1876, i., 489). The list includes tellurium, with its chlorides and bromides, cuprous bromide, etc. The boiling points were determined by the method described in *Chem. Soc. Jour.*, 1878, Trans. 281. The melting points of silver and copper have been recently re-determined by Violle, and in consequence, some corrections have been necessitated in the last paper of the authors (*Chem. Soc. Jour.*, 1879). The authors point out that in the mercuric compounds the melting point sinks and the boiling point rises with an increased molecular weight, the reverse is the case with cuprous compounds, thus:—

		Chlorides.	Bromides.	Iodides.
Mercuric	melting point	287	244	241
	boiling point	303	319	349
Cuprous	melting point	434	504	601
	boiling point	954	861	760

Mr. WARINGTON then contributed some notes on—

Some Practical Points connected with his Laboratory Experience.—The first point considered was the modification proposed by Dr. Frankland, some time since, as a substitute for the steel blocks which form the air-tight connectors between the laboratory and the measuring tubes in the gas apparatus. It will be remembered that Dr. Frankland causes the measuring tube to end in an upright funnel in which fits roughly a conical stopper, which terminates the laboratory tube. The joint was made tight by a piece of sheet indiarubber tied on the lower end of this conical stopper, the indiarubber being turned back, applied to the sides of the funnel and the joint covered with mercury. This modification the author has found extremely convenient; one difficulty was the constant wearing out of the indiarubber. This was traced to its rubbing up and down, as it was not absolutely fixed on the stopper. By tying the indiarubber above as well as below the stopper, this difficulty has been obviated and the rubber lasts many months instead of a week. The author strongly recommends the coating of laboratory benches, mercury troughs, etc., with paraffin. The wood is made quite hot by a Bunsen flame or in an oven and the paraffin rubbed in. Thus the wood is completely protected from the action of acids. In the determination of nitric acid by Frankland's process, the author has observed that the action is often incomplete when the attack on the mercury is feeble; by adding a drop of dilute hydrochloric acid the reaction is always vigorous and the results good. Diphenylamine solution in strong sulphuric acid forms a magnificent blue coloration in the presence of a trace of a nitrate. The author has thus detected $\frac{1}{1000}$ of a milligram of nitrogen as nitric acid. The absence of other oxidizing agents must be secured.

The Society then adjourned to February 5.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, the 8th inst., Mr. H. Allen, Vice-President, in the chair.

The Secretary read the following paper on—

THE ANALYSIS OF STEEL.

BY WYNDHAM R. DUNSTAN, F.C.S.,

Assistant Demonstrator of Chemistry in the Laboratories of the Pharmaceutical Society.

Steel differs from pig iron in its percentage of carbon, its property of welding and its higher melting point, steel melting at a temperature of 1800° C. and pig iron from 1400 to 1600° C. It is distinguished from wrought iron by its fusibility and larger proportion of carbon. Steel is further characterized by its softening at a red heat and its property of becoming hard and brittle by sudden cooling. These properties depend upon the proportion of carbon present and on the presence or absence of other substances. It is not my intention, this evening, to treat of the manufacture of steel, but of its analysis; I may say, however, that most of the steel in commerce is produced by one of the three following processes: (1) The cementation method, consisting in the addition of carbon to malleable iron; (2) the Siemens-Martin method, by the solution of malleable scrap iron in molten pig iron; (3) the Bessemer process, as improved by Mushet, consisting in the oxidation of the carbon and silicon of the pig iron by blowing air through the molten metal and the subsequent addition of an iron containing a large proportion of carbon to bring the iron back to the composition of the steel required.

The steel made by any of these processes should contain from 98 to 99 per cent. of iron. Carbon might exist in it in two forms, (1) as uncombined carbon or graphite, of which a good steel should contain a very small proportion, the best steel containing none; (2) the carbon existing as carbide of iron, generally known as combined carbon, the proportion of which determines in a great measure the quality of the steel. A small amount of carbon, from 0·8 to 0·05 per cent., renders the steel more difficult to fuse, and a larger amount, from 1·0 to 2·0 per cent., facilitates the fusibility but decreases its tenacity and weldability. Phosphorus is an important element in steel; the proportion should be as small as possible, as little as 0·1 per cent. rendering it "cold short" or unworkable at ordinary temperatures. From this will be seen the importance of the recent discovery of Messrs. Thomas and Gilchrist, that by substituting a lining of magnesian limestone instead of a silicious lining for the Bessemer converter the phosphorus is almost entirely eliminated. Silicon is an ingredient which should not exist in large quantities in the steel; 0·5 per cent. renders the steel "red short" or unworkable at a red heat. Silicon is considered a necessary constituent of hard steel to the extent of from 0·03 to 0·04 per cent. Krupp's cast steel contains 0·3 per cent. Sulphur is an element which exists in the best steel only to the extent of from 0·00 to 0·01 per cent.; 0·1 per cent. renders it red short, weldable at lower temperatures, but brittle. Copper should be entirely absent from good steel, as a very small amount renders it red short. Manganese is now universally considered a necessary constituent of steel; its probable virtue consists in its presence during the manufacture by combining with the silicon and sulphur, thus removing them. This view is confirmed by the fact that nearly all the manganese passes into the slag; 0·3 to 0·5 per cent. generally exists in the steel.

It will be seen that the determination of the amount of carbon, phosphorus, sulphur, silicon, manganese and copper is very important, and from the small amount of the substances present the accurate analysis of steel is one of the most difficult and delicate processes in chemical analysis. The steel must be reduced to a fine state of division before analysis, either by means of a hard file or by crushing in a steel mortar. The graphite is most easily and accurately determined by the method proposed by Tosh: 5 grams of the steel are dissolved in pure hydrochloric acid and warmed; the solution is filtered, the insoluble matter washed with dilute hydrochloric acid until the filtrate ceases to give any coloration with potassium ferrocyanide, then with a hot solution of sodium hydrate to remove silica, with boiling water, and finally with a mixture of alcohol and ether, as this residue often contains hydrocarbons. The insoluble matter is dried at 100° C., weighed, then ignited and weighed again, the loss is pure graphite, the residue may contain titanium and a mere trace of silica. This method gives results which compare very well. The total carbon is best estimated by Bromeis' modification of Regnault's method. The steel must be in very fine powder. A piece of combustion tube drawn out in the usual manner for organic combustions is first filled to about three inches with a mixture of equal parts of lead chromate and previously fused potassium chlorate. Three grams of the steel are mixed with lead chromate, previously incorporated with 16 per cent. of fused potassium chlorate, and the mixture introduced into the tube, then finally some pure lead chromate. A calcium chloride tube and previously weighed potash bulbs are then attached. The lead chromate is first heated to redness, then the mixture containing the steel, which when it is at a red heat burns with incandescence, all the carbon being oxidized to carbonic anhydride; finally, the mixture at the end of the tube is heated, which drives forward any remaining carbonic anhydride. I have obtained accurate results with this process; two combustions of the same steel gave respectively 1·5 and 1·6 per cent. of total carbon. Fresenius recommends that a weighed portion of the steel be dissolved in dilute sulphuric acid and the gases evolved passed over red hot cupric oxide; the carbonic anhydride produced, after drying through calcium chloride, is absorbed by solution of potassium hydrate and weighed. This only gives the combined carbon, as when steel is dissolved in hydrochloric or sulphuric acid the formerly combined carbon unites with the nascent hydrogen and forms hydrocarbons, the graphitic carbon remaining behind; this is either treated as I have described under graphite or burned in a stream of oxygen, the resulting carbonic anhydride being absorbed by potassium hydrate solution. This amount added to the former gives the amount of total carbon in the steel. The presence of hydrocarbons in the residue of graphite, as I have before noticed, renders the process untrustworthy for the estimation of the combined carbon only. The process for the estimation of combined carbon which is most commonly employed in commercial analysis is that proposed by Eggertz. It depends upon the fact that when steel containing combined carbon is dissolved in nitric acid a soluble brown colouring matter is produced, the intensity of which varies with the amount of combined carbon present. By dissolving the same weight of two different kinds of steel in nitric acid and diluting till both colours are alike, the steel containing the largest amount of combined carbon will yield the largest amount of liquid, the proportion of the volumes indicating the relative proportion of carbon in the two steels. If then the amount of carbon in one sample of steel be known the amount in another sample can be determined by this process. An ordinary piece of bar steel is obtained and the amount of total carbon determined by combustion, several combustions being made and the mean taken; the graphite is then determined by the method of Tosh and deducted from the amount of total carbon; this gives the amount of combined carbon present in the steel. This sample, the carbon in which has been determined thus, is kept as a standard steel, portions of which must be filed off from time to time as required. A tube sealed at one end and of the same bore as a graduated tube, so that a given quantity of liquid stands at the same height in both tubes, must be obtained, and some pure nitric acid having a specific gravity of 1·20. Nitric acid of this strength and at the temperature followed in the experiments yields with iron containing no combined carbon a solution of ferrous nitrate of a greenish colour. A decigram of the standard steel and the same quantity of the steel under examination is weighed out and placed in two test tubes with from 1·5 to 3 cubic centimetres of the nitric acid, and after a short time both are placed in a water-bath at a temperature of 80° C. for about two or three hours; if any residue is then left the supernatant liquid is poured off and the residue treated with more nitric acid until nothing more is dissolved. The solution of the standard steel should be poured into the graduated tube and diluted so that every cubic centimetre corresponds to 0·0001 gram of carbon, thus if the standard steel contains 1·55 per cent. of carbon the solution must be diluted to 15·5 cubic centimetres and then poured into the ungraduated tube; a mark should be made on this tube indicating 15·5 cubic centimetres. The solution of the other steel is then poured into the graduated tube and diluted with water until the colour appears the same as that of the standard upon placing them in front of a piece of wet blotting paper and holding in front of a window; by this means the changes in colour can be viewed without difficulty. The number of cubic centimetres the solution of the steel occupies when the colours are the same indicates, after division by ten, the percentage of combined carbon in the steel. If, for instance, the solution stood at 9·5 cubic centimetres the steel contains ·95 per cent. of combined carbon. This process is quick and, provided the necessary materials are at hand, easy of manipulation, so that twenty analyses of combined carbon per diem may be made with ease. To facilitate the working of the process it has been proposed to imitate the colour produced by the standard steel by various substances having a similar colour, as a solution of coffee in alcohol, caramel, etc., but the most satisfactory way is to take 0·1 gram of the standard steel for each analysis.

Phosphorus being present only in small quantities in steel, and as a small difference in the percentage makes an appreciable difference in the quality of the steel, its estimation must be conducted with great care. Tosh's process is to dissolve three grams of steel in aqua regia, evaporate the solution to dryness, dissolve in hydrochloric acid and filter off insoluble matter. The iron, which is now in the ferric state, is reduced to the ferrous state by heating with excess of sodium sulphite; sulphurous acid is driven off by heating, a little ferric chloride added and then solution of ammonium carbonate until a permanent precipitate is produced. This precipitate, which is small, contains all the phosphorus as ferric phosphate; it is filtered off and, after washing, dissolved in a small quantity of hydrochloric acid, citric acid added and the phosphorus precipitated as ammonio-magnesium phosphate. This process is quite accurate and generally reliable. Abel dissolves the steel in warm nitrohydrochloric acid, evaporates to dryness, expels the nitric acid by excess of hydrochloric acid and again evaporates to dryness. The residue is dissolved in hydrochloric acid, diluted and filtered, nearly neutralized with ammonium carbonate, the iron reduced as in Tosh's process by ammonium sulphite and subsequent expulsion of the sulphurous acid by heat after acidifying the solution with dilute sulphuric acid. Amonium acetate and a small quantity of ferric chloride are added and the solution boiled; all the phosphorus is precipitated as basic phosphate and acetate. The liquid is quickly filtered, washed once with boiling water, dissolved in hydrochloric acid, neutralized with ammonium carbonate, a mixture of ammonium hydrate and sulphide added and the solution warmed. By this means the phosphate of iron is decomposed, the iron remaining as a precipitate of sulphide, which is filtered off and washed with dilute ammonium sulphide solution, all the phosphorus passing into the filtrate, which is precipitated in the usual manner with magnesia mixture. The process which I have been in the habit of employing is to empty two grams of the steel into a capacious beaker containing about one ounce of hot nitric acid. When all action has ceased the solution is evaporated to a low bulk, hydrochloric acid added to expel all the nitric acid and the solution evaporated to dryness, dissolved in hydrochloric acid, filtered to remove silica, and evaporated to low bulk with nitric acid; twenty cubic centimetres of ammonium molybdate solution prepared by Eggertz's method are then added and the solution allowed to stand in a warm place for twenty-four hours. The precipitate is filtered off, washed with a mixture of the ammonium molybdate solution and water, dissolved in ammonium hydrate, tartaric acid added (in case any traces of iron should be left in the precipitate), then magnesia mixture. This process gives results which compare very well and eliminates most sources of error.

Sulphur is estimated by taking ten grams of the steel, which is emptied into a hot mixture of two parts of hydrochloric acid and one part of nitric acid. When all action has ceased the liquid is evaporated to dryness, dissolved in hydrochloric acid, filtered, the filtrate diluted with water and nearly neutralized with ammonium hydrate, barium chloride added, the solution warmed, and allowed to stand twelve hours. The barium sulphate is filtered off and washed with dilute hydrochloric acid and hot water. Eggertz estimates sulphur by dissolving the steel in sulphuric acid and exposing a silver plate to the action of the gases evolved, the colour produced being compared with standard coloured plates. Sulphur may also be estimated by dissolving ten grams of steel in concentrated hydrochloric acid and passing the gases evolved through a solution of lead acetate acidified with acetic acid. The lead sulphide is washed, heated with nitric acid, and when cool sulphuric acid added, the solution evaporated until fumes of sulphuric anhydride appear, diluted with water, and the lead sulphate collected and weighed.

Silicon is estimated in the filtrate from the graphite estimation by evaporation and dissolving the residue in hydrochloric acid and treating it in the usual manner. Sometimes it occurs that slag has become incorporated with the metal and therefore the silicon results would come out too high. Eggertz dissolves the steel in bromine which does not attack the slag, but separates, of course, the silicon from the iron. Sodium carbonate dissolves this latter variety of silicon but has no effect on the former. Slag in English iron rails was found by Eggertz to be often from 4 to 5 per cent. In finished steel and cast steel, however, it rarely occurs.

Manganese is estimated by dissolving two grams of iron in hydrochloric acid, a small quantity of nitric acid is added, the solution warmed, so as to convert the iron into the ferric state, and neutralized with ammonium hydrate so that it shall be cloudy. A saturated solution of ammonium acetate is then added and the solution boiled, when the iron is completely precipitated as basic iron acetate, which is collected on a filter and washed. The washings and filtrate are rendered alkaline with ammonium hydrate and a few drops of bromine added, the solution kept at a temperature of 50° C., and being allowed to remain at that temperature for twelve hours; the hydrated oxide of manganese is collected on a filter, dried, ignited and weighed as Mn_3O_4. Formerly sodium or potassium salts were used throughout the above process, but it was found that after ignition the oxide of manganese had an alkaline reaction due to the presence of sodium hydrate. Wright and Menke* have shown that the oxide of manganese precipitated by bromine in presence of potassium acetate, after drying, contained 11·87 per cent. of K_2O.

Copper is estimated by dissolving thirty grams of steel in hydrochloric acid, partially neutralizing with sodium carbonate, evaporating to low bulk, passing sulphuretted hydrogen, dissolving the precipitate and estimating the copper by the colorimetric method, if only a small quantity is present.

After a discussion on the above, paper the Chairman called upon Mr. Arnold to deliver his Report on Pharmacy.

Suppositories.

BY H. R. ARNOLD.

The manufacture of these preparations is somewhat troublesome to the pharmacist, often involving much time and ending unsatisfactorily. This report will best be classed under three heads:—1st. A reference to the machines generally used; 2nd. The excipients, and 3rd. The manner of manipulating green extract suppositories.

The general way of making these preparations is to melt the excipients together at a gentle heat, then to add the active ingredients, and constantly to stir until the mixture is of the consistence of thick cream, then to pour it into metal moulds, previously cooled (more especially is this necessary if the mould be made of block tin).

These moulds are made in two pieces, the conical hollows occupying the junction, so that when the mass is cold they are easily opened and the suppositories turned out. Another form of mould has been devised and used by Mr. Gerrard, the mould opening as it were transversely, instead of longitudinally, as is the case with the other. Lastly, machines have been invented, but I believe not generally adopted, for making suppositories by pressure. Whether this method will ever supersede the old way of melting I would not venture to predict, though at present I fail to see the superiority of this new method over the old; at any rate with the excipients that are now in general use for suppositories. Suppose, for instance, we wish to make some opium suppositories:—First the ol. theobromæ has to be grated, and obtained in as fine a state of division as possible; then the powder or extract must be well mixed with it; and by the time this is done I think you will have come to the conclusion that it would have been better had the ol. theobromæ been melted and constantly stirred till cold; by this means a more homogeneous mass is obtained. The mass is now subjected to pressure. Regarding the appearance of suppositories made by pressure (using only ol. theobromæ as the excipient), they do not compare at all favourably with those obtained by the old process, the surface presenting several veins or patches of a lighter colour than the rest of the mass. This defect is not noticed so much with morphia and other light coloured suppositories, as with the darker ones, such as opium; if, however, the basis be altered by the substitution of wax and lard, so as to nearly resemble the B.P., these defects are remedied.

The excipients that have been proposed form time to time are vaseline, stearic and oleic acids, ol. theobromæ and 10 per cent. of cetaceum, and gelatine.

The B.P. basis is too soft, and I think the lard and wax might be left out with advantage.

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* *Jour. Chem. Soc.*, Jan., 1880.

The following method answers well in making green extract suppositories. Rub the extract in a mortar with a little water to a thin paste, then having previously melted the ol. theobromæ, add it gradually to the extract, stirring well until it begins to thicken. Should the extract separate through the ol. theobromæ being too hot, the addition of a few drops of water will completely suspend it. The advantage of the method will be more evident in making suppositories containing morphia in combination with an extract, as the extract invariably separates upon the first addition of the oil, but the water easily solves this difficulty.

In making suppositories containing tannin, too much heat must be carefully avoided, or the tannin coagulates in a resin-like mass.

Lastly, of the many solutions that have been proposed from time to time for moistening the mould, none seem to answer so well as a solution composed of equal parts of sapo mollis and glycerine.

Mr. W. H. Symons, F.C.S., at the commencement of the discussion, exhibited several varieties of pessaries and suppositories prepared with various bases, cacao butter, gelatine, oleic acid and stearic acid, vaseline and paraffin, and by the various official formulæ, including those made in accordance with the 1874 Additions to the British Pharmacopœia. The suppositories had first been fashioned with the fingers, and then pressed into the ordinary mould. They exhibited the same appearance as those made by fusion, all had been kept for over two years and had undergone very little change, with the exception of a 5 grain socotrina aloes suppository three months old, prepared with the gelatine basis, which had become covered with a buff coloured incrustation. The advisability of using a small quantity of oleic acid as a solvent for alkaloids when prescribed in minute quantities, as in the case of atropin, was maintained. The advantage of using a thermometer marked at 130° F. for a stirring rod in the preparation of tannin suppositories as a means of preventing the agglomeration of the tannin, which takes place above the temperature indicated, was suggested. The speaker also explained an easy method of making suppositories and pessaries of extraordinary sizes. A cone of tin foil is made on a moderator lamp with wick-stick, or other suitable cone, the tin foil is strengthened by a paper cone, to which its apex is attached by sealing wax. The mould so made is then placed in any support, such as the mouth of a bottle, or in moist sand, and a proper quantity of the melted mass poured into it; the whole can then be floated on cold water until set, when the tin foil is stripped off. Specimens made by this method were handed round for inspection.

Mr. R. H. Parker thought that the best form of mould was that made of gun-metal, and opening on hinges from the suppositories in longitudinal section and fitted with a screw clamp. He thought that when tannin was used in suppositories a gelatine basis was inadmissible, although prescribed in the Skin Hospital Pharmacopœia. When melted with cacao butter it sometimes aggregated into pasty lumps; this was due to the access of water, either from the water-bath or from using an imperfectly dried specimen of tannin. In the latter case the difficulty was surmounted by avoiding a high temperature. The speaker had found that dry powdered tannin stirred into melted cacao butter at 212° F. for ten minutes, showed no sign of aggregation. He objected to extemporaneous drying of extracts. Many extracts, if not all, suffered more or less deterioration by continued exposure to a temperature of 180° to 212° F. Powdered extracts were perhaps unobjectionable if dried very slowly, in which case of course the heat was not extemporaneously applied. A much more homogeneous appearance was obtained by reducing the extract to thin creamy consistence with water and then rubbing down with the melted fat, which must be kept at a temperature of 100° F. The combination of tannin with aqueous extracts and cacao butter was easily managed by mixing the powdered tannins with one part of the fat and the extract *secundum artem* with the other, then stirring the two together. When atropin was ordered in pessaries the alkaloid should be carefully triturated with nineteen parts or other convenient quantity of very finely powdered sugar of milk in order to weigh small quantities conveniently. It was less objectionable than oleic acid, because it answered for both the theobroma and gelatine bases; in the former case the fat should be stirred till nearly cold, while in the latter it of course dissolved. Moreover, oleic acid unless present in an objectionably large quantity would not facilitate the measurement of small quantities of the alkaloid. When extracts were prescribed for bases, Mr. Parker thought that they were best manipulated as a pill mass, being divided by pressure on the pill machine; this produced cylinders that might be inserted into the ordinary mould, which should be dusted over with starch, the mass being finally pressed into shape.

The meeting then adjourned.

Parliamentary and Law Proceedings.

Prosecutions under the 17th Section of the Pharmacy Act.

At the Newcastle-on-Tyne Borough Police Court, on Thursday, January 15, 1880, before B. B. Blackwell, Esq. (Chairman), Alderman Robinson and J. Burrell, Esq., Mr. William Wright Brewis, grocer and patent medicine vendor, of 1, New Street, Newcastle, was summoned by the Secretary of the Chemists and Druggists' Trade Association of Great Britain, for contravention of the Pharmacy Act, 1868. He was charged, "That he did on January 12 last, at Newcastle-on-Tyne, unlawfully sell to Mr. W. F. Haydon, certain poison, to wit, 'Battle's Vermin Killer,' being a preparation of strychnine, in a certain packet, the cover of which packet did not set forth the name or address of the seller of the same. That the said sale was effected, the purchaser being unknown to the seller and not introduced to the seller. That the date of the sale, the name and address of the purchaser, and the name and quantity of the article sold were not entered by the seller in a book kept by him for that purpose, contrary to the statute in such case made and provided."

Mr. Henry Glaisyer, solicitor, Birmingham, appeared in support of the summonses. Mr. George Rowell, solicitor, Newcastle, appeared for the defence.

Mr. Rowell said he should advise his client to plead guilty, and simply address the bench in mitigation of the offence.

Mr. Glaisyer said he was instructed by Mr. Haydon, Secretary of the Chemists and Druggists' Trade Association of Great Britain, who laid the information, to prosecute the defendant for three offences under the 17th section of that Act. Three summonses had been issued, but as the defendant pleaded guilty, one statement of the facts would be sufficient. On the 12th of this month, Mr. Haydon purchased at the shop of the defendant, No. 1, New Street, in that borough, a packet of Battle's vermin killer. The packet in which this vermin killer was contained did not set forth the name or address of the seller, the purchaser was unknown to the seller, and was not introduced to the seller, and the formalities required by the Act as to the registration of the sale were not complied with by the seller. The article had since been analysed by Mr. Haydon and found to be a preparation of strychnine. Preparations of strychnine were added to part 1, schedule A, of the Pharmacy Act in December, 1869, as appeared by a notice published in the *London Gazette* of December 21, 1869.

Mr. Rowell said in this case he should ask the bench to impose a merely nominal penalty. His client was a grocer carrying on an extensive business in the town. Some little time before he had taken out a licence to sell patent medicines. By accident one of the articles, of which he then took into stock a very small quantity, was Battle's vermin killer. This was a well-known article sold hundreds of times every day in the way his client had sold it for domestic purposes, and not at all for medical purposes.

Chairman of the Bench: Your remarks as to this poison being sold in hundreds of cases in the same manner in which it has been sold by your client is not only no reason why your client should not be punished, but rather the contrary, and we must say that we are sorry to find from your statement that there are numerous instances in which the law has been broken and the public safety endangered. Every week, almost, there are persons poisoned by taking this vermin killer, and if your client reads the papers he must have seen these cases and he ought, therefore, to have been much more cautious as to its sale.

Magistrates' Clerk: Will you be satisfied with a conviction on one summons, Mr. Glaisyer?

Mr. Glaisyer: Yes; with the costs in all the summonses.

Mr. Rowell: One summons would have covered the whole charge.

Magistrates' Clerk: I am responsible for the summonses having been issued. I advised Mr. Haydon to take out three summonses as there were three distinct offences.

The magistrates conferred.

Chairman of the Bench: We have carefully considered this matter, Mr. Rowell. Your client is convicted upon the selling, that is, for having unlawfully sold this poison to a person a perfect stranger to him, and not introduced to him, without making any inquiries; that we consider the most important charge, and we convict upon that, and we fine your client 40*s.* and costs in that summons, but he must pay also the costs in the other two summonses.

At the Leeds Borough Police Court, on Friday, January 16, 1880, before W. Brace, Esq., Stipendiary, Hubert Murray, trading as a chemist and druggist, at 110, Kirkgate, Leeds, was charged: "That he did on the 29th day of October, 1879, at the said borough, unlawfully sell to W. F. Haydon, Secretary to the Chemists and Druggists' Trade Association of Great Britain, certain poison, to wit, oxalic acid, in a certain packet, the cover of which packet did not set forth the name of the seller of the same, contrary to the statute in such case made and provided."

The defendant pleaded guilty so far as selling the packet.

Mr. Glaisyer, who was instructed by the Secretary of the Chemists and Druggists' Trade Association of Great Britain, by whom the information was laid, said that on the 29th day of October last, Mr. Haydon went to the defendant's shop, No. 110, Kirkgate, Leeds, and purchased from an assistant, who gave the name of Backhouse, two pennyworth of oxalic acid. The packet was labelled "Oxalic Acid. Poison. Edward Boothman, Druggist, 110, Kirkgate, Leeds." The parcel was subsequently analysed by Mr. Haydon and found to contain oxalic acid. Oxalic acid was a poison enumerated in part 2, schedule A, of the Pharmacy Act. The defendant was wholly unqualified to sell poisons scheduled under the Act, not being a registered chemist and druggist; but he attempted to do so under cover of Boothman's name. Edward Boothman, a registered chemist and druggist, who formerly owned the business now being carried on by the defendant, had been dead some years. The defendant was the tenant of the premises at 110, Kirkgate, and he had been regularly rated for those premises and has paid rates for many years.

Mr. Haydon, Secretary of the Chemists and Druggists' Trade Association of Great Britain, deposed that on October 29, last, he went to the defendant's shop, No. 110, Kirkgate, when he purchased from the assistant of the defendant, who gave the name of Backhouse, two-pennyworth of oxalic acid, which he now produced, labelled, "Oxalic Acid. Poison. Edward Boothman, Druggist, 110, Kirkgate, Leeds." He subsequently analysed the contents of the packet and found it to be commercial oxalic acid. Hubert Murray, the defendant, was not qualified to sell such poisons, his name not appearing in the last published register of pharmaceutical chemists and chemists and druggists.

The Defendant: I am not a chemist, I admit that, but I thought I had done all that was necessary in carrying on my business by means of a qualified man.

The Stipendiary: Do you say your assistant is a qualified person?

The Defendant: He is not a registered chemist and druggist, but he has had a great deal of experience. We sell very little indeed of this oxalic acid.

The Stipendiary: In this case the defendant is charged with selling poison which is not labelled with the name of the seller.

The Defendant: It is labelled with Boothman's name and I am carrying on the business in Boothman's name.

The Stipendiary: That is so; but that is just what the law says you must not do. The full amount of the penalty appears to be £5; I shall order in this case that you pay a penalty of 50*s.* and costs.

The Defendant: Cannot you mitigate the penalty, your worship?

The Stipendiary: You do not appear to understand me. The full penalty is £5, and I have reduced it to half that amount. You must understand that every day you carry on this business you are trading in an illegal manner, and are liable to be sued for penalties for trading as a chemist without qualification.

The Defendant: Then what am I to do with my business?

The Stipendiary: You must obey the law or you will have the Pharmaceutical Society or some other body suing you for further penalties.

Poisoning by Morphia.

An inquest was opened at the Guildhall, Doncaster, on Wednesday, January 14, respecting the death of a woman named Leonora Hattersley, aged 30 years, which happened the previous night.

The Coroner (A. J. Shirley, Esq.) in opening the inquest said it appeared to him to be a very singular case, and he was sure would receive at the hands of the jury the attention it deserved. Deceased had lived at Brierley, near Burnsley. About sixteen years ago she went out of her mind, but recovered, remaining very weak, both bodily and mentally. About four years ago she suffered from melancholia, but recovered in about fifteen months, and ever since then she had been liable to fits and remaining prostrate. On Saturday and Sunday week she had two fits, Dr. Leak, of Hemsworth, being the attendant. Deceased had an uncle living at 32, Bridge Terrace, Doncaster, and on Monday afternoon she came with her sister on a visit. It appeared ever since her first illness deceased had been in the habit of taking morphia—sometimes he believed six draughts in one week, and sometimes as many as three draughts in one night, without medical advice. She had also had injections of morphia into different parts of her body, but not recently. On the same afternoon she arrived at Doncaster her sister went to Mr. Hopper's shop in Cleveland Street and obtained a sleeping draught, telling the man who supplied her that her sister was used to taking them, and she wanted a strong one. The deceased went to bed at 10.30 and had a tablespoonful of Hopper's mixture at 11. She, however, did not sleep until four o'clock in the morning, when upon her saying she thought she had had, or was going to have a fit, another dose of mixture was given to her, and in about two hours she dozed off and never awoke again, dying about eight o'clock the same evening.

Dr. Wilson was sent for, he arriving about seven o'clock in the morning, and he at once thought the case was one of morphia poisoning, and not a case of a person being in a fit. Mr. Walker, the house surgeon at the Infirmary, also saw the deceased, and would be able to give his opinion. He (the Coroner) mentioned the above facts thus carefully because they would have to inquire whether death was caused by fits or by an overdose of morphia. He must also mention that that was the second time within three months he had had to inquire into cases of that kind, and his predecessor held a similar inquiry shortly before his death. Not only was the question of the use of morphia and other narcotics local, but it was a matter which had been discussed in the *Times*, both by correspondence and an article which appeared on Monday. The Coroner here read extracts from the *Times* article, which deprecated the free use of morphia.

Caroline Hattersley, mother of deceased, said that during the last twelve years her daughter had suffered from epileptic fits. Three weeks before her death she was suddenly taking ill, but Dr. Leak did not express alarm, calling it hysterical croup. She had had sleepless nights, not being able to rest anyway. To facilitate her having rest draughts were brought which caused sleep for three hours at a time. She had morphia injected several times, but it was never used without the doctor's attendance. She had also suffered from neuralgia. The reason she came to Doncaster was to give her change of air and scenery. Witness was not with her when she died. They had got everything for her that could do her any good.

Sophy Hattersley, sister to deceased, stated that the doctor said the mental illness contributed to the bodily, but deceased always thought differently. Brandy was given as a stimulant, and chloral and morphia made into draughts for her. Morphia was injected into her arms about twelve grains (*sic*) at a time. The draughts she generally took previous to her death did not make her sleep very long. The last time morphia was injected was a year and a half ago, while at Scarborough. On Monday witness and her sister reached Doncaster about half-past two in the afternoon, and deceased then seemed rather excited. They did not bring any sleeping draughts with them. Dr. Leak had attended her twice during last year, a week ago being the last time. He then changed the medicine. Witness thought the first medicine contained iron. She was unable to continue the last medicine, as she became ill after taking a dose of it. On the night of Monday, January 12, witness went to Mr. Hopper's, Cleveland Street, and asked for a sleeping draught, saying "Let it be a strong one, as she has taken ten grains of morphia."

The Coroner here reminded witness that she must have misled the attendant, as the ten grains were injected, not inwardly consumed.

Witness resumed: The attendant said he would give her five grains, and told a little boy who was in the shop to hand him a bottle. Witness now said she told the chemist's assistant the ten grains of morphia were taken when the deceased had the neuralgia. The bottle was produced, and bore a label "Solution of Morphia. To be used with great care." There was also a notice underneath saying according to the Act of Parliament the mixture had to be labelled "Poison," although its composition remained unaltered. Deceased measured the dose herself by marks on the bottle. Nothing was said at the chemist's shop about the dose, and witness did not ask, as the bottle was the same one used previously. The sale was entered in a book, and witness signed her name. She never signed one before. When deceased went to bed she was restless and tossed about till four in the morning. The first dose was given at eleven, and another at four in the morning, but part of it was left in the glass, and she also spilled a little of the first one. After eleven deceased said either she had had a fit or was going to have one. She also vomited. The dose was not diluted with water. After the second dose she did not sleep for two hours, and was again sick. Witness persuaded her to try and sleep, and in a few minutes she seemed to go into a fit in her sleep, the same as witness had seen her do while at Scarborough. It was then between six and seven, and from that time till seven at night she seemed to be asleep. She had never been in a fit of such a length before, but during the past few weeks she had grown weaker. Her hands and lips were blue. Dr. Wilson was sent for about half-past seven in the morning. Deceased turned cold almost directly after going into the fit. Mr. Walker, of the Infirmary, was with Dr. Wilson.

William James McChesney, manager and assistant at Mr. Hopper's shop, Cleveland Street, said he remembered a female going to the shop about seven o'clock for a sleeping draught, and stipulating for ten grains of morphia. Witness told her he thought it was a great deal. In answer to the Coroner, he said he should think half a grain would kill a man. He asked her if she was sure she wanted morphia, or was it chloral hydrate. She replied she was sure it was morphia, as a medical man had told her so. Witness made her some up, saying it contained five grains each draught. He also explained to her that one draught would be ten times in excess of the maximum dose, and enough to kill several people. He did not tell her when to repeat it, as he thought it would not be used above once. He once made up a draught containing ten grains of morphia for a man, but he was since dead.

The Coroner: I should think so.

Witness: The sum of 1*s.* 6*d.* was paid for the bottle, which was a 6-ounce one. Morphia was extracted from opium. Witness was not himself registered. He put both labels on the bottle. Did not think the label saying its composition remained unaltered was liable to mislead people, by making them believe it was harmless. He particularly explained that not more than a teaspoonful was to be taken by an ordinary person. Witness produced the book, fully showing the sale and signed by the purchaser.

The Coroner here read the section of the Act, which said that no poison was allowed to be sold to any unknown person, or, if so, without being introduced by someone known to the seller, and their name also signed in the book.

Witness said he saw a young man, cousin of deceased, whom he knew, outside, but he did not go into the shop.

By the Foreman: I told the woman if she gave more than a teaspoonful it would be at a risk.

By the Coroner: The next morning Miss Hattersley went down to the shop and said they had had to call in two doctors. Witness told her he was very sorry, but he had used every precaution in his power by telling her how to use the medicine. She replied, "There must be some mistake. I believe I wanted chloral hydrate. I am entirely to blame myself."

Robert Tong, an errand boy in the employ of Mr. Hopper, who was in the shop when Miss Hattersley was supplied with the medicine, detailed the circumstances, and said that when Miss Hattersley went into the shop she said two doses had been given. No blame was laid on either party. Witness was in the shop all the time. He did not hear Miss Hattersley say, "It is my own fault."

Miss Hattersley, recalled, said she did not remember being cautioned, except by Mr. McChesney saying it was a large dose, and she said in answer she had been used to taking large doses. She did not remember any conversation about a spoonful. When she went on Tuesday morning to ask how many grains had been given she told the assistant Dr. Wilson's opinion was it was an overdose of morphia. The assistant said it was a strong dose, and seemed troubled, and witness told him he was not to blame.

Cross-examined by Mr. McChesney: I did not say I was entirely to blame. I said I did not think I wanted morphia, it must have been chloral.

In answer to a juror Mr. McChesney said there was no limit to the quantity of morphia which could be supplied.

The case was then adjourned to Monday, the 19th, the bottles meanwhile to be analysed by Mr. Allen, the borough analyst.

At the adjourned inquest on Monday afternoon, the following additional evidence was taken:—

Thomas Mallone Leak, physician and surgeon, of Hemsworth, said he had known the deceased, Leonora Hattersley, since she was born. Sixteen years ago he attended her for a bad attack of kleptomania. It was some time before she recovered, in fact it was in doubt whether she should not be sent to an asylum. In a few weeks, however, she recovered somewhat, but was always weak and ailing, mentally and bodily. Later on she suffered from neuralgia, dyspepsia, hysteria, and epileptic fits. She had continued in a like state up to the present time. He did not think he had attended her more than three times during the past year, once it was for neuralgia, and the last time for croup. He had an attendant named Hunter, who left eighteen months ago. He was quite certain that neither he nor his attendant had ordered her 10 grains of morphia. She had taken very little of it. He never recommended her to take morphia; if she wanted any, he gave it to her, but never told her to buy it. On looking into his books, he found she had not taken morphia more than three times, and not more than ½ a grain. If he was giving a dose, he should give from ⅛ to ½ a grain. It would be dangerous to give as much as 3 grains. When he supplied morphia, it was given in an ounce draught, but the strongest deceased ever took was ½ a grain. It was several years since she had morphia injected, about ⅛ of a grain, increased to a ¼ of a grain, not more. Neither by injection nor draughts had he or his assistant ever given her as much as 10 grains of morphia. He had given her hydrate of chloral, from June to July, 1878, in 15 grain doses. That was the ordinary dose, and would not be dangerous. He did not know she ever got any morphia or chloral at any chemist's shop. The last time he attended her was on Sunday, December 28, being called in for an attack of croup. He mixed some medicine for her, which he thought was consumed. He attended her after, and changed the medicine, as she had ceased to be feverish, and had had two epileptic fits. She was a person liable to go off at any time. Mr. Coleman recommended her coming to Doncaster. He (witness) knew the family, who were exceedingly respectable. He never saw anyone waited on before, as deceased had been.

By the Foreman: He did not remember anyone being able to take morphia in grains, but had known them take a quantity of laudanum tantamount to 5 grains of morphia.

By the Coroner: He did not know of bottles marked for teaspoons. The bottle produced was a 6-oz. bottle, and if he had sent it out he should have put on so much for a dose. It was impossible to say how much morphia anyone could take that had been used to it. 3 grains was dangerous for anyone to take at first, but one accustomed to it might take 5 grains.

By the Foreman: If he sent morphia he should put it in a bottle as a dose.

By the Coroner: Not on any account would he supply a bottle containing 30 grains. He did not know that a female was more susceptible to it than a male, but this woman would be very likely to suffer from it unless she had been in the habit of taking it unknown to him.

Dr. Wilson, physician and surgeon, said he was called to deceased. He was told she was subject to epilepsy, and that during the night she had had a fit. She was in a profound state of insensibility, and he could elicit no signs of consciousness whatever. He ordered various applications likely to rouse her and left. He was again summoned, and found his directions had been carried out, but still she had not recovered. Finding she was in a state of stupor deeper than she ought to be, he made inquiries. The sister went into the room and showed him a bottle, asking if it had anything to do with it, and he replied everything. Witness sent to the Infirmary for the galvanic battery and Dr. Walker. She died at 8 o'clock that night. He thought death was caused by morphia poisoning. He afterwards made a *post-mortem* examination. They found she was suffering from heart disease in a form not at all unlikely to cause sudden death. Epileptic fits sometimes cause death, but deceased did not show any symptoms.

William Walker, house surgeon at the Infirmary, was called in to see deceased. He had heard Dr. Wilson's evidence, and confirmed it. The body was well nourished, and was not at all emaciated,

By Mr. Claybourn: When he went it was too late to apply the stomach pump.

Sergeant John Thompson proved receiving two bottles, marked A and B, from the coroner. He took them to the public analyst, Mr. Allen, at Sheffield, with instructions to analyse them.

Mr. Allen, public analyst, said he received two bottles from Sergeant Thompson, and was told by him to search for narcotic poison. It was necessary to direct his attention to the point in question. He analysed the bottle marked A. It smelt of chloroform. He also found a preparation of iron, iodine, and a small quantity of morphia, but not more than ½ a grain to the fluid ounce. He did not examine that further, but analysed the bottle marked B, which he found to be a solution of morphia, containing about 5 grains of hydrochlorate of morphia to the fluid ounce. The bottle was divided into twelve parts, so that an ounce would be two divisions. When he received it, rather more than four divisions, or 2 ounces, had been used by someone. There was a little acid in the bottle. In the official authority, the Pharmacopœia, the maximum dose to be taken was ½ a grain, reckoning 4 grains to the ounce. There are 4 grains of hydrochlorate of morphia in a fluid ounce. He had analysed a bottle before containing 4 grains to the ounce, but never one so strong as that one. 1 grain of morphia was considered dangerous, and not more than ½ a grain should be given as a dose.

The Coroner, in summing up, said it was one of the most important cases they had had to consider for some time. It was only some months ago that a similar inquiry was held, and the jury then recommended that more care should be taken in dispensing medicines. The three things they had to consider, were, a case of poisoning; if it was by morphia poisoning; was there any negligence, and if so, on whose side. The Coroner concluded by saying that supposing the jury agreed that there had been negligence on the part of the druggist, was it so gross as to amount to criminal negligence; and if there had been criminal misconduct, it would be their duty to say so; if, on the other hand, they believed due care had been exercised, and that death had been caused by misadventure, it would be their duty to say so.

The jury then retired for about twenty minutes, when they returned the verdict that deceased died of morphia poison, by misadventure on the part of the sister, and gross negligence on the part of the druggist, but not so gross as to amount to criminality.

The Coroner said the verdict was an exceedingly proper one. The recommendation which was given at the last inquest had not acted in a salutary manner, and he was satisfied the druggist had not used the care he should have done.

The Coroner then reprimanded McChesney, telling him it might have been a much more serious affair. It was perfectly clear either that he did not give instructions to the sister, or she did not understand him. He hoped that in future McChesney would be more careful, as if again before a jury that fact would go hard against him. To the sister the coroner said he had no doubt she had been very kind and attentive to the deceased, but he would recommend her when she went again to a druggist's shop not to make a rash statement, and also to take care the druggist put full directions on the bottle.—*Doncaster Free Press.*

THE USE OF PATENT MEDICINES CONTAINING POISONS.

Last week Mr. St. Clair Bedford held an inquiry at the Westminster Sessions house, as to the death of Mr. Henry MacFarlane, aged 53 years, of 21, Coburg Row, Westminster, who died on Monday under somewhat mysterious circumstances.

Henry MacFarlane, the son, said his father was a horse dealer, and had been a sufferer from rheumatic gout for the past ten or twelve years. He had been in the habit of taking different patent medicines. He would always take a larger dose than was prescribed on the bottle. Witness got home at two o'clock on Wednesday, the 7th inst., and found his father had had a severe attack of the gout. The deceased told witness that "he had taken a jolly good dose of the tincture," but did not say the quantity. He then held up a 1-ounce phial labelled "Gout and rheumatic tincture." On Sunday morning the deceased complained of shortness of breath, and witness fetched Dr. Sylvester, who prescribed some other medicine. He did not get any better, and when Dr. Sylvester called on Monday morning the deceased was unconscious. The doctor then told the witness that his father was suffering from an effusion on the brain. The deceased remained insensible until his death, which occurred on Monday night.

Dr. Sylvester said he had no knowledge of the deceased previous to his being called to his residence. Witness made a *post-mortem* examination, and found excessive inflammation of the pericardium, with effusion of serum. The left ventricle of the heart was very much thickened, the aorta was diseased, and both lungs were full of serum. The abdomen and kidneys were very much contracted, and the latter were afflicted with Bright's disease of some years' standing. Death was due to Bright's disease and peritonitis.

The Coroner: Do you know the contents of the phial?

Witness: No; I do not know the contents, but if the tincture contains morphia or opium it would accelerate the death. He (witness) could certify the cause of death, but he would not like to swear that the tincture did not accelerate the death, because he thought it more probable that it had.

The jury, after some discussion, returned a verdict in accordance with the medical testimony.

POISONING BY LAUDANUM.

On Thursday, Jan. 15, Dr. Hardwicke held an inquiry at 2, Ingestre Road, Highgate New Town, as to the death of James Charles Mills, 24, who committed suicide on the previous Saturday. He was a salesman at Messrs. Ward and Crawley's, house furnishers, of Camden Town. In consequence of toothache he had been in the habit of taking laudanum for the purpose of procuring sleep. On Saturday morning he returned home, complaining of being very tired. After drinking a large quantity of laudanum, which, however, was supposed to be sherry, he went to bed, where a few hours afterwards he was found in an insensible condition. He gradually got worse, and died from poisoning by laudanum. The jury returned a verdict that the deceased committed suicide while of unsound mind.—*Times.*

WRONGFUL USE OF MERCURIAL POWDERS.

An inquiry has been held at Okehampton into the circumstances attending the death of Lilian Drew. It appeared from the evidence that the child while being treated for measles by a regular medical practitioner had had some powders administered to her by the advice of a nurse. Symptoms of salivation were manifested, and the child eventually died, and in the opinion of Dr. Walters death resulted from exhaustion produced by mercurial poisoning. It was admitted, however, by the medical witnesses that the powders might not have caused death, although they aggravated the symptoms. The jury returned a verdict that the death resulted from measles and other disorders, and requested the coroner to caution all persons not duly qualified to abstain from administering any drugs without medical advice.

Obituary.

Notice has been received of the death of the following:—

On the 5th of December, 1879, Mr. Henry Clairmont Lea, Chemist and Druggist, Hastings. Aged 76 years.

On the 15th of December, 1879, Mr. James Tennant, Chemist and Druggist, John Street, Pentonville, N. Aged 69 years.

On the 15th of December, 1879, Mr. Henry Huggins, Chemist and Druggist, Stansted. Aged 40 years.

On the 3rd of January, 1880, Mr. John Hartley Jennings, Chemist and Druggist, Burley Lawn, Leeds. Aged 52 years.

On the 6th of January, 1880, Mr. Edward James Evans, Chemist and Druggist, Llanybyther, Carmarthenshire. Aged 36 years.

On the 7th of January, 1880, at his residence, Rose Hill, Derby, Mr. Arthur Elijah Hughes, Chemist and Druggist. Aged 32 years.

On the 9th of January, 1880, at Malta, Mr. John Reginald Evans (of the firm of Evans, Sons and Co., Liverpool), of Wallace Bank, St. Michael's Hamlet, Liverpool.

On the 10th of January, 1880, Mr. Henry Limon, Pharmaceutical Chemist, Burgh-le-Marsh, Lincolnshire. Aged 48 years. Mr. Limon had been a Member of the Pharmaceutical Society since 1857.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

[381]. I had the following prescription handed me last week to prepare. How should it be dispensed the second, third and fourth weeks? State quantity of iodide for those weeks:—

℞ Iodid. Potass	grs. 100.
Spirit. Ammon. Aromat. . . .	℥j.
Aq.	ad ℥xx.

℥j ter die sd.

The iodide to be increased ij per dose every week until 80 grains are taken each day.

Two chemists' assistants I have asked say the ij means double. For myself I think the physician means ij grains per dose. Which is right? J. H.

[382]. I should like to have the opinions of any of your readers as to what should have been given for last-mentioned article in the following prescription. The powders were for a child two years of age.

Scammony	24 grains.
Jalap	24 "
Grey Powder.	18 "
Powdered Antimony	18 "

Mix. Divide into six powders. JUNIOR.

[383]. What should be used when alum. sulph. is ordered in a prescription?

W. S.

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[384]. Will some reader kindly say if the following prescription can be dispensed without separation? My customer informs me that it has frequently been dispensed in town without any separation:—

Tr. Valerian. Am. . . . . ʒij.
Ferri et Quin. Cit. . . . . ʒj.
Aquæ . . . . ad ℥viij.

Is the separation not due to the ammonia in the tincture?

Beta.

Correspondence.

Weights and Measures Act, 1878.

Sir,—As manufacturers of graduated glass measures, we have carefully read the reports of your meetings to learn all that was possible respecting the above Act.

We found that at the Evening Meeting of the Pharmaceutical Society on December 3, 1879, Mr. Greenish stated that he had four dozen and eight measures verified, for which the inspector charged halfpenny each. We have applied to the inspector for our district and he states his fees are *halfpenny* for *each line* on the measure. The President stated at the same meeting that he had been confirmed at the Standards Office in the idea that an 8 oz. measure might be graduated in ounces, half ounces and drachms, and that it was fully provided for in the Act that a 6 oz. measure should have graduations from half drachm up to full measure. We have been informed by our inspector that he will not verify either 6, 8, 12 or 16 oz., and no size above 20 oz. measures. The sizes that he will verify must be graduated quite different to the present method. A 4 oz. measure on the drachm side must have a line only at ½, 1, 2, 3, 4, 8 and 16 drachms, and no lines above the 16. On the ounce side the graduation would be the same as at present, excepting that the 1½ oz. line would be removed. According to his opinion also the 1 oz. and 2 oz. measures are to be treated similarly, no measure showing a line for 6 drachms—whilst the 20 oz. measure must have lines only at 1, 2, 3, 4, 5, 10 and 20 ounces, "only seven lines on each."

Can any of your numerous readers kindly inform us if our inspector is correct in his interpretation of the Act, as it seems very hard on all the chemists and druggists throughout the United Kingdom that their measures, although quite correct, should not pass the inspector through not being graduated as above? Can they also inform us if the use of "fl. oz." and "fl. dr." on each measure in place of the present symbols for fluid ounces and drachms is compulsory, also if it is a correct rendering of the Act to charge a halfpenny per line for testing, as, if so, it will cost fourpence halfpenny to verify a 4 oz. measure, there being nine lines on each? We also consider it very hard that all the grosses of graduated measures we have in stock should be rendered quite useless for home trade, through not being graduated in what we venture to call, as practical graduators, an awkward way. Dispensers, too, will frequently have to use two measures to get one quantity, say for instance, six drachms, besides hampering trade by so greatly increasing the cost. Finally, the present inspector only attends his office twice a week for three hours a day. How is he to verify the grosses of measures that we alone would require verifying?

J. H. McIntyre and Sons.

The Electric Light and Paper Carbons.

Sir,—The appearance in your issue of 17th inst. of the long letter on Edison's recent doings in electric lighting, prompts me to send you a note on this subject. It will interest many of your readers to know that as regards the use of paper carbons, the point now made most important by Mr. Edison or his friends, this versatile American has been forestalled by an English electrician and pharmacist. More than twenty years ago my friend and neighbour, Mr. Joseph W. Swan, expressed to me his conviction that incandescence lamps would ultimately prove better than the electric arc, and that carbon would probably be the best material to be rendered incandescent by the current. He worked for some time upon this subject, producing his carbons from paper and card, and I remember many years ago taking up one of his paper carbons under the impression that it was a piece of watch spring. It was of a steel grey colour, sonorous, and sufficiently elastic to bear slight flexure if carefully handled. With these carbons he obtained a beautiful and steady light, though not a durable lamp. They were used, as Edison has recently used them, enclosed in an exhausted vessel, and included in the voltaic circuit, but Mr. Swan's difficulties, like those which Mr. Edison is now experiencing, showed that to obtain and maintain a satisfactory vacuum was more important and more difficult than to produce carbon ribbons from paper and card. I am glad to add that Mr. Swan's recent experiments give promise of ultimate success, and that not far distant.

Grey Street, Newcastle. Barnard Proctor.

"Unknown to the Seller."

Sir,—The opinion expressed by the Wigan coroner, reported in the Journal recently, introduces another difficulty in connection with the retail trade and induces me to ask what is understood by the words used in the 17th section of the Pharmacy Act, 1868, "unknown to the seller," and "known to the seller." In large towns, where there is a class of operatives, these are so constantly removing that it is almost impossible to say more than you know them by sight, and this term can with great propriety be applied to others who have been occasional customers for years, when they required a simple medicine; and although I know that they do reside somewhere in the neighbourhood (perhaps under some officers in charge of the building), yet if they asked for Battle's vermin killer and took it with the intention of committing suicide, and did accomplish their purpose, according to Mr. Rowbottom I should have acted "carelessly" in supplying it.

Whilst admitting the necessity for due care in the sale of poisons, I cannot suppose that it was intended to fetter our business with such stringent restrictions as to make it almost impossible to carry on a retail trade.

Observer.

Errata.—On p. 572, col. i., line 22 from bottom, *for* "sulphate of lime" *read* "tartrate of lime." On p. 579, col. ii., at the end of the equation in Mr. Williams's reply to query 633, *for* "$4\,H_2O_4$" *read* "$4\,H_2O$."

H. B. L. B. (who should have sent his name and address). —It is not compulsory to pass an examination before practising as an analyst. The answers to your other questions would be so dependent upon circumstances of which we are ignorant that we cannot give them satisfactorily.

H. S. S.—See the article on Syrup of Lactophosphate of Lime in the number for the 10th inst., p. 544. For the preparation of ipecacuanha see the paper by Dr. Duckworth, on the "Pharmacy of Ipecacuanha," in vol. ii. of the present series of this Journal, p. 721.

"*An Apprentice.*"—A recipe for "inseparable lime juice and glycerine" has been given in the Journal for June 14 last, p. 1032, as well as in other places.

"*Quæro.*"—(1) Royle's or Garrod's 'Materia Medica and Therapeutics' would possibly suit you. (2) Proctor's 'Lectures on Pharmacy' or Parrish's 'Practical Pharmacy.'

"*French.*"—(1) *Petit Moniteur de la Pharmacie*, the office of which is at 6, Rue Gît-le-Cœur, Paris. (2) We cannot say, but possibly your object might be attained by the cautious use of a depilatory.

T. O. Owen.—See the communication on "Distilled Essence of Lemon," by Mr. J. Moss, published in the Journal for March 29 last, p. 798.

C. L. H.—Species laxantes St. Germain (Gray's Suppl.). —Senna leaves exhausted with spirit, ℥iv; elder flowers, ʒiiss; fennel seeds, anise seeds, āā ʒx. Weil cut and bruise them and mix together, and when dispensing add purified cream of tartar powdered, ʒvj.

Communications, Letters, etc., have been received from Dr. Downes, Messrs. G. Cormack, Macnaught Bros., Howie, Reynolds, Flynn, Eyre, Mallen, Williams, Umney, Miller, Junior, Mot Rekla, W. R.

"THE MONTH."

Cold frosty air and biting north-easterly winds are still the order of the day, and the ground seems too hard and dry to allow even the earliest flowers to burst through its frozen crust. Even the winter heliotrope is far behind in its appearance, and the christmas rose is rarely to be seen. At the time of writing, however, a specimen in bud of the *Helleborus fœtidus* has been forwarded by a Kentish correspondent. The small number of flower buds and the frost-bitten appearance of the leaves of this specimen show that winter has dealt hardly with it even in that favoured "garden of England."

In the Botanical Gardens at Regent's Park, the boldo tree is now in blossom; also, the winter's bark tree, whose handsome clusters of snow-white flowers contrast admirably with the dark green foliage. A species of eucalyptus and one of the cardamom plants, *Amomum angustifolium*, are also in blossom in the Economic House, but the Herbaceous Ground presents so blank an appearance that skating rather than botanizing appears to be the most attractive pursuit to those pharmaceutical visitors who have the good fortune to obtain admission.

The subject of the dormant vitality of seeds must always possess some interest for pharmaceutical readers, since it has a bearing upon the cultivation of henbane. In a recent number of the *Garden* a correspondent gives an instance which came under his notice, in which the seeds of several species of *Solidago* apparently remained dormant for twenty years. The ground had been covered with shrubs and carefully kept free from weeds during that time; at its expiration the ground was cleared, and two years afterwards it was covered with specimens of *Solidago* three or four feet in height.

In the *Gardeners' Chronicle* a correspondent calls attention to the poisonous properties of the berries of *Solanum Dulcamara*. Eight animals out of a flock of healthy (?) sheep pined away and died after eating the plant, and there was found in their stomachs only dulcamara besides the turnips; on removal from the field no more died.

In the same paper, Mr. C. U. Dod remarks that he recollects a boy of twelve, at a boarding school, whose life was but just saved by emetics within an hour of eating nightshade berries. On the other hand, the editors of that journal say that the berries of *S. nigrum* have been eaten as tomatoes with impunity.

Bentley and Trimen in their 'Medicinal Plants' state that "the action of dulcamara is unknown, and that several physicians have given the preparations of dulcamara in very large doses without any obvious effects." In Gerarde's time it was evidently used in medicine as a resolvent; the celebrated Boerhave considered the young shoots superior to sarsaparilla; while Linnæus recommended it as a remedy for inflammatory diseases, fever and rheumatism, and does not appear to have regarded it as poisonous.

The black nightshade, *Solanum nigrum*, however, has had a bad reputation, Floyer having stated that thirty of the berries killed a dog in three hours. Dr. Swain Taylor also observes that the berries of the *Solanum nigrum* have in one instance, at least, produced very serious effects on children who have eaten them. The children complained of headache, nausea, vertigo, colic and tenesmus. One child died in the acute stage, and two others, apparently from secondary consequences, during treatment. He denies, however, that the effects of the plant on the system are as dangerous as they are generally supposed to be. On the other hand, one hundred and eighty ripe berries of the plant have been given by Duval to a dog, and in another experiment six ounces of a watery extract, without any ill effects resulting. Orfila also relates that he found the extract of the plant to have a very feeble effect as a poison.

Amidst these conflicting statements it is difficult to arrive at the truth, and it seems a blot on the escutcheon of the medical profession that the knowledge of the medical properties of two of our commonest wild plants should still remain undefined. It would be interesting to determine whether a poisonous property is contained in the seeds and not in the pulp of the fruit, whether it is more powerful in certain seasons than in others, whether the poisonous effects occasionally produced are due to idiosyncrasy, or whether other plants have been mistaken for *Solanum*. In the case of sheep poisoning above mentioned, it is within the limits of possibility that belladonna, or other herbs poisonous to sheep, might have grown in the same field, and that death might have been due to their eating such plants. In a case of sheep poisoning which occurred in a particular meadow on a farm in one of the southern counties, the plants by which the sheep were poisoned were found to be *Ranunculus Flammula* and *Hydrocotyle vulgaris*, plants which are almost sure to be abundant in damp pastures in the hedges of which *Solanum Dulcamara* loves to grow. Woody nightshade is such a common plant that it must very frequently be within the reach of both sheep and children, and it is certainly remarkable that cases of poisoning by it are excesssively rare. Observers in the country might possibly be able to find out whether the berries of these plants are eaten by birds.

A correspondent of the *Garden* points out that although the plants of *Cotoneaster microphylla* and other bushes in the neighbourhood are quite cleared of berries, those of *Cotoneaster Simmondsii* remain untouched by them, another illustration of the fact that different species of the same genus may, like those of the genus *Aconitum*, possess very different properties.

More than twenty years ago Professor Bentley pointed out the differences between aconite root and horseradish,* in consequence of the former having been mistaken for the latter with a fatal result. The two roots are so totally unlike in almost every respect that it is difficult to comprehend how even a cook could mistake the one for the other. Nevertheless on Christmas day last, a farmer and his family, at Malmesbury, partook of the scraped root of aconite, and the wife succumbed, in spite of medical aid, to its deadly properties.

Under proper treatment, however, aconite is by no means one of the most fatal poisons. In the *British Medical Journal* for December 27, an account is given of recovery after taking a teaspoonful of linimentum aconiti, a quantity nearly equal in strength to an ounce of the B.P. tincture. It cannot be too widely known that after an emetic has been given, or the stomach pump used, the antidotes to aconite poisoning which have been found most effectual are strong stimulants, such as ether, brandy, ammonia, etc.

* *Pharm. Journ.*, [1], vol. xv., p. 449.

The economical, but dangerous custom of putting the sprouting top of the horseradish root back into the ground after it has been used, when, from the scraping it has been subjected to, it would have the conical shape and little more than the size of aconite root, has probably led to the sad mistake which has recently occurred. In connection with this subject it may be interesting to note that an Indian species of aconite root, called "wakhma,"* and supposed to be obtained from *Aconitum palmatum*, has a peculiar odour slightly resembling horseradish when dried, and probably in the fresh state also. This odour Dr. Dymock, in his paper, likens to that of the garden nasturtium which, as is well known, smells like plants of the cruciferous order. It would be worthy of inquiry if any of the species of aconite cultivated in gardens in this country have roots possessing a similar odour to that of horseradish.

The interesting researches of Dr. Pringsheim on the function of chlorophyll were briefly referred to in the last "Month," and subsequently a fuller abstract was given in this Journal.† In reference to these notices a letter has been received from Dr. A. Downes, of Chelmsford, claiming that, in a paper by himself and Mr. T. P. Blunt,† communicated to the Royal Society in October, 1878, on the Influence of Light upon Protoplasm, which was a continuation of their research upon the effect of light upon bacteria and other organisms associated with putrefaction and decay,‡ Dr. Pringsheim has been anticipated in the observation that chlorophyll acts as a protective substance to the protoplasm against the injurious influence of the light by diminishing the amount of combustion. In that paper it was recorded that sunlight in the presence of free oxygen destroyed bacterial life by effecting the gradual oxidation of the constituent protoplasm of these organisms, and it was argued that it would be unreasonable to suppose that this protoplasm is so essentially different in its fundamental composition from other protoplasm that this special action of light should be found in connection with it only. But it is pointed out that, nevertheless, protoplasm may be very differently circumstanced in its relations to light and oxygen, in that it may be protected, and among the forms of protection mentioned is that of "special colouring matters, which filter out the more injurious rays." Dr. Downes says that when this sentence was written the protective function of chlorophyll was very prominently in the authors' minds.

Professor Planchon has recently contributed an interesting communication to the *Journal de Pharmacie*, in which he shows that great similarity of structure exists in the stem and bark of several species of *Strychnos*, including the hoang-nan of China, the m'boundou poison of West Africa, *Strychnos Nux-vomica*, *S. Castelnæ* and *S. Colubrina*. The bark consists of an outer corky layer of rectangular cells; next a zone, consisting of elongated cells filled with reddish matter, then a zone of sclerogenous or stony cells, and, lastly, the liber tissue. In the bark of the species yielding curari this stony layer is more developed than in others. The wood is marked by the presence of large lacunæ, which at first sight might be mistaken for vessels. In one species, *S. Colubrina*, the lacunæ do not at first appear to be present; but upon microscopical examination they are found to exist, and to be filled with what seem to be white silky fibres, though really consisting of matter secreted by the plant in the interior of the lacunæ, as may be seen from the resinous deposit which is found in a rudimentary state in several other species. It may be hoped that M. Planchon will continue his researches, and endeavour to show in which part of the bark the curarine is more especially developed.

According to the *Journal de Pharmacie* one of our common weeds, *Arenaria rubra*, L., perhaps better known in this country under the name of *Lepigonium rubrum*, Fries, has recently been brought into notice in France by Dr. Boureau, of St. Lazare, as a remedy for cystitis, vesical catarrh, hæmaturia and gravel. The results obtained from its use have led him to the conclusion that its diuretic properties will cause it to become an important agent in therapeutics. It has been known for some time in Malta and Sicily, and was introduced by a Maltese into Algeria about twelve years ago; it was there experimented upon by Dr. E. Bertherane, whose paper in the *Bulletin de la Société des Sciences d'Algérie*, 1878, appears to have attracted attention in France. It has been analysed by M. F. Vigier, a Parisian pharmacien, who attributes its action to the large proportion of alkali and the resinous aromatic principles it contains; but as the distillate was decidedly ammoniacal there seems to be a possibility of its containing also an easily decomposable alkaloid. M. Vigier considers the best pharmaceutical preparations to be a decoction and an aqueous extract. Inquiries as to the probability of a demand arising for it in this country having recently been made, it may be well to mention that the plant is a common littoral weed in England, and that if gathered on our southern shores it is likely to be scarcely, if at all, inferior to that obtained from Algeria.

Another new Californian drug has been introduced to notice in the United States. It is called "yerba mansi," and is the root of *Anemopsis californica*, Hook., a plant belonging to the natural order Saururaceæ. It is used as a remedy for venereal sores and swellings. As might be expected in a plant so nearly allied to the pepper family, the root possesses an aromatic pungent taste. Its properties have been found by Mr. J. U. Lloyd to be due to a volatile oil heavier than water and to an astringent substance. He could find no trace of alkaloid or resin. The active principles of the plant are yielded to alcohol.

In the *American Journal of Pharmacy*, Professor Maisch gives an account of experiments performed in the laboratory of the Philadelphia College of Pharmacy, which he believes to furnish confirmation of his former statement in February, 1876, that gentian root does not contain tannin. Further experiments upon the fresh root are to be undertaken and it is hoped that by aid of the results obtained this moot point may be definitely settled.

Dr. T. Peckolt has examined the volatile oil of *Myroxylon peruiferum* and finds that its sp. gr. is 0·892 at +13° C., and 0·852 at +15° R. and that it has a pleasant aromatic odour resembling sassafras. The action of combined nitric and sulphuric acid on it produces a resinous mass of a brown colour and a mild aromatic musky odour, a gramme of oil yielding 0·60 of the resin, which is said to be well adapted as a substitute for musk. The *Myroxylon peruiferum*, L.f., must not be confounded with *M. Pereiræ*, Klotsch.

* *Pharm. Journ.*, [3], vol. viii., p. 23.
† See before, pp. 501 and 561.
‡ See *Pharm. Journ.*, [3], vol. viii., p. 512.

which yields balsam of peru. The former is a native of South, not Central, America, and yields a resin resembling balsam of tolu, but not containing any crystals of cinnamic acid. It is known at Buenos Ayres under the name of "albahaca."

In the *Pharm. Central.*, Oct. 30, a mixture of Siam benzoin, pitch, salicylic acid, gurjun balsam and absolute alcohol is recommended as a cheap substitute for balsam of peru, which it much resembles. It is especially adapted for healing wounds, and for use in veterinary practice; it goes under the name of "balsamum salicylico-benzoinatum."

To a limited number of persons sneezing appears to be a pleasant operation, but those who find it excessively disagreeable will be glad to learn of a simple and cheap remedy, made known in the *British Medical Journal* by Mr. S. M. Bradley, surgeon to the Royal Infirmary at Manchester. It consists in placing a loose plug of cotton wool in the nostrils. In hay fever, in a dusty atmosphere, or in those stages of catarrh in which a cold atmosphere is irritating to the mucous membrane of the nose, this simple application is said to give immediate relief.

An Italian correspondent of the *Lancet* calls attention to an insidious and frightfully fatal disease called "pellaga," of which no less than 97,000 Italians are said to be dying at the present time, the number of victims representing 3·62 per 1000 of the whole population, and in the infected departments, especially in Lombardy and Venice, a higher proportion than ever occurred during the worst cholera epidemic in France. The disease usually runs a slow course, like consumption. Its cause is believed to be the exclusive consumption as food of maize in a deteriorated condition and the unhealthy state of the hovels in which the rustics live.

Another case of fungus poisoning has recently occurred at Lynn, in Norfolk, in which the patient died. The case is a very interesting one from a botanical point of view, since the fungus eaten, *Amanita phalloides*, is nearly allied to the *Amanita muscaria*. It seems to have acted as an irritant poison, and not in a similar manner to the *A. muscaria*. Fortunately for the advancement of scientific knowledge, the case fell into the hands of an accomplished fungologist, Dr. C. B. Plowright, so that the symptoms produced can be traced to a known fungus. The species eaten in this case is an especially dangerous one, as it has a pleasant taste resembling that of the mushroom. Only half an ounce appears to have been eaten on an empty stomach, but no symptoms were produced until after a lapse of twelve and a half hours.

In a paper on the destruction of obnoxious insects, by Dr. Hagan, professor of entomology at Harvard University, he states that the application of yeast on insects produces in them a fungus which proves fatal to the insects. In an experiment made by Mr. J. H. Burns,* all potato beetles sprinkled with diluted yeast died on from the eighth to the twelfth day and the fungus was found in the vessels of the wings. Most persons must have noticed dead flies stuck to the window panes in the autumn by a fungus or mould which has caused the death of the insect. In proposing, as Dr. Hagan does, to use yeast as an insecticide, he has struck on a new plan of destroying enemies that are intangible by ordinary means. A great deal more is required to be known, however, of the relations between various microscopic bacteria and fungi, such as mucor, before it will be wise to fill the atmosphere of our houses with fungoid germs, lest the remedy be worse than the disease. It has been remarked by many people that in years when cholera was prevalent in this country there were very few house flies to be seen.

* *Nature*, December 25, p. 188.

At the drug sales recently, a fine specimen of the leaves of *Cassia obovata* was offered, probably from Barcelona. Calabar beans and jaborandi of good quality were more abundant than usual, and condurango bark, which appears to have no sale in this country was again offered. A small variety of cardamoms, bleached perfectly white, the roots of *Cyperus esculentus*, senega containing vincetoxicum root, and aricine bark (*C. pubescens*), were also noticed. Siam benzoin in the tear was offered in unusually large quantities.

Within the last few weeks, also, a very fine sample of pale bark in quills was offered at the drug sales under the name of Loxa bark, but the price bid for it upon the basis of experience as to the usual composition of this bark was small, and as it had been ascertained that this particular parcel contained an unusually large amount of quinine it was withdrawn from the sale, and when put up afterwards at the bark sale it realized four shillings a pound.

The fate of this bark in the drug sales serves to illustrate how much need there is for revising the Pharmacopœia standard of officinal bark. At present external appearance is thought more of than anything else; bark presenting the characters of flat calisaya or yellow bark will always sell, whether it contains quinine or not, and, generally speaking, the bark of this kind now met with in the market does not contain anything like the amount of quinine indicated in the Pharmacopœia as proper, while a great deal more contains none at all. The Loxa bark above referred to, contained 1·75 per cent. of quinine, with 0·61 per cent. cinchonidine and was therefore well calculated for pharmaceutical use.

Lately there have been several parcels of bark containing aricine offered, and although they all agreed in being totally destitute of any of the usual cinchona alkaloids, they have been sold at good prices. It is somewhat difficult to conjecture what use such bark as this can be put to, for it is not only without even cinchonidine or cinchonine, but is also without the bitterness characteristic of the poor kinds of bark that are useful in making liqueurs, although they may not have much medicinal value.

A communication from Mr. Murrell on the use of nitroglycerine in angina pectoris, which appeared a few months since in the *Lancet*, has created some demand for medicinal preparations of this compound. The appearance, therefore, in the *Practitioner* for the present month, of an article by Mr. Martindale on the difficult subject of its pharmacy is very timely. Mr. Martindale has made the important observation that nitroglycerine is readily soluble to the extent of 15 per cent. in almond or olive oil, and he is of opinion that a 1 per cent. oily solution would in many cases be preferable for medicinal use to the alcoholic solution of the same strength, it being stable, non-volatile, uninflammable and perfectly inexplosive. Nitroglycerine is also readily soluble in melted cacao butter, but care is necessary to prevent, by frequently shaking the solution, a separation during the cooling of the fat. To such a medicated fat of definite strength sugar may be added, and the mass may then be rolled into pills, and varnished.

It being usually desirable, however, to obtain the effects of the nitroglycerine as quickly as possible after administration, a more convenient plan is to add the cacao butter mass to chocolate paste, mix well with the aid of heat, and then roll out and cut into lozenges, which may be made to contain each one-hundredth of a grain, or more if required.

In *New Remedies* for this month a new suppository mould is described and figured, which has the advantage of compressing the suppositories while the mould is opened and thus preventing their breakage when made of cacao butter or other material of a friable character.

In the same journal is described a new tincture press, of a different character to any hitherto in use, which has recently been patented by Mr. J. G. Baker of Philadelphia. Professor Remington considers it to be well adapted to expressing tinctures of bulky drugs, such as arnica flowers, hops, etc.; "the only class of drugs for which it cannot be successfully used are those in very fine powder and such as are of a sticky or tenacious character." The materials are supplied to the press through a funnel, and fall on a screw which works in a horizontal direction in a tapering tube, at the end of which they are delivered quite dry, while the liquid passes through a perforated false bottom in the tube. By this means the use of press cloths is avoided, and the residue is not dry on the surface only and moist in the interior, but is uniformly dry throughout.

In a note upon vanillin, in the *Chemiker-Zeitung* (Dec. 18 and 25), by Messrs. Haarmann and Reimer, regret is expressed that consumers of vanilla have been so slow in adopting the use of the vanillin prepared artificially by the oxidation of coniferin. On more than one occasion, however, statements have been quoted in this Journal which, if correct, would fully explain this, to the effect that the artificial vanillin does not truly represent all the aromatic principle of vanilla. Nevertheless, in the present article the authors maintain that the artificial vanillin is not to be distinguished from the natural principle for which vanilla is valued, it being identical in melting point, crystalline form, smell, taste, and chemical reactions, whilst it can be produced much more cheaply. The amount of vanillin in vanilla varies from ½ to 2 per cent., and it is estimated that the annual consumption of vanilla amounts to at least 50,000 kilograms yearly, at a cost of £150,000. This the authors claim would be fully represented by 1000 kilograms of vanillin, costing £70,000.

At the meeting of the Chemical Society on the 23rd inst. Dr. Pavy brought forward a modification in connection with the test for sugar by the reduction of cupric oxide, which promises to be of service where the test is only occasionally used. In order to obviate the inconveniences accompanying the keeping of the usual test solution for any considerable time, he has sought for a method of bringing a mixture of the dry ingredients into a coherent mass so that they might be kept in solid form. This has now been effected under his directions by means of pressure, and the product is a sort of pellet, which when placed in about 3 c.c. of water and heat applied yields the clear deep blue liquid constituting the ordinary cupric test solution.

In a paper read before the Royal Society on the 13th inst., Dr. E. J. Mills claims to have observed a new order of chemical phenomena, which he has provisionally designated "chemical repulsion." If a thin layer of solution of baric chloride be evenly distributed between two plates of glass, placed horizontally, excess being removed by pressing the plates together, and then dilute sulphuric acid be brought into contact with it through a perforation made in the upper plate, precipitation takes place and continues progessively and uniformly from the perforation as a centre; forming an increasing circle, for instance, if the perforation be circular. If the sulphuric acid be introduced through two perforations in the upper plate, two circles are formed, but as their circumferences approach each other development is retarded between the perforations, the figure of advance being no longer circular but oval, and however long the experiment may be continued there always remains a line of demarcation of "no chemical action" between the two figures. When there are perforations at the four points of a square and one in the centre, the centre circle, having as it develops no way of escape from the surrounding four, eventually forms a square figure bounded by repulsion lines. Dr. Mills considers that the phenomena observed afford proof of two propositions—(1) that chemical action can take place at a distance, and (2) that two or more chemical actions, identical except in position, completely exclude one another.

The public has been so surfeited during recent years with the wonders of science that even the announcement simultaneously from both sides of the Atlantic that the track has been struck which might lead to the artificial crystallization of carbon in the diamond form fails to excite an exuberance of surprise. One of these claims, and the one most worthy of notice, has been put forward by Mr. Mactear, of the St. Rollox Chemical Works, who announced at a meeting of the Philosophical Society of Glasgow, in December, that he had produced artificially what he believed to be diamonds, but which, until further tested, he preferred to describe as a pure crystalline form of carbon. These crystals were said to have the crystalline form and possess the refractive power of diamonds, also to resist the action of acids and alkalies and the intense heat of the blow-pipe. This claim was at first somewhat summarily dealt with by Professor Maskelyne, in a characteristic letter addressed to the *Times* and *Nature*. That gentleman, having had "a few microscopic crystalline particles" handed to him as representing the product, submitted them to examination and found that when rubbed between topaz and sapphire they were crushed without producing abrasion; that they behaved towards polarized light in the manner of a birefrangent crystal; and finally, that the particles resisted all attempts to burn them. From these and other experiments Professor Maskelyne had no hesitation in declaring that Mr. Mactear's "diamonds" were not diamonds, but consisted of some crystallized silicate, possibly one resembling augite.

Mr. Mactear, however, was not so easily put down, and replied, affirming in the most positive manner that he had been able to produce carbon in the diamond modification, and that of this he did not despair of convincing Professor Maskelyne; meanwhile, he asked the scientific world to suspend its judgment. In addition, Mr. Crookes, in the *Chemical News* of the 9th inst., stated that some of Mr. Mactear's particles when submitted to the molecular discharge in a high vacuum showed phosphorescence similar to that manifested by Brazilian diamonds under similar conditions. Almost simultaneously, on the 8th inst., appeared another letter from Professor Maskelyne, in which he acknowledges, after working during several hours with Mr. Mactear, that without altering his opinion with respect to that part of the product he had previously examined, he had now seen other portions, differing in properties and worthy of further investigation, which he believed bore out the claim that topaz and sapphire had been scratched with them. In fact this letter was followed by a certificate signed by four experts, testifying that a diamond had been scratched, and rubies, sapphires, an amethyst and a cairngorm had been engraved with Mr. Mactear's "crystallized carbon sand." However, eventually, in a letter published on the 16th, Mr. Mactear admits that the substance he had looked upon as crystallized carbon was not so, but consisted almost entirely of silica, alumina, magnesia and a residue insoluble in hydrofluoric acid, which when fused with caustic soda still contained minute crystalline forms and particles of what was assumed to be carbon in some graphitic form; in fact, that it was probably a mixture of substances of the nature of sapphire, spinel, and possibly corundrum, with graphitic carbon. But notwithstanding his present failure, Mr. Mactear believes he is on the right track, and is encouraged by Professor Maskelyne to pursue his research. Meanwhile, he claims that the production of such a hard crystalline substance is likely to be successful from a commercial point of view, as it might replace diamond dust in many of its uses in the arts, it being producible at a moderate cost.

Incidentally, this result appears to have thrown some doubt over the trustworthy nature of the inferences drawn from phosphorescent phenomena in a high "vacuum," inasmuch as the crystalline particles ascertained to consist of silica, alumina, magnesia, etc., manifested a behaviour similar to Brazilian diamonds. Chemical inferences from physical phenomena, as in this case and in spectroscopic observations, appear therefore to be questionable, just as the inferences drawn from certain phenomena of a pretended supernatural order have been shown to be untrustworthy by the recent "capture of a spirit," called up by a young lady upon whom a distinguished philosopher is said to have been experimenting for years without being able to detect any deception.

The other claim has somewhat of pathetic interest attached to it. A frog, impatient of confinement in a frogarium, threw off restraint, and, like his brother of nursery fame, went on his travels, but only like him to come to grief, being found some time after starved to death and shrunk to half his original proportions. Froggie's former jailor, a Dr. W. B. Fletcher, being of an inquiring turn of mind, submitted the body to dissection, and coming to the lungs found these organs clogged with thousands of black crystals which looked like coarse gunpowder, but under the microscope presented facets with smooth surfaces, presenting the same angle of crystallization as the diamond. On burning they gave off carbonic acid gas and are represented to have been pure crystals of carbon, in fact, it may be supposed, black diamonds. Theorizing upon these results Dr. Fletcher suggests that in the lungs of huge reptiles of the antediluvian period dying under similar conditions there may have been formed large crystals of carbon which afterwards became transformed into lustrous diamonds. Remembering the very severe rebuke referred to in these columns last month, it is perhaps rather venturesome to ask whether this is a specimen of "quiz."

The announcement respecting Mr. Edison's alleged success in solving the problem of the general application of the electric light, which was included in these columns last month, has since been supplemented by some very interesting—though rather highly coloured—information respecting the work done in this direction at Menlo Park and in other parts of the States. But it turns out that the success at present is one that has rather been attained than maintained. It is found that in many of the lamps the carbons, after a time, become destroyed, though whether by the oxygen in the residual millionth of an atmosphere, to which degree the exhaustion of the globes is said to be effected, or by the impairment of the vacuum by the access of air through minute imperceptible fissures formed during variations of temperature in the glass, is yet a subject of dispute. Moreover by the substitution of incandescent carbon for incandescent platinum the number of lights maintainable per horse power is considerably reduced and the expense thereby increased. In fact, Mr. Edison seems to be at present foiled by difficulties that have hitherto baffled other investigators, and amongst them, as appears from the letter of Mr. Proctor in last week's Journal, is Mr. J. W. Swan, of Newcastle, one of our own craft.

That a residual atmosphere in an exhausted globe is capable of manifesting considerable activity is shown by the result of an investigation recently reported by Mr. Swan to the Newcastle Chemical Society, as to the nature and cause of the deposit which takes place on the sides of the vessel when carbon is heated to incandescence by the electric current. Such a deposit was examined a short time since by Mr. B. S. Proctor, and pronounced to be chiefly carbon, and the question arose whether the carbon had been volatilized and deposited from a gaseous form. Experiments are now said to have conclusively proved that this is not the case, but that the deposit is due to the mechanical transport of carbon particles, the residual air contained within the globe being the medium.

With the opening year the Institute of Chemistry has shown signs of life in the announcement of an examination in practical chemistry to be held towards the end of next month, and in the offer of two prizes in encouragement of original research. One prize of the value of £50, provided by the President, is for the "best original investigations involving gas analysis;" the other, of the value of £25, is provided by Dr. C. Meymott Tidy, and is for the "best original investigation on the special reactions of the alkaloids and their separation from mixtures." These prizes will be open to Associates of the Institute and to all persons (except Fellows) who shall, before the 31st of December next, have qualified for the associateship in all respects short of passing the prescribed practical examination, for which examination success in this competition will be accepted as a substitute.

This month, one of the oldest and most important of pharmaceutical journals commences its seventy-second year and one hundred and eighth volume with a new series. Its first series of six volumes appeared in the years 1809 to 1815, under the title of the *Bulletin de Pharmacie.* Then came the second series of twenty-seven volumes, published under the title of the *Journal de Pharmacie et des Sciences Accessoires.* With the third series of forty-six volumes, commencing in 1841, the present title of *Journal de Pharmacie et de Chimie* was adopted, and the fourth series, just concluded and numbering thirty volumes, was commenced in 1864.

Apropos of scientific journals, a very interesting Catalogue of Scientific Serials of all countries that has been compiled under the auspices of Harvard University by Mr. S. H. Scudder includes the names of 4390 scientific serials. Of these 1128, or more than one-fourth, are published in Germany. Next comes France with 715; then follow Great Britain and Ireland with 550, the United States with 427, Italy with 333, Austria and Hungary with 308, Holland with 218, Russia with 107, etc. Judged by this standard of numbers, the preponderance of scientific periodical literature published in the German language is very marked, as it exceeds that published in Great Britain and her colonies and in the United States added together.

Not long since a remark was attributed to the German government to the effect that Germany being a civilized country regulations controlling the sale of proprietary medicines in it were not required. There would therefore appear to be a sad retrogression towards barbarism if it be true, as currently reported, that the suppression of secret and proprietary medicines is now under consideration by the German Imperial Health Department. It is said also that in Switzerland the sale of secret and patent remedies is about to be submitted to very stringent regulations.

Salicylate of soda is of comparatively recent introduction as a remedial agent, but is at the present time very extensively prescribed. It must be expected that some of its combinations in prescriptions will present difficulties such as that experienced in No. 380, where salicylate of soda is added to a mixture with quinine. If a solution of sulphate of quinine be poured into a solution of salicylate of soda, the quinine will separate, and some of it will float on the surface of the liquid and the remainder will adhere to the sides of the bottle; but a very satisfactory mixture may be made from this prescription by dissolving the salicylate of soda in a part of the orange flower water and mixing with it from two to four drachms of mucilage of acacia. The dissolved quinine being then poured in becomes thoroughly diffused through the mixture, and continues so without any tendency to agglomerate.

The dispenser should always direct his efforts to carrying out the intentions of the prescriber, and this cannot effectually be accomplished unless the active ingredients are so combined in the medicine that the patient will experience no difficulty in taking a definite quantity of each ingredient in the measured dose. Most of the difficulties that present themselves with combinations of quinine may be overcome by the addition of a little mucilage.

In the prescription No. 381, there appears to be an omission, on the part of the prescriber, of the word "grains" after "ij;" the directions as regards increase of dose would then read, an increase of two grains per dose every week until 80 grains are taken per day. As the prescription stands, each dose will contain 5 grains of iodide of potassium to be taken three times a day; this proportion, it is intended, should be that of the first week; the second week, by increasing the dose two grains, each dose would be 7 grains, and so on until it reaches 27 grains, which would be equivalent to 81 grains in the day, the closest approach to the maximum dose indicated. There does not appear to be any valid reason for the rendering of these two figures into double the dose.

No. 382 is one of those recipes, frequently met with by dispensers, which are generally considered to be copied from a family medical guide, or written by a person who has not received a medical education. Perhaps none of the recipes which come under the notice of the dispenser give more trouble than some of these. He has in these prescriptions to use great care, the names of the drugs are sometimes very puzzling, and the dose is also approaching the dangerous. Such a dose as is here ordered may be given in cases demanding prompt treatment, but the dispenser, in the exercise of his judgment, would do well to make some inquiry previously to the dispensing of the one in question. As regards the preparation intended by "powdered antimony," the antimonial powder, B.P., being an official preparation, would be the safest to use.

When alum. sulph. is ordered in a prescription, it is usual to use the alum of the B.P. It is more generally ordered as alum. sulph. than alumen. The prescribers of medicine direct their attention to therapeutics and do not always follow closely the alterations required by the progress of chemical science. There is a sulphate of alumina, made by dissolving a precipitated hydrate of alumina in sulphuric acid, which is official in the United States Pharmacopœia.

The prescription, No. 384, contains ferri et quinæ cit. with tr. valer. ammon., and necessarily the quinine will be thrown out of solution, for the most part adhering to the sides of the bottle. A little mucilage added to the water in which the salt has been dissolved previously to the addition of the tincture will obviate this inconvenience and form a satisfactory mixture. This combination of ingredients has already been commented on in the pages of this Journal; the prescription will be found September 21, 1878, p. 238, and referred to in "The Month," following p. 246, and at the same time reference is made to "The Month," June 29, 1878, p. 1045. It may again be stated here that when ammonia is prescribed with a solution of sulphate of quinine, or those combinations of quinine used in dispensing and having a place in the B.P., the quinine will be thrown out of solution in the solid form, unless diffused by means of mucilage previously added to the vehicle.

GURJUN BALSAM.

A letter received from Professor Dragendorff informs us that Mr. Hirschsohn was in error in stating in his recent paper on this subject (see before, p. 561) that one of the samples described in it as having been examined by him had been received from Professor Flückiger, it having been presented to the Dorpat Museum by Professor Hamberg, of Stockholm.

PICROTOXIN AND ITS PROPERTIES.

The recent introduction of picrotoxin as a remedy for the night-sweating which accompanies phthisis has led to some inquiry respecting the nature and properties of this drug. The following information is taken from an article appearing in the *British Medical Journal* for the 17th inst., under the title of "Recent Studies on Therapeutics:—"

Picroxtin is the active principle of cocculus indicus (*Anamirta cocculus*, the *Menispermum cocculus* of Linnæus), a plant which has been recognized as a medicine since the days of the Arabian physicians, by whom it was described under the name of "*maheradsch*." This cocculus was probably first known in Europe as a poison for taking fish, which it first throws into violent irregular motion and then stupefies. All kinds of fish are killed by it; the barbel, it is said, taking the longest to die. Fish are inordinately fond of the berries, and, when rendered helpless by the dose they have taken, are readily caught. They should be removed from the water as soon as they appear on the surface, and their bellies emptied, or their flesh may become poisonous and cause irritation if eaten. In nearly all civilized countries, the use of cocculus for this purpose is illegal. Cocculus has also been used from an early peroid by unprincipled brewers, partly for giving beer a due degree of bitterness without the employment of hops, partly to give it "bottom" and render it more intoxicating. In an old treatise on brewing, we find the following instructions:—"Three pounds of cocculus indicus to be added to ten quarters of malt, it giving an inebriating quality which passes for strength of liquor; it also prevents the second fermentation of beer, and the bursting of the bottles in warm climates." It is said to be used by thieves and bad characters for the purpose of drugging their victims.

It is a curious circumstance that, although cocculus indicus possesses such powerful and valuable properties, it has in modern times found little favour as a medicinal agent; and we cannot help thinking that its general abandonment as a remedy was a singularly unwise step. It is a valuable local application for certain forms of skin-disease. In the east, it has been long used applied externally in the form of a powder for the destruction of vermin on the skin, as well as for the cure of scabies; and, in the form of ointment, it is said by Christison to be one of the best applications for the treatment of ringworm of the scalp. Speaking of the ointment of the old Edinburgh Pharmacopœia, he said that, although it may occasionally fail to cure the eruption, it always does good by relieving the accompanying irritation. Undoubtedly a picrotoxin ointment, made with vaseline or some similar substance, would prove a welcome addition to the armament of the dermatologist. Cocculus indicus also possesses considerable value as a medicine for internal administration. A few years ago, M. Felix Planat recommended it as a remedy for epilepsy—not as a specific, but as a truly useful drug. The sole exceptions recognized by him to its curative powers in this affection are inveterate cases, whether idiopathic or symptomatic. He employs a tincture made by macerating for three weeks two hundred grammes of cocculus indicus in one thousand grammes of alcohol. Of this, he begins by giving two drops twice-a-day, and then each successive day increases each dose by one drop until thirty drops a-day are being taken. He then gradually reduces the quantity a drop at a time until the original dose is reached, when the treatment is suspended for a fortnight; after which it is renewed, and again intermitted alternately during six months. For chorea, picrotoxin is recommended by no less an authority than Gubler; and, according to Tschudi and others, it is especially useful in paralysis of the sphincters. It is also employed in various forms of dyspepsia, notably when there is severe epigastric pain aggravated by pressure or by taking food. Dr. Phillips speaks of it as being of singular service when the colon is distended with flatus, and when the bowels are constipated and the motions hard and lumpy. He also recommends it for certain symptoms associated with irregular menstruation. The administration of two or three drops of a saturated tincture of cocculus three or four times a day prior to the expected flow, and continued during the first two or three days of its progress, will frequently ward off the pains and render the discharge more natural.

Picrotoxin, or cocculin as it is sometimes called, was discovered by Bouillay in 1812; and its composition is represented by the formula $C_{12}H_{14}O_5$. It may be obtained in several different ways, details of which will be found in Watt's 'Dictionary' and other works on chemistry. It is colourless, inordorous, has an intensely bitter taste, and is neutral to test-paper. It is soluble in water, alcohol, ether, and fixed oils, and it crystallizes out from aqueous solutions in the form of beautiful stellate groups of colourless needles. In its physiological action it is most peculiar. In some respects its effects on the living organism resemble those of strychnia. Tonic and clonic spasms of great severity and violence culminating speedily in death are induced by large doses, and opisthotonos and gasping are frequent concomitants. It induces spasmodic contractions, involving first a single group of muscles, and finally almost every muscle in the body. The tetanic cramps of picrotoxin differ from those of strychnia in that the latter affect chiefly the extensors. It has been well said that the convulsions of picrotoxin more resemble the choreic, those of strychnia, the tetanic; in other words, picrotoxin exerts its influence chiefly on the cerebral contres, whilst strychnia affects the spinal.

Quite recently, Dr. Murrell has introduced picrotoxin as a remedy for the night-sweating of phthisis. He uses a 1 in 240 solution in water, and of this he gives from one to four minims three times a day, the last dose being taken at bedtime, or immediately before the time at which the perspiration usually commences. He has employed this mode of treatment at the Royal Hospital for Diseases of the Chest in twenty cases, with only one failure. The sweating is usually arrested in two or three days, and there is no return for a fortnight or more. The picrotoxin is best give alone, and not in a mixture, and it has been found to succeed after oxide of zinc, belladonna, Dover's powder, and other remedies have failed. A great advantage of the treatment is that it does not make the skin too dry, but leaves it comfortably moist, whilst not unfrequently atropia seems to parch it up. The aqueous solution is apt to deposit crystals in winter, but it soon clears up on warming.

JAPAN WAX.*

It is only about twenty-five years since Japan wax has found its way to Europe. From small insignificant samples which reached the London market about the year 1854, the quantity exported has reached very large figures at the present time. Japan as well as China produces this article, but the manner of production and even the true source of the Chinese article are still so much enveloped in doubt that no reliable data can be given. The author of the present paper, therefore, confined his investigations to the Japanese article.

Before entering upon a description of the latter, the author gives a list of such other vegetable tallows or fats as have been actually used, or might possibly be employed, as substitutes of Japan wax. The most important of these are the following:—

Carnauba Wax, also called Ceará or Brazil wax, found upon the leaves of *Copernicia cerifera*, Mart. Native of Brazil. Forms a hard brittle mass, melting at 83·5°—84° C.

Pela Wax, or Chinese wax, is produced upon the young shoots of *Fraxinus chinensis*, Roxb., by the agency of an insect, viz., coccus pe-la, Westwood. It does not reach the European market. Melts at 82·5° C.

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* Abstract of a paper by Arthur Meyer, of the Pharmaceutical Institute of the University of Strassburg. From *Archiv der Pharm.*, Aug. Reprinted from *New Remedies*, November, 1879.

Koga Wax, without doubt obtained from *Cinnamomum pedunculatum*, N. ab E., in Japan. Softer than Japan wax.

Ibota Wax, produced by an insect upon *Ligustrum Ibota*, Sieb. Very firm and white. Neither of the two latter reach Europe.

Chinese Vegetable Tallow, Stillingia tallow, prepared from the seed-kernels, or more likely fruit-capsules of *Stillingia sebifera*, Mart., in China. A rather soft, white, granular mass, chiefly used in China for making candles. Melts at 37° C.; according to the author, however, it does not melt completely, until 45° C. is reached.

Palm Wax from the trunk of *Ceroxylon andicola*, Humb., of tropical America. When crude, melts at over 100° C.

Myrica Wax, or myrtle wax, from the fruit of *Myrica cerifera*, L. Melts at 47·5°—49° C.

Japan wax may be distinguished from all of these by its physical and other properties. Formerly it was only imported in round cakes, of about 12 cm. ($4\frac{7}{8}$ inches) in diameter, and 2·5—3 cm. ($1-1\frac{3}{16}$ inch) in thickness; but at present it occurs also in square cakes, and in square blocks, the latter of about 65 kilos (143 pounds) each. When freshly broken, the fractured surface is almost white, sometimes slightly yellowish-green. At the surface they have a hoary appearance, owing to a shining, crystalline, white down. When freshly broken, the odour is tallow-like and disagreeable. Occasionally dark yellow lots occur in the market. These fetch a lower price, and have the peculiarity that they turn darker relatively much more rapidly than the white variety. After being preserved for some time in a solid condition, the melting point of the fat is at 52—53° C.; but a recently solidified sample melts at exactly 42° C. The specific gravity of the bleached substance is somewhat above that of water. Boiling alcohol of 97 per cent. dissolves it easily, but deposits it nearly all again on cooling, retaining only 3 per cent in solution. Warm ether likewise dissolves it readily, but deposits it in flakes or granular masses on cooling.

There are three principal sources of this fat or tallow in Japan, namely, *Rhus succedanea*, L., *Rhus vernicifera*, DC., and *Rhus sylvestris*, Sieb. et Zucc. The latter, however, furnishes none of the commercial product, being only cultivated in some districts of Japan for domestic use.

Rhus succedanea, L., when fully developed, attains a height of about 9 metres ($29\frac{1}{2}$ feet), and has a short trunk, reaching a circumference of about 1 metre (39·4 in.). The stem or trunk is covered with a uniform grey bark, and has a yellow wood, which contains a bright sap turning dark or black on exposure to air. The ramification is not profuse, and the leaves are placed close together at the ends of the branches. The colour of the leaves is a handsome green, turning to red in the autumn. They are about 15—20 cm. ($5\frac{3}{4}$—$7\frac{3}{4}$ inches) long, imparipinnate, and have a round, naked petiole. The leaflets, from four to six pairs, are opposite, naked, rather tender and entire. Some samples are stated to have more or less serrated leaflets. The size of these is about 5—7 cm. in length, and 1·5—2·5 cm. in width. The flowers are mostly situated in the axis of the leaves, and form broad, multiflorous panicles, which are, however, much shorter than the leaves. The flowers are diœcious, small, greenish-yellow and have a short peduncle.*

Rhus vernicifera, DC. attains a height of 8 to 12·5 metres (26 to 41 feet), and a girth of 1 m. (39·4 inch.). The bark of the trunk is grey and becomes fissured by age; the wood is greenish-yellow. The leaves make their appearance in May, and fall off about the end of October, without first turning red. Their length is up to 30 cm. (12 inch.). The leaflets are in pairs of 4 or 5, entire, and mostly opposite. The upper ones are elliptical, the lowest pair oval and somewhat smaller; all have a short pointed apex and generally an uneven base.

Neither *Rhus succedanea* nor *R. vernicifera* appear to be natives of Japan. Professor J. Rein, of Marburg, who has resided for some time in the country, thinks they are introduced from the Loochoo Islands. *R. sylvestris*, however, is a true native of Japan and does not occur elsewhere.

The fruits of the above, and of many other species of *Rhus*, have a great similarity, being a drupe or stone-fruit, which in the case of *R. succedanea* is about 7 mm. long, 5 mm. broad, and 5 mm. high. The colour of its smooth, shining epidermis, when dry, varies from a dirty bright yellow to a light brown; when fresh, it is yellowish-green. The vegetable fat or tallow is contained in firmly closed cells which are loosely coherent, and are completely filled with the fat. For this reason the fat resists, while inclosed by the epidermis, the action of solvents, such as hot alcohol or ether, and even hot water. The shell incloses the embryo very tightly, and the whole fruit may be boiled with water for a long time before any fat is extracted from it. Mr. Meyer assayed ten fruits, which together weighed 1·51 grams. They consisted of 46·45 per cent. mesocarp, 42·35 per cent. epidermis and putamen, and 8·85 per cent. embryo (with 2·35 per cent. loss). The quantity of fat extracted from the ground mesocarp by ether amounted to 20·9 per cent. of the whole weight of the fruit. The properties of the fat, whether obtained from the one or the other species of *Rhus*, are identical. It is brittle, bright yellowish-green, and has the specific gravity 0·916. It melts at 52—53° C. when old, and at 42° C. when recently solidified.* At 30° C. it is soluble in about 700 parts of 97 per cent. alcohol.

From the various statements of eye-witnesses and existing reports on the process employed by the Japanese to extract the fat, Mr. Meyer concludes that the most usual plan is the following:—

The fruits are previously well dried,† and then ground by means of mill-stones, or in mortars, with wooden pestles, or by bamboo flails. They are then freed by sifting and winnowing from shells and epidermis; sometimes, however, these latter are not separated. The mass is then heated over boiling water, in order to melt the fat in the cells, which is then expressed by means of different presses. During the second pressing, a little fatty oil is occasionally added to the mass, in order to retard the congelation of the fat. The crude tallow thus obtained is now boiled with dilute lye, whereby it becomes granular and more susceptible to the bleaching process; then exposed to the sun, and several times melted with water. The bleaching and melting is repeated until the product is pure and white.

Japan wax is chiefly used in Europe (and in the U. S.) as an admixture to beeswax in the manufacture of candles, as it facilitates the removal of the latter from the moulds; it is also used in the manufacture of wax-matches. Shoe and furniture manufacturers likewise use it in considerable quantity as an ingredient in polishing materials. For pharmaceutical purposes (ointments) it is not well adapted, since it is, like bleached beeswax, already a rancid substance, and promotes the rapid deterioration of fats mixed with it. Perfumers, however, make use of it for preparing a castor oil pomade; a mixture of castor oil and Japan wax having the peculiar property of becoming entirely transparent by repeated melting.

* For a further description of this and the following as well as for the details of the microscopical examination of the seeds, see the original, which is illustrated by two excellent coloured plates. In *New Remedies* there is an illustration of a flowering branch of *Rh. succedanea* constructed after the plate accompanying the author's paper.

* The fat obtained from the fruits of *Rhus Toxicodendron*, L., melts always at 42° C., whether old or new.

† Complete drying is supposed to be necessary for this reason, that the milk-sap of the mesocarp becomes insoluble in water, etc., only after drying in the air.

The Pharmaceutical Journal.

SATURDAY, JANUARY 31, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SALE OF POISONS.

In pointing out last week the misconception under which the coroner for Doncaster laboured in respect to the Pharmacy Act, and by which he was induced to make an entirely unfounded charge against the Pharmaceutical Society, we anticipated that this correction of his error and especially the very clear exposition of the matter by Messrs. Flux and Slade, the Solicitors of the Pharmaceutical Society, would have sufficed to convince him that he was wrong in his opinion that the Society had privately condoned offences of a grave nature, involving the destruction of human life. We were also disposed to believe that as a natural result of this demonstration of error on the part of the coroner for Doncaster, that gentleman would have lost no time in rescinding his unjust charge. Such a proceeding seemed to be not only proper in common fairness, but also to be one consistent with the official position of the accuser and requisite under the circumstances of the case.

But Mr. Shirley has not followed this course. On the contrary, he has again written a letter on the subject, which appeared in the *Times* of last Tuesday, without manifesting any sign of having been convinced of his erroneous interpretation of the Pharmacy Act. We can therefore only infer that he has not recognized his mistake and express our regret that this circumstance compels us again to refer to the subject for the purpose of exposing his errors, and if possible, making them apparent to himself. In the letter just mentioned, Mr. Shirley takes the trouble to point out that the person who incurred the forfeiture of five pounds was besides that liable under the seventeenth section of the Act for selling poison unless he did so in accordance with the regulations specified in the Act. Why he should take this trouble and thus occupy the columns of the *Times* it is not so easy to comprehend, because the statement is merely a reiteration of the information given by Messrs. Flux and Slade in the explanatory letter by which they sought to enlighten Mr. Shirley concerning the Pharmacy Act.

But though Mr. Shirley has somehow arrived at a perception of the fact that in respect to the sale of poisons there are two distinct offences contemplated by the Act, and two distinct penalties provided for their commission, he has apparently failed to perceive that there is a wide difference between the two offences so far as the powers and action of the Pharmaceutical Society are concerned. The provisions of the fifteenth section of the Act are to be regarded as mainly directed to the promotion of the objects for which a Royal Charter of Incorporation was granted to the Society, and—out of regard for the public benefit to be derived from their promotion —the Pharmacy Acts of 1862 and 1868 were passed to confirm that charter and furnish a protection to persons competent to carry on the business of pharmacy. Though the provisions of that section operate in a manner conducive to the public interest, they are at the same time principally protective of a class and the duty of proceeding against offenders under this section was therefore made the especial business of the Pharmaceutical Society. That duty was to be exercised in accordance with the objects of the charter, "for the protection of those who carry on the business of chemists and druggists." And while the funds of the Society were to be applicable for the purpose of defraying the cost of prosecuting offenders in such manner as the Council of the Society might direct, all penalties recovered by convictions under the fifteenth section were to be subject to the disposal of the Commissioners of Her Majesty's Treasury.

If there were in the Pharmacy Act no other provision for restricting the sale of poison than that above referred to, it might reasonably have been made incumbent upon the Pharmaceutical Society to exercise its powers under the fifteenth section of the Act, not specially for the protection of the class it represents, but also in all cases where the interest of the public was prejudiced. Such an extension of the Society's duties as a public guardian would have necessarily entailed its endowment with public funds adequate for the purpose. Even if such had been the duty of the Pharmaceutical Society it would have been impossible to prevent persons sued for penalties from paying the penalty incurred so as to avoid trial of the action, and in such a case there would not have been a shadow of justification for saying that an offence had been condoned without due regard to public interest, or "squared" by the payment of money.

But the important point is that in the Pharmacy Act there is other provision for restricting the sale of poison in regard to the interests of the public, and by the seventeenth section it is made unlawful to sell any poison unless certain specified conditions are fulfilled by the seller. A person committing an offence under this section is liable to prosecution at the instance of anyone who chooses to take action, and upon summary conviction is liable to a penalty of five pounds. This is altogether irrespective of the liability incurred under the fifteenth section, and the provisions thus made by the Pharmacy Act, give the public generally full power to punish offenders. The case which has called forth the strictures of the coroner for Doncaster was precisely one of a nature to be dealt with, under the seventeenth section now referred to, by those persons who were in the exercise of their official duties cognizant of the offence. If there be any blame attributable for the failure to prosecute it lies at the door of those who, knowing the facts, did not avail themselves of the power given by the Pharmacy Act, and it is not to be cast upon the Pharmaceutical Society.

But Mr. Shirley so represents the circumstances of this case in his last letter to the *Times* as in some degree to make it appear that the further prosecution of the offender was the duty of the Pharmaceutical Society. He says "that a druggist who sells poison "to a child in an unlabelled bottle asking no "questions and causing death should be punished "as the law directs." We do not demur to the justice of this proposition as it reads, but it contains a fatal fallacy which renders the inference intended to be drawn from it invalid. The assumption that the seller of the poison was a druggist is no doubt intended to suggest that his punishment was a duty appertaining to the Pharmaceutical Society; but that assumption was altogether gratuitous; he was not a druggist at all, but as was proved before Mr. Shirley, acting as coroner at the inquest, he was a grocer, and in no way qualified to deal in poisons.

It is only by means of such confusion of the two kinds of offences punishable by the Pharmacy Act that it is possible for Mr. Shirley to suggest that "the public will learn with surprise that having ex-"tracted for its own benefit five pieces of the "current gold coin of the realm called sovereigns, the "Society's functions ceased." It might more correctly be said that the Pharmaceutical Society having performed its duty of prosecuting under the fifteenth section of the Act, some other persons had failed to perform their duty by prosecuting under the seventeenth section. It is true this fact may be a ground for satisfaction in knowing that a public prosecutor is now appointed, and that in future there will be a special functionary to deal with such cases; but it affords no real ground for the conclusion that the utility of the Pharmaceutical Society is less than it is properly supposed to be, or than it it ought to be. Neither is it any reason for concluding that the action taken by the Pharmaceutical Society in the case Mr. Shirley refers to was a half measure, or anything less than it should have been according to the law both in the interests of the public and in the interests of the class it represents.

Therefore the whole of the conclusions to the disparagement of the Pharmaceutical Society and the Pharmacy Act, which Mr. Shirley considers irresistible, and has been enabled to make known by the publication of his letter in the *Times*, are in reality mere unsubstantiated fancies. Just in the same way, his assumption that the five pounds paid to the Pharmaceutical Society as the penalty for a breach of the fifteenth section of the Act was money obtained for and applied to the benefit of the Society, can only be supposed to rest upon defective acquaintance with the Pharmacy Act. Nothing therefore seems to remain for Mr. Shirley but to ponder over the provisions of that Act, and to confess with a good grace he has been mistaken. In that way he may yet prove that his zealous activity in this matter has been well intentioned, and he may serviceably contribute towards the realization of objects which others besides himself are desirous of bringing about, for lessening the liability to accidental poisoning arising either from the sale of poisons by unqualified persons or from their sale without due precaution.

THE NEXT EVENING MEETING.

An Evening Meeting of the Pharmaceutical Society will be held on Wednesday next, when the following papers will be read:—"Tincture of Senega as an Emulsifying Agent," by Mr. H. Collier; and "On the Diffusive Properties of Some Preparations of Iron in Relation to Dialysed Iron," by Professor Redwood. Some Specimens of Drugs, etc., from the late Indian Museum, which have been presented to the Pharmaceutical Society by the Government, will be placed upon the table.

CHEMISTS' ASSISTANTS' ASSOCIATION.

On Wednesday evening, the Annual Dinner of this Association took place at the Holborn Restaurant, the chair being taken by Professor Redwood. Among the guests were Professor Bentley, Dr. Muter, and Mr. Luff, and in all, the party numbered ninety-three. After dinner, several toasts were proposed and responded to, and some good songs and music were given by members of the Association. In all respects the vitality manifested by the ordinary meetings of the Association was recognizable on this occasion, and there was little reason to doubt that its members were as good at recreation and refreshments as they have proved themselves to be at work. Such Associations are calculated to be of great service in promoting the interests of pharmacy, and we cordially hope that this one may continue to maintain the prosperity and success it has already attained.

SEIZURE OF COCCULUS INDICUS.

At Revel, one of the Russian ports in the Baltic, a large quantity of cocculus indicus, imported as laurel berries, has been seized and confiscated. The chemist who detected the fraud will get half the value of the seizure, in this case amounting to several hundred roubles. With the exception of a portion retained for scientific purposes, the whole of the cocculus indicus will be destroyed.

At the next meeting of the Chemical Society, which will be held on Thursday, February 5, the papers read will be:—"Communications from the Laboratory of the Tokio University, Japan: On Persulphocyanate of Silver," by W. Atkinson; and "On Methylated Dioxethylenamines," by H. F. Morley.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

At a meeting of the Board of Examiners for England and Wales, held in London on Wednesday, January 21, 1880.

The undermentioned certificates were received in lieu of the Society's examination:—

Certificate of the University of Oxford.

Rogers, Francis Alfred ....Stamford.

Certificates of the University of Cambridge.

Keeling, Arthur Gadsby ....Walthamstow.
Daintree, Ernest ....Cardiff.

Certificate of the University of Edinburgh.

Dodds, Nicholas ....Kelso.

Certificates of the College of Preceptors.

Bacon, Edward...... ....
Benson, Colin ....Chelmsford.
Hall, William Joseph ....Belper.
Roberts, Richard Ellis............Penmaenmawr.

MEETING OF THE NORTH BRITISH BRANCH.

The third evening meeting was held in the Society's rooms, 119A, George Street, Edinburgh, on Thursday, January 22, Mr. J. B. Stephenson, in the chair. The minutes of previous meeting having been read and confirmed, the Honorary Secretary announced the following donations:—

To the Museum:—Thirty-three specimens from the Society in London, mostly drugs from North British America, per Mr. Holmes. These will be exhibited at the next meeting.

To the Library:—*The Canadian Pharmaceutical Journal* for December, from the Ontario College of Pharmacy; *The Pharmacist and Chemist* for December, from the Chicago College of Pharmacy; *The Australian Supplement to the Chemist and Druggist*, from the Pharmaceutical Society of Victoria; the *Journal of the Chemical Society* for December and January, and Balfour on the Ipecacuanha Plant, from Mr. Mackay.

Dr. Stevenson Macadam then read the following paper on—

The Presence of Arsenic in Common Things.

BY DR. STEVENSON MACADAM,

Lecturer on Chemistry, Edinburgh.

Fully eighteen years ago I drew special public attention to the extensive employment of arsenical green colouring matter in ordinary wall paper-hangings, which contained from 1 to 40 grains of arsenic in each square foot of paper. Taking 20 grains of arsenic as an average proportion, an ordinary large-sized room with 1000 square feet of wall surface would thus have 20,000 grains of arsenic, and an ordinary small-sized room with 500 square feet of wall surface would have 10,000 grains of arsenic covering the walls. Such arsenical colouring matter is in most cases more or less loosely adhering to the surface of the paper, and the dusting and rubbing down of the walls are liable to detach the pigment as a fine powder, which becomes diffused through the atmosphere of the room, and temporarily settles on the carpet, bedclothes, bed and window hangings, cornices, etc., liable to be disturbed again by the next dusting operation, any alteration of the bedclothes or hangings, or even during the airing of the room. The arsenical dust might thus be inhaled in every breath. Possibly, also, the alternate damping and drying of the wall paper in such a room, which always takes place from time to time during occupancy and non-occupancy, and even during fluctuations in the humid condition of the atmosphere, may tend to vaporize the arsenic into the atmosphere of the room. I have repeatedly tested the dust from the cornices, etc., of rooms papered with the arsenical paper-hangings, and have always found more or less arsenic in the dust.

During the last year my attention has been specially directed to the great prevalence of green colour in textile fabrics, paper for labels and boxes, artificial flowers, children's books and toys, and other common articles, and I resolved to investigate how far the green colour was of an arsenical nature. In a very large proportion of the articles examined arsenic was found more or less present, often in small quantity, but occasionally in very large proportion. The preliminary trials were made by Reinsch's process, taking care to have a blank experiment throughout, and, thereafter, various articles were selected for the purpose of the determination of the quantity of arsenic present in such. The quantitative analysis was carried on by treating the article with a dilute solution of hydrochloric acid, containing one part by volume of the acid to eight parts of water. After heating and filtration, the arsenic and copper were precipitated by a stream of hydrosulphuric acid, and the liquid filtered and the precipitate washed. Thereafter the mixed sulphides were treated with dilute ammonia, the solution evaporated to dryness, the residue acted upon by nitric acid, again evaporated, dissolved in water, and the resulting arsenic acid treated with ammonia and ammoniacal sulphate of magnesia solution. The precipitate thus obtained of the arseniate of magnesia and ammonia—

$$2(MgNH_4AsO_4)H_2O$$

was dried on a weighed filter, and the arsenic calculated therefrom into arsenious oxide.

Working in this way, I examined three samples of thin gauze cloth which were coloured of a light green tint. These cloths gave me the following results, calculated to the square foot of each of the cloths:—

	Arsenious Oxide obtained from the square foot.
No. 1 Cloth	31·72 grains.
No. 2 „	11·60 „
No. 3 „	26·60 „
Average of three samples . . .	23·31 grains.

These cloths are sold for cheap ball dresses, and for trimming dresses, and are often used for covering gasaliers, mirrors, etc., during summer weather. The price was sixpence to a shilling a yard, and consequently for a few pence, a large amount of deadly material could readily be purchased. Indeed, taking ten yards of cloth of 36 inches wide as a reasonable amount in a dress, there would be present in such a dress 90 square feet, each containing on the average 23 grains of arsenic, or in all fully 2000 grains of arsenic. Such an amount is enough to startle any one, not only in the fact of its being present in the cloth, but also in the readiness with which the poison can be so procured.

Again, I examined a large number of green coloured papers, more or less glazed, and used in covering pasteboard boxes, and in making printed and other labels for articles of food, drink and general merchandise. Indeed, a large proportion of band-boxes sent out by milliners, hatters, etc., of toy boxes, and of shop labels and tickets are more or less covered with this green paper. Three samples were taken for quantitative analyses, and they yielded as follows:—

	Arsenious Oxide obtained from the square foot.
No. 1 paper	45·40 grains.
No. 2 „	35·98 „
No. 3 „	16·22 „
Average of three samples . .	32·53 grains.

Taking the average amount of 32 grains of arsenic in the square foot, a small sized band-box with three square feet of green surface, will have about 100 grains of arsenic. An ordinary sized cracker-box with one and a half square feet of green surface will have 48 grains, whilst the small cracker-boxes, specially fitted up for children, have a square foot of green paper and 32 grains of arsenic. Even the papers of the crackers themselves are often green and arsenical, and yield 2 to 3 grains of arsenic each. The labels on tinned meats are often green and arsenical, and yield from 6 to 20 grains of arsenic each. Indeed you can scarcely purchase a bottle of any liquid or solid article of food, delicacy or stimulant, at the present time, without running the risk of getting at least one poisonous dose of arsenic on the label affixed to the bottle or package, or even on the paper in which the article is wrapped up.

I have likewise found the same poisonous green pigment on envelope wrapping bands, each containing 1 to 2 grains of arsenic; in children's picture and story books containing at least 50 grains of arsenic; in concert and ball-room cards and tickets, in artificial flowers, water colour paints, children's toys, etc. Indeed, the present rage for green colour seems so general that it is a rare thing to find a shop window where arsenical green is not present on the paper of the shelves or walls, the labels and tickets on the articles, and the wrappers or boxes containing the wares.

In domestic use also, the green colour has lately invaded the size tinting of kitchens, presses, and rooms which are size painted. Emerald green, which is sold in every painter's shop to all and sundry at a few pence per lb. contains, as analysed by me, fully 50 per cent. of arsenic; and size green, which is also sold to every one at as cheap a rate, contains from 2 to 14 per cent. of arsenic, according to the depth of the shade of green. I have tested the size colour as supplied and put on by painters on the walls of kitchens and other rooms, and have calculated that from 7 to 36 grains of arsenic are present in every square foot of wall surface.

In this communication I have limited my analyses and observations to those cases in which the arsenic was present as arsenical green in large quantity. I am aware that the same poison is present in other colours and in other states of combination than as the arsenite of copper (Scheele's green), and the aceto-arsenite of copper (Schweinfurt green), and it is probable then I may return to the subject again. But in the meantime, enough has been said to show the great prevalence of the poisonous arsenical green in common things. It scarcely admits of question that such ready means of acquiring deadly material should not be allowed in any country. Independently of the question of accidents occurring from children sucking or even eating articles containing the poison, or of parties being affected by the arsenical wall papers, or wall size paint, there is the facility for carrying out murderous designs, which ought not to be placed in the hands of a community, or be left to chance for malicious people not to take advantage of. There seems little use in a Poison Act to restrict the sale of comparatively small doses of poison, when every one can purchase in any painter's or drysalter's shop about half a pound of arsenic in the form of emerald green for sixpence, and at least a quarter of a pound of arsenic in green paper hangings for the same money; and where, without making any direct purchase at all, anyone can obtain from an old meat can, a bottle label, a grocer's wrapper, a child's picture book, a worn-out artificial flower, or a piece of an old band-box, as much arsenic as will enable him to inflict deadly injury upon himself or his neighbours.

Noxious trades cannot be carried on where the atmosphere or the water supply of a community are affected injuriously thereby, and it would seem reasonable that the wholesale trade of disseminating over the country vast quantities of arsenic should be equally amenable to and be suppressed by the strong arm of the law.

Dr. Macadam illustrated his lecture by tests, and exhibited a large number of articles in common use containing arsenic.

Mr. D. B. Dott, Edinburgh, afterwards read the following notes on "Beberia":—

Beberia.

BY D. B. DOTT.

Beberia is the principal alkaloid of the bark of the greenheart tree (*Nectandra Rodiœi*), and was discovered therein by Dr. Rodie, of Demerara, in 1834. Professor Maclagan, in 1843, showed that Rodie's beberia was a mixture of two alkaloids—beberia and siperia. In 1845, Maclagan and Tilley assigned to beberia the formula $C_{35}H_{20}NO_6$ (old notation); but it was first obtained in approximate purity by V. Planta, who gave the formula $C_{19}H_{21}NO_3$. In 1860, Walz made experiments on buxine, the alkaloid of *Buxus sempervirens*, and found it to be identical with beberia; his analysis agreeing with the formula of V. Planta. A valuable paper on the subject was contributed by Professor Flückiger to the *Neues Jahrbuch für Pharmacie* (xxxi., p. 257), of which an abstract appears in *Pharmaceutical Journal* (2nd ser., vol. xi.). He prepared his purified base by exhausting the crude alkaloid with ether, dissolving the base so obtained in dilute acetic acid, and precipitating with potash. This treatment was repeated several times until the precipitate produced was free from colour. The alkaloid prepared in this way was analysed by Dr. Kraushaar (Flückiger's assistant), and gave of carbon, 71·61 per cent., and of hydrogen, 6·73 per cent. The platinum compound gave 19·22 per cent. of platinum. The chief point of interest in Flückiger's paper is, however, his identification of the alkaloid pelosine with beberia.

Pelosine was discovered by Wiggers in 1838, and found by Bödeker to answer to the formula $C_{18}H_{21}NO_3$. Flückiger prepared pelosine from the bark of *Cissampelos Pareira*, L., and found that its reactions were in all respects the same as those of beberia, and he was quite unable to detect any difference between the two bases. An analysis gave 72·09 per cent. of carbon, and 6·80 per cent. of hydrogen. The platinum compound yielded 19·13 per cent. of metal, and the hydrochloride, 12·68 per cent. of hydrochloric acid. Referring to these results, Fluckiger remarks, "Perhaps Bödeker's formula is the more correct. It would be desirable to examine crystalline derivatives of the alkaloid in order to ascertain whether $C_{18}H_{21}NO_3$ or $C_{19}H_{21}NO_3$ is the true expression of its constitution; but I tried in vain to obtain, for instance, a bromated compound, or any product of the decomposition of the alkaloid in a crystallized state."

From what has been said it may be held as proved that beberia, pelosine, and buxine are one and the same alkaloid, and Flückiger maintains that the name buxine must be applied to them all as it was given as early as 1830 to the alkaloid of *Buxus* by Faurè. I do not admit, however, that this rule of priority of name must be considered as invariably binding, and would rather be inclined to say that if an alkaloid or other substance had become well known under a certain name, that name ought to be retained, even although the substance had been called something else at an earlier time.

As I mentioned in a note read before the British Pharmaceutical Conference at Dublin, I some time ago obtained the hydrochloride of beberia in the crystalline form, which enables me to say that the alkaloid I worked with was really pure beberia. The hydrochloride was recrystallized several times, and the base precipitated from its solution by ammonia. Thus obtained and dried at the ordinary temperature, beberia is a white amorphous substance which loses water by exposure to the heat of a water-bath. It is a monacid base of well-marked alkaline character, being capable of decomposing ammonic salts when warmed with their solutions. This property is only possessed by the stronger alkaloids such as codeia and morphia, and not by the weaker members of the class such as papaverine and narcotine. Beberia combines to form readily soluble salts with hydrochloric, nitric, sulphuric, acetic, tartaric, citric and oxalic acids.

The hydrochloride crystallizes in minute four-sided prisms from an aqueous solution. If the solution is neutral it is apt to assume the form of a transparent jelly. The only other salt I have obtained in the crystalline form is the nitrate. It is almost characterestic of the salts of beberia that their solutions yield precipitates with such a variety of reagents. These include hydrochloric, hydriodic and nitric acids, potassic ferricyanide and ferrocyanide, sodic phosphate, nitrate and iodide, and mercuric chloride. Beberia forms a deep red solution with strong nitric acid, which on dilution with water gives a bulky precipitate; but I hardly think this reaction can be considered characteristic of the alkaloid, and I have tried in vain to devise some colour-test which should be conclusive evidence of its presence.

It only remains now to give the results of my analysis of the crystallized hydrochloride. The alkaloid was estimated in the air-dry salt by precipitation with ammonia, the precipitate being dried at 120° C.

6·125 grs. gave 5·105 grs. = 83·34 per cent.
3·520 „ „ 2·970 „ = 84·37 „ „
Mean = 83·85 per cent.

I need hardly say that no great accuracy could be expected in this determination, as the alkaloid is by no means insoluble in solution of ammonic chloride.

The chlorine was estimated by precipitating with argentic nitrate in the presence of nitric acid.

6·225 grs. gave 2·540 grs. Ag Cl = 10·37 per cent. HCl.
7·380 „ „ 3·010 „ „ „ = 10·36 „ „ „
8·220 „ „ 3·338 „ „ „ = 10·32 „ „ „
Mean = 10·35 per cent.

Various portions of the hydrochloride prepared at different times were dried by exposure to the air and then under a bell-glass over sulphuric acid.

10·040 grs. lost 1·470 grs. = 14·64 per cent.
6·755 „ „ 0·900 „ = 13·32 „
7·695 „ „ 1·025 „ = 13·32 „
8·620 „ „ 1·240 „ = 14·38 „
Mean = 13·91 per cent.
$C_{18}H_{21}NO_3H_2O$. $3H_2O$ = 13·25 „ H_2O.

The last molecule of water is not lost in the exsiccator or in the water-bath, but requires a temperature approaching 120° C. for its elimination. At the same time, however, there is evidently some decomposition, as the anhydrous hydrochloride obtained at that temperature invariably yielded a smaller percentage of chlorine than was afforded by the same salt dried over sulphuric acid.

The beberia-hydrochloride platinic-chloride was prepared by adding solution of muriate of beberia to solution of platinic chloride, the former being in excess. The precipitate was well washed with warm water and dried at 120° C. The temperature must not be allowed to rise above that, on account of the liability of the salt to decomposition under the influence of heat.

4·290 grs. gave 0·840 gr. pt. = 19·55 per cent.
3·955 „ „ 0·770 „ „ = 19·46 „
6·065 „ „ 1·180 „ „ = 19·45 „
2·535 „ „ 0·495 „ „ = 19 52 „
5·190 „ „ 1·015 „ „ = 19·55 „
Mean = 19·50 per cent.

It was not considered necessary to make a combustion of the alkaloid, as the afore-mentioned results, considered along with those of previous experimenters, are sufficient to determine the composition of the base.

Appended are the percentages of Kraushaar's and Flückiger's analyses. The numbers under the name of he last-mentioned chemist relate to pelosine.

	Found. F.	Found. K.	Calculated for $C_{18}H_{21}NO_3$.
C	72·09	71·61	72·24
H	6·80	6·73	7·02

The Platinochloride.

F.	K.		Calculated for $(C_{18}H_{21}NO_3.HCl)_2PtCl_4$
19·13	19·22	19·50	19·54

The Hydrochloride.

	Found.	Calculated for $C_{18}H_{21}NO_3.HCl.H_2O$.
$C_{18}H_{19}NO_3$	83·85	84·58
HCl	10·35	10·32

These results leave little room for doubt that the composition of beberia is represented by the formula $C_{18}H_{21}NO_3$.

Mr. Dott gave practical illustrations of the tests for beberia and kindly presented to the Society specimens of bebeeru nuts, beberia and hydrochlorate of beberia.

Essential Oil of Aloes.

Dr. Wm. Craig, Edinburgh, exhibited to the meeting a curiosity in the shape of a specimen of the essential oil of aloes, on which he made the following remarks:—

This oil is a pale yellow mobile liquid, sp. gr. 0·863, and boils at from 266° to 271° C. It is to the presence of this oil that the odour of aloes is due. It exists in very small quantity in aloes, only about two fluid drachms being obtained from five hundred pounds of aloes. This oil has a resemblance in taste and smell to the oil of peppermint. The boiling point, however, of the oil of peppermint is only 190° C. Although aloes has been used in medicine for upwards of two thousand years, its volatile oil was first discovered in 1873 by Messrs. T. and H. Smith and Co., the well-known chemists of this city, and the discoverers of aloin, the active principle of aloes. In that year they succeeded in isolating a small quantity of the "oleum aloes," and exhibited it that same year at the Vienna exhibition. That specimen was afterwards presented to the Pharmaceutical Society, London, and unfortunately the bottle containing it was broken, and the oil was lost. Last year they again succeeded in obtaining a small quantity of the oil from five hundred pounds of Barbadoes aloes. When it is remembered that to obtain two fluid drachms of this oil, it is necessary to distil about 500 gallons of fluid, the members of the Society will have some idea of the difficulty of obtaining this substance. In the specimen exhibited the oil is floating on the surface of a colourless, mobile, ethereal liquid, of a sp. gr. 0·95, being the liquid from which the oil of aloes was finally distilled. The specimen exhibited is interesting on account of its extreme rarity, being in all likelihood the only specimen of this oil in the world. Through the kindness of the Messrs. Smith, I am enabled to exhibit it to the members of this Society. Of course there has been no opportunity of investigating its therapeutic qualities, but from its nature it is likely to be an aromatic and antispasmodic.

Dr. Craig also exhibited some very beautiful and perfect crystals of citric acid.

The usual vote of thanks to the gentlemen who furnished the evening's programme brought the meeting to a close.

Provincial Transactions.

GRIMSBY CHEMISTS' ASSOCIATION.

The annual dinner of the above institution took place at the Royal Hotel, on the evening of Tuesday, the 20th inst. After dinner the usual loyal and patriotic toasts were given and responded to, and were followed by those of "The Trade Association of Great Britain," "The Pharmaceutical Society of Great Britain," and the toast of the evening, "Success to the Grimsby Chemists' Association."

The President (Mr. G. Croft) explained the chief objects of the society. He said the Association was formed for the mutual protection of the trade in Grimsby and district; to promote friendly relations of chemists and druggists towards each other; and to create a better understanding amongst the community than had previously existed. He was convinced that the chemists of Grimsby, as well as chemists generally, were an intellectual class of society, and he sincerely hoped they would individually and collectively try to elevate their professional status rather than degrade it. If a trade grievance occurred let it be brought before the Association and all would be made right. He felt that these annual dinners would be productive of good fellowship and trusted they would be more successful each succeeding year. Several of the gentlemen present enlivened the proceedings during the evening with songs and pianoforte music.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The assistants' section of this society met in Anderson's College, George Street, on Wednesday evening, the 14th inst., to hear a paper by Mr. David Lees, President.

Mr. Lees took for his subject "The Constituents of the Atmosphere," and spoke of the more important of them at some length, explaining the functions of the elements which go to compose the air, their properties collectively and in an isolated condition, the effect of continued breathing on the air, and its relation to the animal and vegetable worlds generally.

The paper was attentively listened to throughout, and after a few remarks by members a hearty vote of thanks was awarded to the reader.

It was intimated that Mr. William Simpson, Vice-President, would read an essay at the next meeting.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The annual meeting was held on Wednesday evening, January 23. Mr. W. Ward, F.C.S., etc., in the chair. The following officers were elected for the ensuing year:—President, Mr. G. Ellinor, Ph.C., etc.; Vice-Presidents, Mr. J. Preston and Mr. Turner; Joint Hon. Secs., Mr. E. Radley Learoyd and Mr. G. W. Newsholme; Treasurer, Mr. W. Jervis; Council, Messrs. Ward, Carr, Burnell, Ottley, Maleham, Cubley, Watts and Hall.

The President delivered his inaugural address, in the course of which he said, the past year had been eventful in the assembling, for the first time in Sheffield, of the British Pharmaceutical Conference, and expressed the great satisfaction it gave to local members. Referring to the subject of prosecutions under the Sale of Food and Drugs Act, he thought it was high time a determined effort was made to protest against the manner in which money is unjustly taken out of the pockets of chemists in various parts of the country, through the incompetence or want of correct knowledge of drugs by the majority of borough or county analysts. The question that should be asked was, Is it right that defendants should have to pay the costs when there is no adulteration? He further noticed some of the amusing and variable interpretations of the Pharmacy Act and the instructions given by some coroners. In conclusion, he expressed a hope that he would be able to conduct the business of the Society with that care and diligence which had characterized his predecessors.

Votes of thanks for past services concluded the business of the meeting.

Proceedings of Scientific Societies.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association was held at the rooms of the Association, George Street, Hanover Square, on Wednesday evening, January 14, the President in the chair, when a paper was read by Mr. G. W. Bullen on "Benzene and its Derivatives."

After a few preliminary remarks with reference to the important position occupied by the benzene, or aromatic group, both chemically and commercially, the author commenced by giving a somewhat detailed account of the discovery, manufacture, and uses of benzene, passing notice also being given to the other hydrocarbons of this group, viz., toluene, xylene, cumene, etc.

The nitro-derivatives of the benzene series were then considered, special reference being made to nitro-benzene, or artificial oil of almonds, including the best methods for distinguishing it from the natural oil; reference was also made to two other kinds of nitro-benzene differing from that ordinarily known in having higher boiling points, the differences in the boiling points being due to the presence of the nitro-derivatives of the higher hydrocarbons, toluene, xylene, etc., in greater or less proportions. These two heavy nitro-benzenes are used solely in the commercial world for the manufacture of aniline.

The amido-derivatives, or those bodies which are derived from benzene and its homologues by substitution of amidogen (NH_2) for hydrogen, were then described, attention being principally confined to the discovery and manufacture of aniline, the amido-derivative of benzene, processes for the manufacture of the principal dyes on the large scale being mentioned.

The two kinds of alcohols belonging to the series were next brought under notice:—1. The phenols, or those alcohols which are incapable of being converted into aldehydes and acids by oxidation. 2. The normal, or aromatic alcohols, which contain the group CH_2OH, and are capable of forming aldehydes and acids by oxidation in the same manner as the ordinary primary alcohols, such as methyl and ethyl alcohols.

The difference in the formation of these two kinds of alcohols having been explained, the most important of the phenols and their derivatives were then described, viz., carbolic acid, cresol, thymol, pyrocatechin, guaiacol, resorcin, orcin, and trinitrophenol, or picric acid. It was also noticed, as being of some interest, that carbolic acid and thymol, possessing such great similarities in their antiseptic and caustic properties, are so closely allied chemically. The normal alcohols and their aldehydes were then submitted to consideration, benzol alcohol being regarded as the most important, yielding as it does benzaldehyde, or bitter almond oil, and benzoic acid by oxidation. Saligenin was mentioned as partaking both of the nature of a phenol and a normal alcohol, the hydroxyl radical being substituted for hydrogen, both in the principal and lateral chains of the molecule. Among the aldehydes benzoic aldehyde, or bitter almond oil, salicyl aldehyde, the aldehyde of salicylic acid, and vanillin were noticed, mention being made of the fact that vanillin prepared artificially from coniferin was a complete failure from a commercial point of view, as it loses its aromatic odour in a very short time. Among the acids of the aromatic group, benzoic acid was regarded as occupying a position analogous to that of aniline among the aniline dyes, or in other words, as being the keystone of the series, there being a vast number of acids derived from it by addition, substitution, etc.,—salicylic, or oxybenzoic, and gallic, or trioxybenzoic acids, being mentioned among other examples. In conclusion, the principal processes for the manufacture of benzoic acid, both from natural and artificial sources, were described.

After the reading of the paper a discussion took place, at the termination of which a cordial vote of thanks to Mr. Bullen for his interesting paper was passed.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Buffon.*

BY PROFESSOR ST. GEORGE MIVART, F.R.S., SEC.L.S., V.P.Z.S.

(*Continued from page* 517).

I next desire to direct your attention to another matter treated of by Buffon—I mean THE RESEMBLANCES AND DIFFERENCES WHICH EXIST BETWEEN THE MIND OF MAN AND THE HIGHER PSYCHICAL FACULTIES OF ANIMALS.

This question is eminently a question of our own day, and one which I feel cannot but excite interest in this Section.

But its accurate investigation is attended with special difficulties, and amongst them are two temptations, which are apt to beset the inquirer:

(1). The first of these arises from the wide-spread love for the marvellous of whatsoever kind, and the tendency to inverted anthropomorphism.

(2). The other is the temptation to strain or ignore facts to serve a favourite theory.

As to the former of these dangers, I may perhaps be permitted to quote some remarks made by Mr. Chambers, approvingly cited by Professor Bain: "There are two subjects where the love of the marvellous has especially retarded the progress of correct knowledge—the manners of foreign countries, and the instincts of the brute creation . . . . It is extremely difficult to obtain true observations" as to the latter "from the disposition to make them subjects of marvel and astonishment." . . . . "It is nearly as impossible to acquire a knowledge of animals from anecdotes as it would be to obtain a knowledge of human nature from the narratives of parental fondness and friendly partiality." This I believe to be most true, and that here the danger of mistaking inference for observation is exceptionally great. The inquirer ought not to accept as facts marvellous tales without criticism and a careful endeavour to ascertain whether the alleged facts are facts and not unconscious fictions.

As to the second danger, the lamented George Henry Lewes, whom no one can suspect of any hostility to Evolution in its most extreme form, remarks (in his posthumous work† just published) that the researches of various eminent writers on animal psychology have been "biassed by a secret desire to establish the *identity* of animal and human nature," and certainly no one can deny that those who do assert that identity are necessarily exposed to the temptation referred to. Of course persons who desire to disprove this identity are exposed to the opposite temptation; but it cannot be maintained that there is evidence of Buffon having been influenced by any such desire.

The obvious difference between the highest powers of man and animals has led the common sense of mankind to consider them to be of radically distinct kinds, and the question which naturalists now profess to investigate is whether this is so or no.

But we may doubt whether many who enter upon this inquiry do not enter upon it with their minds already made up that no such radical difference can by any possibility exist. To admit it, they think, would be tantamount to admitting some non-natural origin of man, to accepting as a fact something not harmonizing with our views as to nature generally, leading to we know not what results—possibly even to lending some support to Christianity. To admit it, would be to deny the principle of continuity. There cannot, therefore, be any essential difference between man and brute, and their mental powers must be the same in kind. This, I think, is no unfair representation of the state of mind in which this question is very likely to be entered upon at the present time. Surely, however, if we profess to investigate a question, we ought in honesty to believe that there *is* a question to investigate, or else leave the matter to others; and if evidence should seem to show that "intellect" *cannot* be analysed into sense, but is an ultimate, it ought to be accepted, at the least provisionally, as such, even at the cost of having to regard its origin as at present inexplicable. Can we explain the origin of "motion?" But what rational man thinks of denying it on that account? Let us not reject anything, then, which may be evident, on account of certain supposed speculative consequences.

But that no such consequences as those referred to need follow from the admission of the radical distinctness of human reason, seems evident from the views of Aristotle. He certainly was free from theological prejudices or predispositions, and yet to his clear intellect the difference between the merely sentient and the rational natures was an evident difference, and the facts which are open to our observation are the same as those which presented themselves to his.

To enter on this inquiry with any fair prospect of success, it is not only necessary to guard against such temptations as these, but it is also necessary to be provided with a certain amount of knowledge of a special kind: namely, with a clear knowledge of what our own intellectual powers are. I conceive that, great as is the danger of exaggeration and false inference as to the faculties of animals, the danger of misapprehending and underrating our own powers is far greater.

Buffon held very decided views as to the distinctness of the mind of man from the so-called minds of animals. But an ingenious and gifted writer,* who has recently done good service in supporting Buffon's claims to greater consideration than he commonly receives, has, nevertheless, done him what I believe to be strange injustice in attributing to his great work an ironical character, and this in spite of Buffon's protest† against irony in such a work as his. I cannot venture to take up your time with controversy on this subject; but apart from Buffon's protest against "équivoque," it is incredible to me that he should have carried on a sustained irony through so voluminous a work—thus making its whole teaching absolutely mendacious. One remark of Buffon's, which has been strangely misinterpreted by this writer, I shall have occasion to notice directly; but I think it may suffice to clear Buffon's character from the aspersion of his admiring assailant, to point out that in the table of contents in the final volume of his 'History of Mammals,'‡ (which table gives the pith and gist of his several treatises), he distinctly affirms the distinctions maintained in the body of his work.

The following were Buffon's views. In his "Discourse on the Nature of Animals,"§ he says, "Far from denying feelings to animals, I concede to them everything, except thought and reflection" . . . . "they have sensations, but no faculty of comparing them one with another, that is to say, they have not the power which produces ideas." He is full of scorn|| for that gratuitous admiration for the moral and intellectual faculties of bees, which Sir John Lubbock's excellent observations and experiments have shown to be indeed gratuitous. Speaking of the ape, most man-like (and *so* man-like) as to brain, he says:¶ "Il ne pense pas: y a-t-il une preuve plus évidente que la matière seule, quoique parfaitement organisée, ne peut produire ni la pensée, ni la parole qui en est le signe, à moins qu'elle ne soit animée par un principe supérieur?"**

* Presidential Address to the Biological Section of the British Association, Sheffield, August, 1879.

† 'Problems of Life and Mind.' Third Series, 1879, p. 122.

* Mr. Samuel Butler. See his 'Evolution, Old and New,' Hardwicke and Bogue, 1879.

† *Op. cit.*, tome i., p. 25.

‡ *Op. cit.*, tome xv.

§ *Op. cit.*, vol. iv., p. 41.

|| *Op. cit.*, tome iv., p. 91.

¶ *Op. cit.*, tome xiv., p. 61.

** Mr. Butler cites objections brought forward in a certain passage (from pp. 30 and 31, vol. xiv.), as if they were Buffon's own. But they are the objections of an imagined opponent whose views Buffon himself combats. It is worthy

Buffon has been accused of vacillation with respect to his doctrine concerning animal variation, but no one has accused him of vacillation with respect to his views concerning reason and instinct.

I come now to the passage which I said has been so strangely misunderstood. It is that in which he expresses his conviction that "animals have no knowledge of the past, no idea of time, and consequently no memory." But to quote this passage without explanation is gravely to misrepresent the illustrious French naturalist. Buffon was far from ignoring, indeed he distinctly enumerates the various obtrusive phenomena which often lead the vulgar to attribute, without qualification, both knowledge and memory to brutes. But, in fact, he distinguishes between* memory and memory. His words are: "Si l'on a donné quelque attention à ce que je viens de dire, on aura déjà senti que je distingue deux espèces de mémoire infiniment différentes l'une de l'autre par leur cause, et qui peuvent cependant se ressembler en quelque sorte par leurs effets; la première est la trace de nos idées, et la seconde, que j'appellerais volontiers réminiscence† plutôt que mémoire, n'est que le renouvellement de nos sensations," and he declares‡ true memory to consist in the recurrence of ideas as distinguished from revived sensuous imaginations.

This distinction is one which it is easy to perceive. That we have automatic memory, such as animals have, is obvious; but the presence of intellectual memory (or memory proper) may be made evident by the act of searching our minds (so to speak) for something which we know we have fully remembered before, and thus intellectually remember to have known, though we cannot now bring it before our imagination.

As with memory, so with other of our mental powers, we may, I think, distinguish between a higher and a lower faculty of each; between our higher, self-conscious, reflective mental acts—the acts of our intellectual faculty—and those of our merely sensitive power. This distinction (to which I have elsewhere§ called attention) I believe to be one of the most fundamental of all the distinctions of biology, and to be one the apprehension of which is a necessary preliminary to a successful investigation of animal psychology. It is, of course, impossible for us thoroughly to comprehend the minds of dogs or birds, because we cannot enter into the actual experience of such animals, but by understanding the distinction between our own higher and lower faculties|| we may, I think, more or less approximate to such a comprehension.

It may, I believe, be affirmed that no animal but man has yet been shown to exhibit true concerted action, or to express by external signs distinct intellectual conceptions —processes of which all men are normally capable. But just as some plants simulate the sense-perception, voluntary motions and instincts of animals, without there being a real identity between the activities thus superficially similar, so there may well be in animals actions simulating the intellectual apprehensions, ratiocinations, and volitions of man without there being any necessary identity between the activities so superficially alike. More than this, it is certain *à priori* that there must be such resemblance, since our organization is similar to that of animals, and since sensations are at least indispensable antecedents to the exercise of our intellectual activity.

I have no wish to ignore the marvellous powers of animals or the resemblance of their actions to those of man. No one can reasonably deny that many of them have feelings, emotions and sense-perception, similar to our own; that they exercise voluntary motion and perform actions grouped in complex ways for definite ends; that they to a certain extent learn by experience, and can combine perceptions and reminiscences so as to draw practical inferences, directly apprehending objects standing in different relations one to another, so that, in a sense, they may be said to apprehend relations. They will show hesitation, ending apparently, after a conflict of desires, with what looks like choice or volition, and such animals as the dog will not only exhibit the most marvellous fidelity and affection, but will also manifest evident signs of shame, which may seem the outcome and indication of incipient moral perceptions. It is no great wonder, then, that so many persons, little given to patient and careful introspection, should fail to perceive any radical distinctions between a nature thus gifted, and the intellectual nature of man.

But, unless I am greatly mistaken, the question can never be answered by our observations of animals, unless we bear in mind the distinctions between our own higher and lower faculties.

Now I cannot here even attempt to put before you what I believe to be the true view of our own intellectual processes. Still I may, perhaps, be permitted to make one or two passing observations.

Everybody knows his own vivid feelings (or sensations), and those faint revivals of feelings, simple or complex, distinct or confused, which are imaginations and emotions; but the same cannot be said as to thought. Careful introspection will, however, I think, convince anyone that a "thought" is a thing widely different from an "imagination"—or revival of a cluster of faint feelings. The simplest element of thought seems to me to be a "judgment," with an intuition of reality concerning some "fact," regarded as a fact real or ideal. Moreover, this judgment is not itself a modified imagination, because the imaginations which may give occasion to it persist unmodified in the mind side by side with the judgment they have called up. Let us take, as examples, the judgments "That thing is good to eat," and "Nothing can be and not be at the same time and in the same sense." As to the former, we vaguely imagine "things good to eat," but they exist *beside* the judgment, not *in* it. They can be recalled, compared, and seen to co-exist. So with the other judgment, the mind is occupied with certain abstract ideas though the imagination has certain vague "images" answering respectively to "a thing being" and "a thing not being," and to "at the same time" and "in the same sense;" but the images do not *constitute* the judgment itself any more than human "swimming" is made up of "limbs and fluid," though without such necessary elements no such swimming could take place.

This distinction is also shown by the fact that one and the same idea may be suggested to, and maintained in the mind by the help of the most incongruous images, and very different ideas by the very same image. This we may see to be the case with such ideas as "number," "purpose," "motion," "identity," etc.

But the distinctness of "thought" from "imagination" may perhaps be made clearer by the drawing out fully what we really do when we make some simple judgment, as, *e.g.* that "a negro is black." Here, in the first place, we directly and explicitly affirm that there is a conformity between the external thing, "a negro," and the

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of note that Buffon long anticipated our contemporaries with respect to man's place in nature in so far as concerns his mere anatomy. For he did not hesitate to affirm that the Orang differs less from us structurally than it differs from some other apes.

* *Op. cit.*, tome iv., p. 60.

† Here he follows, without citing, the old distinction of Aristotle between memory and reminiscence.

‡ *Op. cit.*, tome iv., p. 56.

§ 'Lessons from Nature,' Murray, 1876, p. 196

|| Certain writers (as, for example, Professor Ewald Hering, of Prague) have used the word "memory" to denote what should properly be called "organic habit," *i.e.* the power and tendency which living beings have to perpetuate, in the future, effects wrought on them in the past. But to call such action as that by which a tree as it grows preserves the traces of scars inflicted on it years before, "memory," is a gross abuse of language—a use of the word as unreasonable as would be the employment of the word 'sculptor" to denote a quarryman, or "sculpture" to indicate the fractures made in rocks by the action of water and frost.

external quality, "blackness"—the negro possessing that quality. We affirm secondarily and implicitly a conformity between the two external entities and the two corresponding internal concepts. And thirdly, and lastly, we also implicitly affirm the existence of a conformity between the subjective judgment and the objective existence.

All that it seems to me evident that sentience can do, is to associate feelings and images of sensible phenomena, variously related, in complex aggregations; but not to apprehend sensations as "facts" at all, still less as internal facts, which are the signs of external facts. It may be conceived as marking successions, likenesses and unlikenesses of phenomena, but not as recognizing such phenomena as *true*. Animals, as I have fully admitted, apprehend things in different relations, but no one that I know of has brought any evidence that they apprehend them *as* related, or their relations *as* relations. A dog may feel shame, or possibly (though I do not think probably) a migrating bird may feel agony at the imagination of an abandoned brood; but these feelings have nothing in common with an ethical judgment, such as that of an Australian, who, having held out his leg for the punishment of spearing, judges that he is wounded more than his common law warrants.

Animals, it is notorious, act in ways in which they would not act had they reason; while, as far as I have observed or read, all they do is explicable by the association of sensations, imaginations, and emotions, such as take place in our own lower faculties. We cannot, of course, prove a negative, but we have no right to assume the existence of that for which there is no evidence, without which all the facts can be explained, and which if it did exist would make a multitude of observed facts impossible. Apes (like dogs and cats) warm themselves with pleasure at deserted fires, yet, though they see wood burning and other wood lying by, though they have arms and hands as we have, and the same sentient faculties, they never have, so far as I know, been recorded to have added fuel to maintain their comfort. Swallows will continue to build on a house which they see has begun to be pulled down, and no animal can be shown to have made use of antecedent experience to *intentionally* improve upon the past.

If, on the other hand, animals were capable of deliberately acting in concert, the effects would soon make themselves known to us so forcibly as to prevent the possibility of mistake.

Mr. Lewes has not hesitated to affirm* that "between animal and human intelligence there is a gap which can only be bridged over by an addition from without," and he also says:† "The animal world is a continuum of smells, sights, touches, tastes, pains and pleasures: it has no objects, no laws, no distinguishable abstractions, such as self and not self. . . . . . If we see a bud, after we have learned that it is a bud, there is always a glance forward at the flower and backward at the seed . . . . . but what animal sees a bud at all except as a visible sign of some other sensation?" As a friend of mine, Professor Clarke,‡ has put it: "In ourselves sensations presently set the intellect to work; but to suppose that they do so in the dog is to beg the question that the dog has an intellect. A cat, to bestir itself to obtain its scraps after dinner, need not entertain any *belief* that the clattering of the plates when they are washed is usually accompanied by the presence of food for it, and that to secure its share it must make certain movements; for quite independently of such belief, and by virtue of mere association, the simple objective conjunction of the previous sounds, movements, and consequent sensations of taste, would suffice to set up the same movements on the present occasion." Let certain sensations and movements become associated, and then the former need not be noted: they only need to exist for the association to produce its effects, and simulate apprehension, deliberation, inference and volition. "When the circumstances of any present case differ from those of any past experience, but imperfectly resemble those of many past experiences, parts of these, and consequent actions, are irregularly suggested by the laws of resemblance, until some action is hit on which relieves pain or give pleasure. For instance . . . . let a dog be lost by his mistress in a field in which he has never been before. The presence of the group of sensations which we know to indicate his mistress is associated with pleasure, and its absence with pain. By past experience an association has been formed between this feeling of pain and such movements of the head as tend to recover some part of that group, its recovery being again associated with movements which, *de facto*, diminish the distance between the dog and his mistress. The dog, therefore, pricks up his ears, raises his head, and looks round. His mistress is nowhere to be seen; but at the corner of the field there is visible a gate at the end of a lane which resembles a lane in which she has been used to walk. A phantasm (or image) of that other lane, and of his mistress walking there, presents itself to the imagination of the dog; he runs to the present lane, but on getting into it she is not there. From the lane, however, he can see a tree at the other side of which she was wont to sit; the same process is repeated, but she is not to be found. Having arrived at the tree he thence finds his way home." By the action of such feelings, imaginations, and associations—which we know to be *veræ causæ*—I believe all the apparently intelligent actions of animals may be explained without the need of calling in the help of a power, the existence of which is inconsistent with the mass, as a whole, of the phenomena they exhibit.

But if there *is* a radically distinct intellectual power or force in man, is such a distinction of kind so isolated a fact as many suppose? May there not exist between the forces which living beings exhibit other differences of kind?

Each living being consists of an aggregation of parts and functional activities which are evidently knit together into a unity. Each is somehow the seat or theatre of some unifying powers or condition which synthesises their varied activities, and is a PRINCIPLE OF INDIVIDUATION. This seems certainly to have been the opinion of Buffon, and it is to this opinion that I referred in speaking of the fourth cause to which he attributed the changes in organic forms. And to me it seems that we must admit the existence of such a living principle. We may analyse the activities of any animal or plant, and by consideration of them separately find resemblances between them and mere physical forces. But the *synthesis* of such forces as we find in a living creature is certainly nowhere to be met with in the inorganic world.

To deny this would be to deny the plainest evidence of our senses. To assert that each living body is made up of minute independent organisms, each with its own "principle of individuation," and without subordination or co-ordination, is but to multiply difficulties, while such a doctrine conflicts with the evidence of our own perceptions, which lead each of us to regard himself as one whole—a true unity in multiplicity.

The existence in each creature of a peculiar, co-ordinating, polar force, seems to be specially pointed to by the phenomena of serial and bilateral symmetry, by the symmetrical character of certain diseases, by the phenomena of monstrous growths, and by the symmetrical beauty of such organisms as the Radiolarian Rhizopods.

It also seems to me to be made evident, by the various activities of each animal, which are, as a fact, grouped in one in mutual interaction—an organism having been described by Kant as a creature, the various parts of which are reciprocally ends and means.

I think now I hear the exclamation—This is "Vitalism!"

* 'Problems of Life and Mind,' vol. i., p. 156.
† *L. c.*, p. 140.
‡ 'Questions on Psychology,' p. 9.

while some of my hearers may deem these matters too speculative for our Section.

But consciously or unconsciously, general conceptions of the kind exist in the minds of all biologists, and influence them in various ways, and their consideration, therefore, can hardly be out of place here; while as to "Vitalism," I am convinced I shall not be wasting your time in endeavouring to remove a wide-spread misconception.

The "Vitalism" which is so reasonably objected to, is that which supposes the existence in each living creature of some separate entity inhabiting the body—an extra-organic force within the living creature, and acting by and through it, but numerically distinct from it. But the view which I venture to put before you as that which is to my judgment a reasonable one, is that of a peculiar form of force which is *intra-organic*, so that it and the visible living body are one thing, as the impress on stamped wax and the wax itself are one, though we can ideally distinguish between the two. It is, in fact, a mode of regarding living creatures with prime reference to their activities rather than to their material composition, and every creature can of course be regarded either statically or dynamically. It is to regard any given animal or plant, not as a piece of complex matter played upon by physical forces, which are transformed by what they traverse, but rather as a peculiar immanent principle* or form of force (whensoever and howsoever arising), which for a time manifests itself by the activities of a certain mass of complex material, with which it is so entirely one that it may be said to constitute and *be* such animal or plant much rather than the lump of matter which we can see and handle can be said to constitute such animal or plant. On this view a so-called "dead bird" is no bird at all, save by abuse of language, nor is a "corpse" really a "dead man"—such terms being as self-contradictory as would be the expression "a dead living creature."

Thus the real essence, the substantial constituent, of every living thing is something which escapes our senses, though its existence and nature reveal themselves to the intellect.

For of course our senses can detect nothing in an animal or plant beyond the qualities of its material component parts. But neither is the function of an organ to be detected save in and by the actions of such organ, and yet we do not deny it its function or consider that function to be a mere blending and mixture of the properties of the tissues which ompose it. Similarly it would seem to be unreasonable to deny the existence of a living principle of individuation because we can neither see nor feel it, but only infer it. This power or polar force, which is immament in each living body, or rather which is that body living, is of course unimaginable by us, since we cannot by imagination transcend experience, and since we have no experience of this force, save as a body living and acting in definite ways.

It may be objected that its existence cannot be verified. But what *is* verification? We often hear of "verification by sensation," and yet even in such verification the ultimate appeal is not really to the senses, but to the intellect, which may doubt and which criticizes and judges the actions and suggestions of the senses and imagination. Though no knowledge is possible for us which is not genetically traceable to sensation, yet the ground of all our developed knowledge is not sensational, but intellectual, and its final justification depends, and *must* depend, not on "feelings," but on "thoughts." I must apologize to such an audience as that I have the honour of addressing for expressing truths which, to some of my hearers, may appear obvious. I would gladly suppress them as superfluous did not my own experience convince me that they are not superfluous. To proceed: "Certainty" does not exist at all in *feelings* any more than doubt. Both belong to thought only. "Feelings" are but the materials of certainty, and though we can be perfectly certain about our feelings, that certainty belongs to thought and to thought only. "Thought," therefore, is our absolute criterion. It is by self-conscious thought only that we know we have any feelings at all. Without thought, indeed, we might feel, but we could not know that we felt or know ourselves as feeling. If then we have *rational* grounds for the acceptance of such a purely intellectual conception as that of an immanent principle as the essence of each living creature, the poverty of our powers of imagination should be no bar to its acceptance. We are continually employing terms and conceptions—such, *e.g.*, as "being," "substance," "cause," etc.—which are intelligible to the intellect (since they can be discussed), though they transcend the powers of the imagination to picture.

(*To be continued.*)

* The word "principle" has been used to denote that activity which, together with material substance, constitutes a living creature, because that word calls up a less sensuous, and therefore less misleading, phantasm than any other. The old term ψυχή, or soul, has in modern times come to be associated with the idea of a substance numerically distinct from the living body, and capable of surviving the destruction of the latter. But as structure and function ever vary together (as do the convexities and concavities of a curved line), so "the principle of individuation" or soul of an animal or plant and its material organization must necessarily arise, vary, and be destroyed simultaneously, unless some special character, as in the case of man, may lead us to consider it exceptional in nature. Even in man, however, there seems no adequate reason for believing in the existence of any principle of individuation, save that which exerts its energy in all his functions, the humblest as well as the most exalted.

Parliamentary and Law Proceedings.

Prosecution under the 17th Section of the Pharmacy Act.

At the Birmingham Police Court, on Thursday, January 22, 1880, before A. Hill, Esq. (Chairman), Alderman Biggs and A. J. Elkington, Esq., Theodore Morris, trading as a chemist and druggist, at 199, Lodge Road, Birmingham, was summoned by the Secretary of the Chemists and Druggists' Trade Association of Great Britain, for an infringement of the 17th section of the Pharmacy Act, 1868. He was charged, "That he did, on the 2nd inst., unlawfully sell to W. F. Haydon certain poison, to wit, laudanum, being a preparation of opium, in a certain bottle, the label of which bottle did not set forth the name of the seller of the same, contrary to the statute in such case made and provided."

Mr. Henry Glaisyer, solicitor, Birmingham, appeared to prosecute. The defendant conducted his own defence.

Mr. Glaisyer, having explained the section of the Pharmacy Act on which the summons was based, said on the 2nd day of this month Mr. Haydon purchased at the shop of the defendant, No. 199, Lodge Road, two pennyworth of laudanum. The bottle was labelled "Poison, Laudanum. R. D. Hughes, Chemist, 199, Lodge Road." The contents of the bottle were subsequently analysed by Mr. Haydon and found to contain laudanum, a preparation of opium. Opium and its preparations are enumerated in Part II., Schedule A of the Act. The defendant is wholly unqualified to sell poisons scheduled under the Act, not being either a pharmaceutical chemist or a chemist and druggist; but he appears to do so under cover of Hughes's name. The defendant is the tenant of the premises at 199, Lodge Road, and has paid rates for those premises.

Mr. William Frederic Haydon, pharmaceutical chemist, and Secretary of the Chemists and Druggists' Trade Association of Great Britain, deposed that on January 2 last, he went to the defendant's shop at 199, Lodge Road, and purchased from the defendant himself two pennyworth of laudanum which he now produced, labelled "Poison. Laudanum. R. D. Hughes, Chemist, 199, Lodge Road." He subsequently analysed the contents of the bottle and found it to be laudanum, a preparation of opium. The defendant was not qualified to sell such poison, his name not appearing in the last published Register of Pharmaceutical Chemists and Chemists and Druggists. The name of Richard David Hughes appeared on that Register as a chemist and druggist, residing at 18, High Street, Denbigh.

Magistrates' Clerk: You do not deny selling this poison, I suppose?

The Defendant: No; but there is the name of the proprietor on the bottle.

Chairman of the Bench: How long have you been at the shop?

The Defendant: Eighteen months.

Chairman of the Bench: Was the shop taken in Mr. Hughes's name?

The Defendant: No; I opened it as a drysalter.

Magistrates' Clerk: Did Hughes ever live on those premises?

Defendant: No; but he has been backwards and forwards to Birmingham.

Mr Elkington: Are you Mr. Hughes's assistant, and paid by him as such?

Defendant: I am a salaried assistant, and over a certain sum all the money made out of the business belongs to me. I am the tenant of the premises and pay the rents, rates and taxes.

Chairman of the Bench: Do you ask for an adjournment to call Mr. Hughes as a witness? if not, we must decide the case on the evidence given.

Defendant: I would rather the case was settled now.

Chairman of the Bench: You must pay a penalty of 21*s*. and costs, or in default one month's imprisonment. I hope full publicity will be given to this case.

Poisoning by Chlorodyne.

Dr. Hardwicke held an inquest on Thursday, January 22, at the St. Pancras Coroner's Court, on the body of John Macham, aged 61, surgical instrument maker, of 37, Oak Village.

Mrs. Jane Macham, widow of deceased, said he had been ailing for the last twelve months, and had been to St. Bartholomew's and other hospitals for relief; he was also in the habit of taking Dr. Collis Browne's chlorodyne. On the night of Monday week, shortly after he went to bed, he laid on his back and made a peculiar noise. When she got up on the following morning she found him in the same position. She saw he had a bottle containing chlorodyne in the bed with him. Medical aid was procured, but he died about half-past twelve. The deceased began taking chlorodyne about three months ago, but she did not think he had had more than two bottles. He was very desponding in mind, fearing he would lose his trade. He said he could not bear it, and had said he would destroy himself.

Mr. Reuben Warne, surgeon, said that when called in, he found the deceased in a state of collapse, and death followed shortly afterwards. He had made a *post-mortem* examination. The heart was fatty, and the lungs and brain congested. There was no doubt the deceased had died from poisoning by chlorodyne.

The Coroner and Jury had considerable discussion as to the facilities for obtaining poisons, especially those contained in patent medicines.

The Jury then returned the following verdict:—"That the deceased committed suicide by poisoning himself with chlorodyne, being at the time in an unsound state of mind. The Jurors are further of opinion that the most stringent measures ought to be enforced to prevent the sale of poisons in the shape of patent medicines, and that at all events is should be made compulsory that a label should be affixed thereto bearing the word 'Poison,' as was compelled to be done in regard to the sale of laudanum and other poisons."—*Standard*.

Poisoning by a Liniment.

Mr. Collier, deputy coroner, held an inquest on Monday last at the Plough, Lewisham, on the body of William Charles Penny, aged 63, a builder, living at Lewisham Hill, who died from the effects of poison.

Fanny Richards, servant to the deceased, said on Thursday night the deceased, who was confined to his bed, asked for a sleeping draught he had been in the habit of taking, pointing to the mantelpiece, on which was a bottle. Her mistress poured it out and witness handed it to deceased, who drank it off. A moment after the bottle containing the sleeping draught was found at the foot of the bed, and it was then seen that the deceased had been given a liniment which he had been using for his leg. The wife exclaimed, "Oh, my darling husband, what have I done?" Witness ran for some salt and water, which was given the deceased and made him sick, and she then went for Mr. Shute. On her return the deceased had expired. There was one candle alight at the time, but it was at the opposite end of the mantelpiece. When Mrs. Penny poured the liniment out her eyes were suffused with tears, because of the pain her husband was in.

Mr. Shute, surgeon, said he supplied both the liniment and the sleeping draught; they were in similar bottles. The liniment was composed of two-thirds of aconite and one-third soap liniment, the former being a deadly poison and the latter harmless. The liniment and draught were of different shades in colour.

The jury returned a verdict of "Death from misadventure," but strongly recommended that some additional precautions should be used in sending out bottles containing poison, both as to colour and shape.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

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[381]. Owing to the word grains appearing after 80 instead of after ij, the sentence looks rather vague, but no doubt the physician means 2 grains. It will therefore be 7 grains per dose the second week, 9 grains per dose the third week, and so on until 27 grains per dose, or 81 grains per day, is reached.

N. H.

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[383]. Alum. A sulphate of ammonia and alumina usually written in prescriptions, alum sulph.

N. H.

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[384]. In answer to *Beta* I beg to state that if he will first put in the tinct. valerian. am., then the aqua, and lastly the ferri et quinæ cit., he will find it compatible. I have never found it incompatible.

F. L. Holloway.

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[384]. Dissolve the "ferri et quin. cit." in aq. distillat. leaving room for the addition, gradually, of the "tinct. valer. ammon." Shake well, and see the result

J. B. O.

[385]. I had a prescription last week with ol. sinapis sem. in it, and not knowing what the doctor meant, I sent up to inquire, but, after making himself very unpleasant, he failed to explain what it really was he did mean. This was the prescription—

℞ Tinct. Iodin. Co. . . . . ℥ij.
Ol. Sinapis Sem.,
Spt. Vini Rect. . . . . . . āā ℥vij.
Ft. liniment.

Would some one kindly say what should be used for it?
Liverpool. JOHN H. TALBOT.

Notes and Queries.

[647]. BOISRAGON PILLS.—In answer to *St. Rule*, the following is Dr. Hewson's formula:—

℞ Hyd. Subchlor. . . . . gr. xij.
Pulv. Scammon. . . . . . . gr. xij.
Ext. Coloc. Comp. . . . . . ℈ij.
Ol. Carui . . . . ♏ iv.
Aloes Soc. . . . . gr. viij.
M. Ft. pilulæ, xiv; sumat ii hora somni.

Hackney. C. H. BRADSHAW.

[648]. HYDROBROMIC ETHER AND BROMOFORM.—1. What is the dose of hydrobromic ether (ethyl. bromid.), and is a spirit of it the best preparation? 2. Is bromoform, or a spirit thereof, administered internally, and if so, in what doses?

PHARMACIST.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE SALE OF PATENT MEDICINES CONTAINING POISONS.

Sir,—In a recent case of poisoning by chlorodyne brought before the coroner at St. Pancras,* the jury added a rider: "The jurors are of opinion that the most stringent measures ought to be enforced to prevent the sale of poisons in the shape of patent medicines."

Cannot the Pharmaceutical Society use their influence to restrict the sale of patent medicines to registered chemists only?

Are not all unqualified persons liable for the sale of chlorodyne and all medicines containing poisons?

In this neighbourhood the proprietor of a patent medicine has actually offered to supply licences to oilmen and grocers who will sell his preparations.

Islington, N. J. K.

Sir,—At the present time, when the question regarding the sale of poisons is before the public mind, I think the Pharmaceutical Society should collect all the facts which will be taken as evidence in considering the necessity of revising the Poisons Bill. That such a revision is necessary is quite evident whilst we daily see the wholesale distribution by grocers, drapers and others of such medicines as chlorodyne, Powell's balsam, Winslow's syrup, etc., etc., most of which contain in a greater or less degree some active poison, and many of which have proved their strength by their fatal effects.

Now, sir, should this revision of the Act take place, surely an opportunity is offered to the Pharmaceutical Society for stepping in and endeavouring to obtain for the pharmaceutical chemists the sole privilege of vending medicines of all kinds, whether containing poisons or whether ordinary Pharmacopœia preparations; the public would then have responsible people to look to, and their interests I am sure would be benefited.

Is it not reasonable, too, that the law should guarantee chemists some protection of this sort, in consideration of the expense it puts them to in order that they may pass their examinations? A lawyer's practice is protected from intruders, as is also the practice of a doctor; why, then, should chemists be left out?

By obtaining some real advantage of this sort the Society would be doing its legitimate duty as the representative body of an educated and responsible class of men, and would confer a benefit on both the chemists and the public of no small importance.

A PHARMACEUTICAL CHEMIST.

* See the previous page.

CREAM OF TARTAR.

Sir,—Two years ago we had doubts about the purity of a lot of cream of tartar we had purchased. We sent a sample to the public analysts here; the following is the result of their analysis:—

Bitartrate of Potash	88·04
(Hydrated) Tartrate of Lime	8·87
Iron and Alumina	·12
Sand and Silica	1·02
Water	1·92
	99·97

(Signed) McCOWAN and BIGGART.

This was accompanied with a certificate stating it to be a sample of genuine cream of tartar.

Possibly the above may be of some interest at the present time.

Greenock. MACNAUGHT BROS.

J. J. Point.—There is no law that would compel a chemist and druggist to supply medicine on a Sunday, but we do not think that anyone would refuse to do so in a case of serious illness.

T. O. Owen.—(1) See the paper on "Soluble Essence of Ginger," by Mr. J. C. Thresh, before, p. 193. (2) It has been pointed out by Dr. Symes (*Pharm. Journ.*, [2], vol. v., p. 161), that lemon juice may be preserved without the addition of alcohol by heating it to 150° F. and then excluding it from the air by carefully closing the full bottles at this temperature. The operation should be carried out during the winter.

W. M. Bishop.—See the note on the pharmacy of nitroglycerine in "The Month," before, p. 603.

A. P. S.—Ganot's 'Elementary Treatise on Physics,' or Deschanel's 'Natural Philosophy.'

T. W. Ogilvie.—*Cetraria glauca.* If our correspondent will compare the specimen sent with commercial *Cetraria islandica*, he will see that the latter has minute cylindrical prominences on the margin of the frond and has a paler under surface.

J. T. B. M.—The finely-divided peroxide of iron, known also as rouge, prepared by precipitating a hot filtered solution of sulphate of iron with concentrated solution of oxalic acid and decomposing the resulting oxalate of iron, after washing and partial drying, by heat.

T. Walton.—The principal alkaloids in the root of *Aconitum Napellus* are aconitine and pseudaconitine, both of them crystallizable, and the former present in relatively the larger quantity. These alkaloids, according to Wright and Luff, are decomposable into two others, aconine and pseudaconine, which may occur ready-formed in the root. They are accompanied by at least one other alkaloid, picraconitine, which is comparatively inert. In *A. ferox* root pseudaconitine is present in larger proportion than is aconitine, together with another apparently non-crystalline alkaloid. From Japanese aconite Wright and Luff have separated an alkaloid that they have named japaconitine, and which may or may not be identical with one observed by Paul and Kingzett.

Mr. C. Bennett is thanked for his communication.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. J. Wade, E. Wyborn, J. C. Thresh, Burroughs and Co., Ion, Dentist sine L.D.S., Tradesman, C.

TINCTURE OF SENEGA AS AN EMULSIFYING AGENT.*

BY HENRY COLLIER,

Teacher of Pharmacy, Guy's Hospital.

I had the honour of laying before the Pharmaceutical Conference at Sheffield emulsions of various fixed and volatile oils prepared by means of tincture of soap bark—the *Quillaia saponaria*. The employment of this tincture is by no means new, for it has been in use as an emulsifying agent for some years. I thought, however, that a useful purpose might be served by bringing forward, more prominently than hitherto had been done, this very useful agent in pharmacy. It has received official recognition in France, at least by the Paris Pharmaceutical Society, who have published a formula for the preparation of the tincture and described its use in their 'Rapport sur les médicaments nouveaux.' I also at the same meeting gave an account of the results of my experiments upon the saponaceous matter of quillaia bark. I there mentioned that this soapy principle was widely diffused throughout the vegetable kingdom, that it had been the object of numerous investigations and that most discordant results were given by different experimenters. The literature of senegin, or polygalic acid, the active matter of senega root, is not so extensive as that of saponin; different statements are made respecting it, and it is still a matter of doubt whether polygalic acid and saponin are identical. Senega root appears to have been first examined by Gehlen in 1804, who found, together with resin, a substance which he described as perfectly insoluble in water, but soluble in alcohol. To this principle was given the name of polygalin. This was associated by Pfaff, who called it "kratzender extractivstoff," and by Bucholz, who named it senegin, with saponin, which is soluble in water. Quevenne, in 1836 (*Journal de Pharm.*, 22—460), published a most exhaustive chemical examination of senega. He appears to have first obtained pure senegin, and according to him it is different from saponin. He gave it the name of polygalic acid, from the fact that it united with bases to form salts. It is not, however, an acid which will expel carbonic anhydride from alkaline carbonates, even with the aid of heat.

Bolly (*Annal. Pharm.*, 90—211), who did not, however, follow Quevenne's method of preparation, in his examination of senega regards saponin and senegin as identical.

I have not been able to find that since Bolly's work the saponaceous matter of senega root has been further chemically examined. W. Procter, junr., in 1861 (*Chem. News*, 1861—40), published his pharmaceutical researches upon polygalic acid, in which he recommends its use in 1 to 2 grain doses in powder or pill. The decomposition products of saponin and senegin or polygalic acid are the same, so that it is probable that these substances are identical, and that the differences in the statements of the various authors may be accounted for by the different degrees of purity of the substance they obtained. If it may be considered any testimony as to the identity of saponin and polygalic acid, I can state that tincture of senega and tincture of quillaia have a similar effect upon mercury. This metal, shaken with either of these tinctures, is quickly reduced to a very minute state of subdivision. They are alike also in their power of emulsifying fixed and volatile oils.

In recommending any particular agent for use in pharmacy it is essential to bear in mind the nature of the substance employed. Acacia, tragacanth or yolk of egg, which are generally used in making emulsions, possess no very active properties. Occasionally, however, active substances are employed in small doses, and they are then considered not to have any detrimental effect. For instance, fixed oils are very frequently made into emulsions by means of liq. potassæ. To use tincture of senega in medicinal doses as an emulsifying agent would certainly not meet with approbation, but in very small quantities there would not be the same objection. I have here examples of emulsions of various fixed and volatile oils prepared with tincture of senega of Pharmacopœia strength, but made by maceration only. These mixtures possess all the characters of good emulsions and they are very easily made. The following is the general formula for the fixed oils, cod liver, olive and castor:—

Oleum	℥ss.
Tinct. Senegæ	♏v.
Aq.	℥ss. Misce.

The same quantity of tincture has been used for ol. terebinthinæ ♏xx; copaiba ʒss; ext. filicis liquid. ʒj; chloroform. ♏x.

The Pharmacopœia dose of tincture of senega is from ʒss to ʒij. The use of a sixth part of the minimum dose could hardly be considered objectionable on account of the effect which it might produce. If so, solution of potash and lime water might also justly be removed from our list of emulsifying agents.

As regards the suspension of resins, I do not consider that tincture of senega is so useful as acacia or tragacanth; these substances require thick liquids or they will separate too rapidly. Tincture of quillaia was adopted by the Paris Pharmaceutical Society for the preparation of "émulsions des médicaments insoluble dans l'eau," and a formula is given for an emulsion of balsam of tolu, but a large quantity of spirit and of tincture is required and the mixture is not a very perfect one.

I have here a mixture containing—

Tinct. Tolu.	♏ 40.
Tinct. Senegæ	♏ 20.
Aq.	ad ℥j. Misce.

This is a very good emulsion, but the quantity of tincture is large, which of course is open to objection; a less quantity of tincture does not prevent the aggregation of the resin into lumps.

In conclusion, I trust you will consider that the fact of tincture of senega possessing emulsifying powers is a sufficient reason why I should have brought it before your notice this evening.

[*The discussion on this paper is printed at p.* 638.]

* Read at the Evening Meeting of the Pharmaceutical Society of Great Britain, February 4, 1879.

THE SUPPOSED ALKALOID OF PODOPHYLLUM.*

BY JOHN M. MAISCH.

In a paper "On the Proximate Principles of some Berberidaceæ and Ranunculaceæ," contributed by the late Professor Ferdinand F. Mayer to the *American Journal of Pharmacy*, 1863, pp. 97—100, the following sentences

* From the *American Journal of Pharmacy*, December, 1879.

are found :—"The rhizome of the mayapple contains both berberina and a colourless alkaloid, a resin, a free acid, a neutral odorous substance volatilizable in white scales and saponin. When the alcoholic extract of the rhizome is freed from alcohol and then mixed with water, the latter dissolves the acid, a considerable quantity of berberina and saponin, together with some resinous matter. The precipitate left after washing with water, the so-called resinoid podophyllin, is a mixture of a resin and the volatile principle, which are soluble in ether, and a portion soluble in alcohol, which is the other alkaloid in combination with saponin and brown resinous matter."

This being the first published assertion of the presence of an alkaloid in podophyllum, soon after I embraced the opportunity of ascertaining the correctness of the statement as far as the presence of berberina was concerned, by working up the mother-liquor from the preparation of the resin from several hundred pounds of podophyllum. It was evaporated to a small bulk, strongly acidulated by hydrochloric acid, and the resulting crystalline precipitate again dissolved in boiling water and treated with hydrochloric acid. On cooling and standing, deep yellow crystals were obtained, resembling those of commercial hydrochlorate of berberina, but evidently tinged with a notable quantity of brown colouring matter. The crystals, which weighed between one and two drachms, were laid aside for future examination and purification, but no opportunity presenting itself for several years, the substance was eventually lost. However, its appearance was so convincing that it seemed to furnish a valid reason for the addition of hydrochloric acid in preparing the officinal resin of podophyllum (*Amer. Jour. Pharm.*, 1863, p. 303).

When about the year 1868 or 1869 I undertook the separation of berberina from the officinal resin prepared by myself, I was surprised at not finding the alkoloid sought; but noticed in its stead the solubility in hot water of that portion of the resin which is soluble in ether (see *Amer. Journ. Pharm.*, 1874, p. 231). It is the same substance which was obtained by Wm. Hodgson in 1831 (see *Jour. Phil. Coll. Phar.*, iii., p. 273), by boiling the rhizome in water, and the laxative properties of which were ascertained by him. The various investigators who have since experimented with podophyllum could either not discover any alkaloid at all, or observed only slight indications of its presence through the reaction with one of the general reagents for alkaloids, notably with Mayer's test liquid. Since, however, the proximate composition of the resin as obtained from the rhizome collected in the spring and autumn varies to some extent, it seemed also possible that the alkaloid, if present, might be found in larger proportion at one period than at another. The valuable paper contributed by Mr. Biddle at the last meeting (see November number, p. 543)* does not completely remove the doubt. The mother-liquors from his experiments were presented and exhibited at the last meeting, and by Mr. Biddle kindly placed at my disposal for further investigation. One of the samples consisted of the concentrated washings of the resin prepared from the rhizome collected in March and April (No. 1); the other was a similar mixture obtained from the rhizome collected in May, July and October (No. 2); the latter had yielded the slightest reaction with Mayer's reagent.

The two samples were set aside for about a week, after which time both had separated a slight precipitate, and the clear liquids yielded no turbidity at all with Mayer's test. The liquid No. 1 was somewhat concentrated, allowed to cool, and filtered when it was rendered turbid on the addition of the test. It was now evaporated to a syrupy consistence, and, after standing for about two weeks, filtered from the resinous deposit, *a*, mixed with a little hydrochloric acid, and after twenty-four hours again filtered from the precipitate, *b*. The filtrate was rendered decidedly turbid on the addition of potassio-mercuriciodide. A portion of the acid liquid was agitated with ether the remaining portion was first rendered alkaline by the addition of sodium carbonate, and then likewise treated with ether. In both cases, on the complete evaporation of the ether, a yellowish amorphous mass, of a rather disagreeable odour, was left, which was agitated with dilute hydrochloric acid, the solutions being afterwards again tested with Mayer's reagent, without producing the slightest turbidity.

The resinous deposit, *a*, was dissolved in a little alcohol, the solution filtered, the filtrate precipitated by cold water acidulated with hydrochloric acid, and on the following day again filtered. The clear liquid gave no reaction with potassio-mercuric iodide, until after it had been concentrated, cooled and filtered. It was, however, noticed that the turbidity again disappeared, after a short time, while on other occasions it remained. The cause for this different behaviour was only determined after many repetitions, and was found to be a slight increase of temperature caused by the radiating heat from a heated iron plate, or by the accidental exposure of the test-tube to the direct rays of the sun; in fact the warmth of the hand was found to be sufficient for making the turbidity disappear entirely or partly. The cold liquid was now completely precipitated by Mayer's test; the precipitate, which was soluble in hot water, was well washed with cold water, dissolved in a little soda and the solution acidulated with hydrochloric acid; on passing sulphuretted hydrogen through the solution, not the faintest indication of the presence of mercury could be discovered.

The precipitate *b* was boiled with water, and filtered while hot. On cooling, the filtrate became turbid. It was again passed through paper, acidulated, and now yielded no turbidity with Mayer's test, until after it had been further concentrated; the precipitate had precisely the same behaviour as indicated above.

The mother-liquor, No. 2, was concentrated and treated with ether and potassio-mercuric iodide; the results were identical with those obtained with No. 1.

It will be observed that none of the experiments detailed above indicate the presence of even traces of an alkaloid, and the cause of the precipitation by Mayer's test must therefore most likely be sought for in the slight solubility in water of podophyllinic acid, one of the constituents of the so-called resin of podophyllum, since even Klunge's test for berberina has proven its entire absence. To test the correctness of this supposition, two samples of podophyllinic acid, prepared from the well-washed officinal resin with hot water and with ether, were dissolved in hot water, the filtered solutions cooled, again filtered, and these filtrates treated with Mayer's reagent, both with and without the addition of hydrochloric acid; but in no case was any turbidity observed. The slight quantity of this resinous compound which remains dissolved in cold water is equally soluble therein after the addition of some potassio-mercuric iodide; but it seems that some other constituent of the rhizome is capable of retaining for some time a somewhat larger portion of podophyllinic acid in complete solution, which is then precipitated by the test liquid mentioned, and perhaps by other salts, without, however, combining with the metal. Hence the clear mother-liquors, if tested shortly after the preparation of resin of podophyllum, may yield a precipitate with the test liquid, which would not be obtainable a few days later.

I believe that it may now be considered proven that the rhizome of podophyllum contains *no alkaloid* at any period of its growth. The yellow crystalline precipitate mentioned above must have doubtless been due to some accidental impurity in the drug (probably hydrastis?), which, from its minuteness, escaped detection before the article was ground.

* See *Pharmaceutical Journal*, before, p. 468.

The Pharmaceutical Journal.

SATURDAY, FEBRUARY 7, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE REGISTRAR'S REPORT.

THE publication of the usual annual statistical Report as to the number of persons on the Registers and the numerical strength of the Pharmaceutical Society, which was presented by the Registrar to the Council at its last meeting, affords us the yearly opportunity of pointing out some of the bearings it has on the interests of the trade when considered in connection with former reports. The full meaning of the figures in certain directions cannot be fully estimated in the absence of other information,—such, for instance, as the relation they bear to the increase of the general population,—but so far as their indications can be followed they are of sufficient interest to justify us in directing attention to them specially on these periodical occasions.

It appears that the general Register of Chemists and Druggists now contains 13,551 names, or 242 more than at the beginning of the year 1879. This increase represents the difference between 403 additions, of which 360 were made in virtue of persons passing the qualifying examinations (Minor and Modified), and 161 erasures, of which 155 were made in consequence of deaths reported from various sources. But the number of 242 does not represent a real increase on the Register, as—taking the average of former years—it is probably reducible by about 100 names that have become subject to erasure through death and other causes, but which, they not having been reported, will remain on the Register till its next rectification by the Registrar under the special powers conferred on him by the tenth section of the Pharmacy Act.

With respect to the Register of Pharmaceutical Chemists it is satisfactory to find that the anticipation expressed a few weeks since in our yearly summary as to this most important class has been fulfilled. In the course of last year 77 persons passed the Major examination and thus became entitled to registration as pharmaceutical chemists, and as during the same time the erasures only amounted to 65 it follows that this class shows an increase of 12 on the new Register, the numbers now being 2299 against 2287, as given in the last previous report. It may be remarked that this increase, like that before referred to, is subject to reduction through unreported deaths, but probably not to the extent of doing away with it altogether. Satisfactory as this is as an improvement on the previous year, in which there was a decrease of 20, it is evident, in the face of the increase of 242 on the general Register of Chemists and Druggists, that the number of persons passing the Major examination is not yet equal to the task of maintaining the relative numerical proportions between the class of pharmaceutical chemists and the whole body of the chemists and druggists, impaired as it is by the death not only of those who like themselves had passed the highest examination, but also of a larger number of those who became pharmaceutical chemists without examination, by election as Members of the Pharmaceutical Society, in the earlier days of its history.

A very interesting point in connection with this Report is the information which it, taken together with the printed Registers, affords as to the progressive increase in the relative proportion of persons carrying on business as pharmaceutical chemists and chemists and druggists in virtue of having passed the legal examinations. By the courtesy of the Registrar, in supplying us with proof sheets of the forthcoming Registers, we are enabled to state these relations on the present occasion.

Taking first the Register of Pharmaceutical Chemists, the number of persons enrolled on it who have passed the Major examination is 1410, or 61·33 per cent., against 1346, or 58·84 per cent., on the previous Register, being an increase absolutely of 64, and relatively of 2·49 per cent. The relative proportion of Major men to the whole body of chemists and druggists is now 10·4 per cent.

The number of examined persons, irrespective of pharmaceutical chemists, who are on the Register of Chemists and Druggists in virtue of having passed the Minor examination is 2645, being an increase of 248, their percentage relation to the whole Register having at the same time been increased from 18·01 per cent. to 19·52 per cent. The total number of the two classes of examined men, therefore, now number 3055, or 29·92 per cent.

These details may be more conveniently represented in the tabular form, thus—

	January 1, 1879.		January 1, 1880.	
	Number.	Per cent.	Number.	Per cent.
Pharmaceutical Chemists:—				
Examined . .	1346 } 2237	10·01 } 17·18	1410 } 2299	10·40 } 16·96
Non-examined	941 }	7·17 }	889 }	6·56 }
Chemists and Druggists who have passed the Minor only	2397	18·01	2645	19·52
Remainder, including those who have passed the Modified . .	8625	64·81	8607	63·52
Total	13,309	100·00	13,551	100·00

The report on the numerical strength of the Pharmaceutical Society affords, on the whole, subject for congratulation, since it shows that there were at the commencement of the present year a larger number of registered chemists and druggists connected with it as Members and Associates than at any previous period of its history. The total number of the four classes was 4589, against 4536 in the previous year, or an increase of 53. Moreover this increase is sufficient, within one quarter per cent., to maintain the previous relative numerical proportions between the subscribers to the Society and the whole number of chemists and druggists on the Register. Although t may be hoped, and reasonably believed, that this proportion will be increased as years roll on, and the Register records more exclusively the names of examined persons, yet it ought not to be forgotten—as it would appear to be occasionally by some who might have been supposed to be better informed—hat upwards of one-third of all the persons legally entitled to carry on the business of a chemist and druggist in Great Britain are now voluntarily associated with the Pharmaceutical Society.

In examining the details of this report it will be found that there was last year (from the cause that has already been hinted at) a decrease of 19 Pharmaceutical Chemist Members. It is interesting to note, as throwing light on the nature of this decrease, that the number of pharmaceutical chemists elected and restored to membership last year (74) nearly equalled the number of persons who passed he Major examination (77), and thus became eligible for such membership. There was also a decrease of 13 Chemist and Druggist Members, a class that must eventually become extinct. On the other hand, there was an increase in the number of Associates in Business amounting to 66, and one of 19 in the Associates not in Business. The decrease in the first two classes was therefore 32, and the increase in the last two 85, leaving a nett increase, as stated before, of 53.

Besides the foregoing there has been in the class of Apprentices an increase of 31, there being at the close of the year 1071 Apprentices or Students of the Society on the Society's books, the number twelve months previously having been 1040.

The following table will enable a direct comparision to be made between some of the indications of the statistics of this Report and those of the one presented in February, 1879:—

	Jan. 1, 1879.		Jan. 1, 1880.	
	No.	Per cent. of whole.	No.	Per cent. of whole.
Pharmaceutical Chemists, Members of the Society .	2002	87·54	1983	86·25
Other Registered Chemists and Druggists connected with the Pharmaceutical Society	2534	—	2606	—
Total number of Registered Chemists and Druggists connected with the Pharmaceutical Society . . .	4536	34·08	4589	33·86
Registered Apprentices subscribing to the Society. .	1040	—	1071	—

ADOLPHUS FREDERICK HASELDEN.

It falls to our lot this week to record the death, on Wednesday last, of Mr. Adolphus Frederick Haselden, a gentleman who in his time rendered valuable service to the pharmaceutical body, and especially to that portion of it constituting the Pharmaceutical Society of Great Britain. Mr. Haselden joined the Society as an Associate at its commencement, and became a Pharmaceutical Chemist Member in 1855. For many years continuously he served as a member of the Council, having been first chosen in 1859 to fill the vacancy caused by the death of Mr. Jacob Bell. In 1869 he was chosen Vice-President, and upon the resignation of Mr. Sandford, in 1871, he became President, which office he held until his retirement from the Council in 1873. Mr. Haselden also acted as an Examiner, with the exception of a short interval, from 1864 to 1877. Mr. Haselden contributed to this Journal a large number of papers which, besides being eminently practical, were frequently marked by a brightness and piquancy that gave evidence of considerable literary skill and rendered them very pleasant reading. As to the esteem in which Mr. Haselden was held nothing need be added to what has fallen from the lips of some of his former colleagues and is reported on another page.

SIR DOMINIC CORRIGAN.

We regret also to have to record the death of Sir Dominic Corrigan, Bart., the first President of the Pharmaceutical Society of Ireland. Sir Dominic took a great interest in the foundation of the Irish Pharmaceutical Society, and the vigorous evidence he gave before the Parliamentary Committee to which the subject had been referred no doubt contributed much towards securing the favourable report upon which the Act constituting the Society was based.

THE CALENDAR.

An advertisement in another page announces the fact that the Calendar of the Pharmaceutical Society for 1880 is now ready, and we call attention to it here, because we feel that were this valuable little annual better known among pharmacists, much trouble now spent in seeking information would be saved. Besides the lists of persons associated with the Society, the Pharmacy Acts and Charter, and the list of subscribers to the Benevolent Fund, the Calendar contains abstracts of a large number of Acts of Parliament and General Orders more or less affecting the carrying on of the business of a chemist and druggist. A list of these will be found in the advertisement. In the present issue also the Preliminary examination questions of the past year are included. In thus putting within the reach of the trade, for a nominal sum, a hand-book containing so much information the Council renders a service that might be taken more advantage of than at present is the case.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association will be held on Thursday next, 12th inst., when a paper will be read by Mr. I. R. James, on "Ostrich and other Pepsines." "A Report on Botany" will also be made by Mr. F. W. Branson.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, February 4, 1880.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT, IN THE CHAIR.

Present—Messrs. Atkins, Bottle, Churchill, Frazer, Gostling, Greenish, Hampson, Hills, Mackay, Richardson, Rimmington, Robbins, Savage, Shaw, Squire and Symes.

The VICE-PRESIDENT expressed his regret at the cause which led to his presiding over the meeting that day, namely, the illness of the President, Mr. Sandford, who was suffering from bronchitis, from, which, however, he was now recovering.

The minutes of the preceding meeting were read and confirmed.

EXAMINATIONS.

Mr. MACKAY asked whether he might remind the Council that some time ago it was arranged that there should be an interchange of visits between the Board of Examiners in London and the Board of Examiners in Edinburgh, and that the two Boards should visit each other in alternate years. There had now been a lapse of two years in this interchange. He did not wish to move a resolution on the subject, but simply to suggest that some arrangement might be made by the Council and the Board of Examiners by which a deputation might be appointed to visit Edinburgh at the April examination, or, if that was not convenient, at the July examination. In that case the examinations would be arranged so as to go on during the time that the deputation was present. An immense amount of good had accrued from the previous interchange of visits, inasmuch as the examinations were now conducted as much like each other as any two examinations could be.

Mr. HAMPSON asked whether there was a resolution on the subject, and whether the Council was bound to send a deputation to be present at the Scotch Board, or whether it was only done once with an understanding that it might be done again.

Mr. MACKAY said that it was done more than once.

The VICE-PRESIDENT said that he felt sure that the scope of the resolution was not simply that one visit should be paid.

Mr. SHAW said that the resolution was passed on account of a great diversity between the results of the examinations by the Scotch Board and the English Board. Was there now any difference between the results of the two examining boards? If so that might be a reason for the resolution being carried out.

The subject was then dropped until later in the meeting.

MEMBERS OF THE COUNCIL WHO RETIRE.

The lot being taken in the usual manner for the seven members of the Council who should retire in May next, the following names were drawn:—

Atkins.	Rimmington.	Squire.
Frazer.	Savage.	Symes.
Hampson.		

The following who remained in by lot last year now retire by rotation:—

Gostling.	Mackay.	Schacht.
Greenish.	Sandford.	Slipper.
Hills.		

The following remain in office for another year:—

Bottle.	Robbins.	Williams.
Churchill.	Shaw.	Woolley.
Richardson.		

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Evans, William Henry ....London.
Gascoigne, Charles ....Hurworth.
Kerr, Charles ....Dundee.
McCallum, Hugh ....Hong Kong.
McJannet, James...............East London, S. Africa.
Shillcock, George ....Bromley.

Chemists and Druggists.

The following registered Chemists and Druggists, who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected Members of the Society:—

Callaway, Lemuel.................Ipswich.
Henry, Edward Laurence ......Lewisham.
Mullock, Richard ....Birkenhead.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Brandsma, Dirk Gerhard ......Ware.
Dawson, William ....Greenwich.
Dixon, Herbert.....................London.
Freeland, Alonzo Joseph.........Angmering.
Hobbs, John Kingdon...........Harlesden.
Jones, James Lewis...............Llanerchymedd.
Jones, Owen William ....Flint.
Parker, Charles.....................Milnthorpe.
White, John Thomas ....Wordsley.
Willis, Blankley William ......Devizes.

Modified.

Frobisher, Frederick ....Selly Oak.
Hick, John ....London.
Littlejohn, Alexander ....London.
Negus, Samuel Thomas ....Northampton.

ASSOCIATES.

The following, having passed their respective examinations and tendered their subscriptions for the current year, were elected "Associates" of the Society:—

Minor.

Bates, Frederic William ....Crowles.
Chadwick, John ....Accrington.
Cock, James ....South Molton.
Cormack, George ....Fochabers.
Dow, William ....Kinross.
George, John Irving...............Tunstall.
Irving, Thomas Stableforth ...Spalding.
James, Thomas Cragg............Dalton-in-Furness.
Jones, William Harris............Abergavenny.
Littlefield, James Clarence......Ventnor.
Moon, George William ....Malton.
Murison, John ....Fyvie.
Newman, Alfred Pointon ......Crewe.
Porteous, Arthur Alexander ...Kirkwall.
Richardson, Arthur ....Epworth.
Tatam, Sam. Blackmore Charles.Ottery St. Mary.
Thompson, Thomas Clay.........Bedworth.
Wilkins, Robert Elliott ....Surbiton.
Winfrey, Richard ....Long Sutton.
Wyborn, Edward ....Reading.

Modified.

Dwyer, John........................London.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Adam, James Bell D. ....London.
Ansell, Alfred ....Birkdale.
Arnott, Daniel ....Pontypridd.

Banbury, Richard..................Camelford.
Batty, George Arthur ....Gt. Driffield.
Bell, Thomas........................London
Biggs, Frederick William ......Lichfield.
Briggs, George William ....Bulwell.
Buxton, Thomas ....Belper.
Carnaby, Francis William ......Blyth.
Chadwick, Arthur ....Leeds.
Chapman, Ingram William ...Crowle.
Clarke, Walter ....Bromley.
Coates, William Henry ....York.
Corder, Edmund Herbert ......London.
Cox, George Frecker ....Guernsey.
Dadley, Edwin B. ....Nottingham.
Davis, Norman ....Sunderland.
Doig, John ....Dundee.
Duckworth, Arthur ....Rochdale.
Featherstone, William B. ......Birmingham.
Fieldsend, John Francis ....Boston.
Flint, Francis Bramwell.........Leek.
George, Alexander Cosgrave ...Rusholme.
Horne, Albert D....................Manchester.
Humphries, Jacob ....Cleckheaton.
Hunt, John Osbaldeston.........London.
Jones, John Hughes ....Llangollen.
Laing, Arthur L....... ....Edinburgh.
Lloyd, James Clement............Lewes.
Mack, William Wilson ....Nottingham.
Martin, Alexander ....Leslie.
Nethercott, Walter John ......Stroud.
Nicholson, Thomas Tanner......London.
Orange, Frederick Charles ......Southsea.
Parker, Thomas Herbert ......Bedford.
Robb, Thomas ....Edinburgh.
Robinson, John Colburn ....London.
Short, Frederick William ......Chagford.
Smee, Walter Wallis ....Axminster.
Smith, Harry James ....Speenhamland.
Smith, William John ....Newcastle-on-Tyne.
Stephenson, Thomas ....Edinburgh.
Suttar, John ....Peterhead.
Tozer, Frederick Early ....Maidenhead.
Watson, Frederick Percy ......Lincoln.
Watts, Francis ....Wolverhampton.
Weddle, William ....Gateshead.
Weighill, William Lancelot ...West Hartlepool.
Wilde, Francis......................Andover.
Wilson, Alexander William ...Eastbourne.
Wood, Alfred Lyon...............Stonehaven.
Wylde, Samuel Roe...............Macclesfield.
Young, Herbert Edward ......Binfield.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

William Henry Evans, 1, Culvert Road, Battersea Park, London, S.W.

Anthony Tucker Roberts, 32, Buckingham Road, Brighton.

REGISTRATION.

The REGISTRAR said that three persons had severally made the statutory declaration that they were in business before the passing of the Pharmacy Act, 1868, and had applied for enrolment upon the Register. The applications were in due form, but as it appeared to him that the Council was sometimes under the impression that he did not exercise sufficient care in placing names on the Register, he had thought that he would bring the names before the Council before registering them. He would read the applications which had been made and the reports which he had received upon them.

The VICE-PRESIDENT said that the first question seemed to be whether the Registrar was perfectly justified in adopting such a course.

Mr. SYMES thought that what the Registrar proposed to do was perfectly unnecessary, unless there was some doubt cast upon the cases.

Mr. MACKAY thought that the Registrar ought to say whether he had the slightest doubt about the cases.

The REGISTRAR said that he had not.

The VICE-PRESIDENT said that the Council had better leave the responsibility of registration in the hands of the Registrar.

Mr. MACKAY asked whether it was to be understood that the Council was satisfied with the way in which names had been placed hitherto upon the Register? Was it an undoubted fact that the claims of all the persons whose names had been recently placed on the Register were perfectly satisfactory?

The REGISTRAR said that he should never think of placing any name on the Register unless he was thoroughly satisfied of the legitimacy of the claim. He might mention that the Council had recently placed a man upon the Register with whose claim he was not at all satisfied. He had kept him off as long as he could. He should like just to read one letter he had received, in reply to his inquiries as to the validity of a claim.

The VICE-PRESIDENT said that the Council had a great deal to do, not only then but generally, and he thought that it had better not undertake the duties of the Registrar as appointed under Act of Parliament. Of course, the members of Council would be very happy privately to assist the Registrar if he wished for assistance, but he thought that the action of the Council must only be in that form.

The REGISTRAR said that he should like to read one page of a letter which he had received in answer to inquiries which he had made about a person applying for registration. He had no objection to its being made public. He then read the following extract from the letter :—

"The inquiry your letter contains somewhat surprises me. . . . . (1) I presume that no one honoured with H.M. Commission of the Peace would sign a declaration without first ascertaining its 'exact meaning.' (2) By referring to the declaration I signed you would see that the words 'to my knowledge' were underlined and marked with a **X** in red ink ; so that my attention must have been drawn to the phrase unless I were 'colour-blind.' (3) Of course I 'adhere' to any declaration I have signed: this question is one of a character not often addressed to gentlemen."

That was the character of some of the letters which he got in answer to what were sometimes called his impertinent inquiries.

Mr. CHURCHILL said that his experience showed that the gentlemen who attested the legitimacy of applications for registration did not always know the person respecting whom they were attesting.

Mr. RIMMINGTON said that the Registrar's experience taught him that the papers which had to be signed were not always carefully read. In fact, he himself had recently met with a case in which a magistrate admitted that he had signed a paper *pro formâ*.

The REGISTRAR said that there were very few declarations by magistrates. He was more particular with magistrates than with medical practitioners.

Mr. RICHARDSON said that a magistrate had no knowledge whether a man was speaking the truth. He merely attested that he was told certain things.

Mr. BOTTLE said that it was within his knowledge that a magistrate had signed a declaration to the effect that A. B. and C. D. were carrying on business together, while he (Mr. Bottle) knew that C. D. was not a partner in the business, but merely served as a boy. He went and saw the magistrate with reference to the matter, when the magistrate told him that he had no knowledge of C. D., except from what his father had told him. He (Mr. Bottle) said to the magistrate, "Do you know that by giving this declaration you have rendered yourself liable to imprisonment without the option of paying a fine?" The magistrate replied in the negative, and before he would allow Mr. Bottle to leave the paper had to be torn up to satisfy him.

Mr. Robbins said that this went to show that the suggestion which he had made was the proper one, namely, that the Registrar should write and inquire whether anything was known of the people who were certified.

The Registrar's Report.

The Registrar presented his Report upon the Registers of Pharmaceutical Chemists and Chemists and Druggists; the Registers of Members, Associates and Apprentices of the Society; a Comparative Statement of the Numerical Strength of the Society; and an Analysis of Examinations for the year 1879.

Mr. Bottle said that he thought that the very succinct report which the Secretary had put into the hands of the Council was, on the whole, very satisfactory. It showed that although the number of pharmaceutical chemists subscribing to the Society was still decreasing, it had last year decreased in a smaller proportion. The decrease was 12 in 1876, 23 in 1877, 29 in 1878, and 17 in 1879. As a set-off against that, the apprentices connected with the Society had increased. In 1878 there was a decrease of 14, and in 1879 there was an increase of 31. This was, to his mind, exceedingly satisfactory, for it showed that they had, coming up amongst them, a class of young men from whom they might hope for the future. For some years the Society had seen persons passing the Major examination, and then not connecting themselves with the Society; but he would venture to suggest to young men that it was to their interest to connect themselves with the Pharmaceutical Society. Perhaps some of those who withheld themselves from the Society were not satisfied with what the Society had done and was doing; but the Society was capable of doing an immense amount of good, and, if it did not do all the good which those gentlemen thought that it ought to do, let them connect themselves with the Society and bring such influences to bear upon the Council as might incline the Society in the direction of good. He had felt a good deal of interest for nearly forty years in the Society, and it might be in the recollection of some of the older members of the Society that some years ago he went into an elaborate calculation as to when the Society would die out; but he had come to the conclusion, very satisfactory to himself, that it might be his fate to die out before the Society. For forty years it had been his privilege to labour in the interests of the Society with the view of helping to hand down a very useful institution to his successors.

It was then resolved—

"That the Registrar's Report be entered on the minutes and published in the Journal and Transactions."

The Report is printed on pp. 628 and 629.

Reports of Committees.

Finance.

The report of this Committee was received and adopted, and sundry payments were ordered to be made.

The report of the Committee included a recommendation to renew for five years the lease of the Society's rooms in Edinburgh at a rental of £85.

House.

The report of this Committee was also received and adopted.

Benevolent Fund.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow of a registered chemist and druggist, aged 50. Applicant had a grant of £10 in March, 1878.

£15 to the widow of a member, aged 70.

£15 to the widow of an annuitant. She has had three previous grants.

£15 to the widow of a registered chemist and druggist.

The report stated that the orphan child of the late Mr. Hall had been elected to the British Orphan Asylum without the necessity of any outlay on the part of the fund, and that the orphan child of the late Mr. Wiggin had been unsuccessful at the recent election at the London Orphan Asylum.

A discussion arose as to the propriety of continuing the payment from the fund to one of the annuitants.

The Registrar said that when the last payment was made to the individual in question, he had been informed, in accordance with instructions, that, unless he attended before the Committee and explained his conduct, the Committee would recommend that his pension be stopped. He attended at the next meeting and the Committee had an interview with him. The result was that the Committee decided that it would not recommend the Council immediately to withdraw his annuity. Then a letter from the annuitant was brought before the Council, stating that he would carry out the wishes of the Committee.

Mr. Hampson said that the Secretary ought not to pay this person anything without visiting him and paying him in his own house. There was reason to suppose that he was living in such a manner as to make him an unfit recipient of the fund. He thought that every annuitant should be visited in his own house if a doubt arose concerning him. Unless the person whose case was now under consideration would permit the Secretary to visit him in his own house, he (Mr. Hampson) should certainly recommend that no more money be paid to him.

Mr. Rimmington said that, to all appearance, the person in question was a most unworthy recipient of a pension.

Mr. Savage asked the Secretary whether annuitants appeared before him each time they were paid.

The Secretary said that, if they were living in or near London, he got them to call. If they were living at a distance from London, he sent a cheque either to the Local Secretary or to some other responsible person who would see them sign.

Mr. Symes said that, seeing that at the last meeting there were nine applicants for annuities, and the Council could grant only three, and that there was pretty clear evidence that all the nine were worthy persons, he thought that the Council ought most decidedly to hesitate before it continued to grant annuities to persons about whom there was any doubt. If there were more funds and there was not a superabundance of applicants, the Council might be more liberal; but under present circumstances, it ought to be most particular that the recipients of annuities should be worthy persons, and should live in a consistent manner.

The Vice-President said that in the present instance a certain opportunity had been given to the person in question to adapt his conduct somewhat more to what the Committee would like, and a date had been fixed, by which time it must be satisfactorily proved that he had changed. Perhaps it would be well not to reconsider the case until the expiration of that time.

Mr. Hampson said that the Secretary ought to have some guarantee that the money that was given to the man would be expended in the direction that the Committee desired—for the man's real benefit.

The Vice-President said that he had no doubt that the Secretary would do the best he could in that way.

Mr. Shaw said that during twelve years there had arisen only two cases in which the character of a recipient had been called into question.

The Secretary said that he always took the greatest possible care for the purpose of seeing that the money was properly disposed of. In the present instance, the

REGISTRAR'S REPORT.

MEMBERS, ASSOCIATES, AND APPRENTICES OF THE SOCIETY FOR THE YEAR 1879.

	Life Members.		Subscribing Members.		Associates in Business.	Associates not in Business.	Apprentices.
	Pharmaceutical Chemists.	Chemists & Druggists.	Pharmaceutical Chemists.	Chemists & Druggists.			
Number in 1878	243	2	1759	825	899	...	..
„ restored, 1879 ...	...	..	7	1	3	...	...
„ elected, 1879 ...	1	...	67	19	133*	...	...
	244	2	1833	845	1035	...	...
Deaths, secessions, etc. ...	3	...	91	33	70	...	...
Total strength of the Society	**241**	**2**	**1742**	**812**	**965**	**827**	**1071**
Summary:—							
1878	243	2	1759	825	899	808	1040
1879	241	2	1742	812	965	827	1071
Increase	...	...	...	...	66	19	31
Decrease	2	...	17	13	...	...	...

COMPARATIVE STATEMENT OF THE NUMERICAL STRENGTH OF THE SOCIETY FOR 5 YEARS: 1875-79.

MEMBERS.—PHARMACEUTICAL CHEMISTS.

	1875	1876	1877	1878	1879
Restored to Membership ...	7	6	5	5	7
Elected „ ...	53	64	56	45	67
(Total additions) ...	60	70	61	50	74
Deaths, Secessions, etc. ...	69	82	84	79	91
Decrease ...	9	12	23	29	17
Total number of Subscribing Members	**1823**	**1811**	**1788**	**1759**	**1742**

MEMBERS.—CHEMISTS AND DRUGGISTS.

	1875	1876	1877	1878	1879
Restored to Membership ...	3	1	2	4	1
Elected „ ...	50	36	23	25	19
(Total additions) ...	53	37	25	29	20
Deaths, Secessions, etc. ..	29	36	34	31	33
Increase ...	24	1	...	...	...
Decrease ...	...	...	9	2	13
Total number of Subscribing Members	**835**	**836**	**827**	**825**	**812**

ASSOCIATES IN BUSINESS.

	1875	1876	1877	1878	1879
Restored	...	2	3	1	3
Elected	148	160	159	153	133*
(Total additions) ...	148	162	162	154	136
Deaths, Secessions, etc. ...	31	32	54	69	70
Increase ...	117	130	108	85	66
Total number of Associates in Business	**576**	**706**	**814**	**899**	**965**

ASSOCIATES NOT IN BUSINESS.

	1875	1876	1877	1878	1879
Increase ...	54	...	18	...	19
Decrease ...	...	70	...	24	...
Total number of Associates not in Business	**884**	**814**	**832**	**808**	**827**

APPRENTICES OR STUDENTS.

	1875	1876	1877	1878	1879
Increase ...	57	82	120	...	31
Decrease ...	...	...	...	14	...
Total number of Apprentices or Students	**852**	**934**	**1054**	**1040**	**1071**

LIFE MEMBERS.

	1875.	1876.	1877.	1878.	1879.
Pharmaceutical Chemists	**261**	**251**	**247**	**243**	**241**
Decrease	8	10	4	4	2
Chemists and Druggists	**3**	**3**	**2**	**2**	**2**
Decrease	...	...	1	...	...

* 134 were elected, but 1 afterwards passed the Major, and was elected a Member.

ANALYSIS OF EXAMINATIONS FOR THE YEAR 1879.

FIRST OR PRELIMINARY EXAMINATION

Number of Candidates during the Year.	Number of Successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year	Average Number of Candidates at each Examination.	Average Number of Rejections at each Examination.	Percentage of Rejections.
1474	783	691	4	368·5	172·75	46·88

MAJOR, MINOR, AND MODIFIED EXAMINATIONS.

ENGLAND AND WALES.

Number of days on which the Board met for conducting the Major, Minor, and Modified Examinations... 25
Average attendance of the Members of the Board of Examiners at each Meeting ... ... 13·8

Examinations.	Number of Candidates during the Year.	Number of Successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year.	Average Number of Candidates at each Meeting.	Average Number of Rejections at each Meeting.	Percentage of Rejections.
Major	126	72	54	6	21·0	9·0	42·86
Minor	525	268	257	6	87·5	42·83	48·95
Modified	23	14	9	6	3·83	1·5	39·13

SCOTLAND.

Number of days on which the Board met for conducting the Major, Minor, and Modified Examinations... 13
Average attendance of the Members of the Board of Examiners at each Meeting 7

Examinations.	Number of Candidates during the Year.	Number of Successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year.	Average Number of Candidates at each Meeting.	Average Number of Rejections at each Meeting.	Percentage of Rejections.
Major	8	5	3	4	2·0	·75	37·5
Minor	131	72	59	5	26·2	11·8	45·03
Modified	9	6	3	5	1·8	·6	33·33

THE REGISTERS OF PHARMACEUTICAL CHEMISTS AND CHEMISTS AND DRUGGISTS, 1879.

Additions during the year:—

Number of persons who have passed the Modified Examination	20
Minor ,, ...	340
Major ,, ... 77*	
Number of persons registered on payment of the Registration Fee, having been in business before August 1, 1868..............................	22
Number of persons restored to the Register on payment of a fine	20
An Associate of the Society before July 1842, restored and elected a Member—Pharmaceutical Chemist	1
	403

* These having already been included in the number who passed the Minor, do not increase the numbers on the Register.

Erasures during the year:—

Deaths:—	
Notices from Registrars	114
Other sources	41
Erased at the request of registered persons themselves	5
Erased by order of the Council	1
Increase of numbers on the Register	242
	403

Number of Pharmaceutical Chemists on the Register, December 31st, 1879	2,299	
,, ,, Chemists and Druggists	11,252	
		13,551

man would not allow him to go to his dwelling-place, the reason which he assigned being that, if the other people in the house knew that he had received money, they would murder him for the sake of getting it.

Mr. GREENISH said that the Council might rest assured that the members of the Benevolent Fund Committee would keep before them the question of this person's annuity.

LIBRARY, MUSEUM AND LABORATORY.

The report of this Committee was presented.

The Librarian's report included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
Month of December.	Day	360	22	3	14
	Evening	145	18	4	8
Year 1879.	Day	5201	33	3	17
	Evening	2264	23	2	11 nearly.

Circulation of books.	No. of entries. Town.	Country.	Total.
Month of December	148	58	206
Year 1879	1723	755	2478

Carriage paid.	£	s.	d.
December	1	2	6
Whole Year	15	9	3

The following donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Commentar zur österreichischen Pharmacopoe, von F.C. Schneider und A. Vogl, 1879. Lief. 2-3. From Dr. Vogl.

Cooley (A.J.), Cyclopædia of Practical Receipts, 6th ed., 1879, pt. 15. From Messrs. J. and A. Churchill.

Masing (E.), Vergleichende Untersuchung der wichtigsten Handelssorten des arabischen Gummi und seiner Surrogate.

Werncke (W.), Über die Wirkung einiger Antiseptica und verwandter Stoffe auf Hefe, 1872. From Professor Dragendorff.

Year-Book of Pharmacy, and Transactions of the British Pharmaceutical Conference, 1879. 2 *copies.* From the Conference.

University College, London, Catalogue of Books in the General Library, etc., 1879, vol. 3. From the College.

United States, Surgeon General's Office, Medical and Surgical History of the War of the Rebellion, part 2, Medical History, 1879, vol. 1. From the Surgeon-General.

St. Bartholomew's Hospital Reports, 1879, vol. 15. From the Editors.

Chemical News, 1879. From the Editor.

American Journal of Pharmacy, 1879. From the Philadelphia College of Pharmacy.

Analyst, The, 1879. From the Editors.

Archiv for Pharmaci og technisk Chemie, 1879. From the Publishers.

Canadian Pharmaceutical Journal, 1879. From the Ontario College of Pharmacy.

Chemist and Druggist, 1879. From the Proprietors.

Chemist and Druggist; Australasian Supplement, 1879. From the Pharmaceutical Soc. of Victoria.

Journal of the Chemical Society of London, 1879. From the Society.

New Remedies, 1879. From the Editors.

L'Orosi, Giornale di Chimica, Farmacia e Scienze affini, 1879. From the Associazione Chimico-Farmaceutica Fiorentina.

Ny pharmaceutisk Tidende, 1879. From the Publishers.

Journal of the Photographic Society of Great Britain, 1879. From the Society.

Revista Farmacéutica, 1879. From the Sociedad Nacional Argentina de Farmacia.

Zeitschrift des allgemeines österreichischen Apotheker-Vereines, 1879. From the Verein.

Anzeiger der kaiserliche Akademie der Wissenschaften in Wien, mathematisch-naturwissenschaftliche Classe, 1879. From the Akademie.

Newcastle-upon-Tyne Chemical Society, Transactions, 1879. From the Society.

Journal of the Linnean Society of London, 1879. From the Society.

Bulletin de la Société Botanique de France, 1879. From the Société.

Proceedings of the Royal Society of London, 1879. From the Society.

Proceedings of the Philosophical Society of Glasgow, 1879. From the Society.

The Committee recommended the purchase of the following books for the Library:—

Hill (J.), Family Herbal, 1812.

König (J.), Chemie der menschlichen Nahrungs- und Genussmittel, 1880, Theil 2.

Piesse (G.W.S.), Art of Perfumery, 4th ed., 1879.

Royal College of Physicians of London, Translation of Pharmacopœia of 1836, by R. Phillips, 3rd ed., 1838.

The Curator had reported that the attendances in the Museum during December had been:—Morning: average, 12. Evening: average, 2.

He had also reported that he had received the following donations to the Museum, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Presented by Mons. C. Chantre:—

Bark and Gum of *Acacia pycnantha* and *Acacia decurrens*; a Japanese Root used in medicine, and Specimens for the Herbarium of *Eucalyptus occidentalis, leucoxylon*, and *Eucalyptus brachypoda.*

Presented by Professor Attfield:—

A Specimen of Lignite.

Presented by Mr. W. Southall:—

Seeds of *Ervum Ervilia.*

Presented by the India Office through Sir J. D. Hooker, K.C.B., from the India Museum collection:—

Several cases of Bombay Drugs, containing a number of valuable and interesting specimens.

Presented by Mr. R. Talling, of Lostwithiel:—

Specimens of Calamine (carbonate of zinc), Asbestos, Cobalt Ore, Iron Pyrites, and Fluor Spar.

Presented by Mr. C. B. Allen:—

Specimens of Cassiterite, Native Copper, Peacock Copper Ore, Blende with Tin, Redruthite, Copper Pyrites, Limonite, and Native Arsenic.

The Curator had reported that he had received an application for loan of Electrical Apparatus for Decomposition of Water, from Mr. A. H. Claypole, of Farnborough; and another for a loan of specimens intended to illustrate a paper to be read before the Chemists' Assistants' Association by Mr. G. W. Bullen.

The VICE-PRESIDENT said that it was a point of congratulation that the Museum continued to receive donations from important quarters; and the donations of books to the Library, which were rather numerous on this occasion, showed that the Society was appreciated by those who wrote and owned works of value.

The report and recommendations of the Committee were received and adopted.

Mr. GREENISH moved that the Journal and Transactions of the Society be sent to the University of Brussels regularly as published. The Museum had received donations from Professor Bommer, director of the Botanical Gardens, of Brussels. Professor Herlandt of that University had told him (Mr. Greenish) that he never saw the Journal of the Society.

The motion was seconded by Mr. HILLS and carried unanimously.

GENERAL PURPOSES.

The Council went into committee to receive the report of this Committee. It included the usual report of the Solicitor as to cases placed in his hands, and also correspondence with two persons against whom proceedings had been ordered.

Several other cases of alleged infringement of the Pharmacy Act were also reported, and in three cases a prosecution of the offenders was recommended.

The Council having resumed, the report and recommendations of the Committee were received and adopted.

PROCEEDINGS IN COMMITTEE.

In pursuance of notice, Mr. SAVAGE then moved the following motion—

"That motions made to go into committee of the Council be adopted or rejected without a discussion, beyond an explanation from the mover as to his reasons for doing so."

He said that the motion was so very simple and seemed so to commend itself, that it would scarcely require a word of explanation. He had thought that the Council might save a great deal of unnecessary talking if, when a member moved that the Council should go into committee, a vote were taken without discussion.

Mr. SHAW said that he had much pleasure in seconding the motion. At the last meeting he had made an observation to the same effect as the motion. It was very desirable that committees should report as fully as possible. The business of the committees was gone over the day previously to the meeting of the Council, and, when there was any matter which required to be discussed in private, any member of the Committee was competent to state at once succinctly the reasons for going into committee, in order that the time of the Council should not be taken up by unnecessary discussions.

Mr. SYMES said that while he sympathized with Mr. Savage's intention, which, he presumed, was to save a waste of time at the Council meetings, he was sorry that he could not at all follow him in the recommendation. When a member of Council stated that he had special reasons for wishing to discuss a subject in committee, as a rule the Council accepted his judgment and went into committee; but he should be sorry to see a resolution passed compelling it to do so. He would prefer that the matter should be left as one for the judgment of the Council. At the last meeting of the Council it went into committee, at the request of a member of Council, with reference to an application for membership, the discussion upon which might very well have taken place openly without the least offence to the person referred to. Going into committee was now a more troublesome thing than it used to be. He really saw no necessity for the Council hampering itself with a resolution of that kind, when the difficulties which it would incur were likely to be greater than those which it would save.

Mr. HAMPSON said that he must oppose the motion, because it was quite unnecessary. Hitherto the Council had not tied its hands in any way, and an occasion might arise when it would be extremely desirable in the interest of the Society that the propriety of going into committee should be discussed. At some future time the Council might be so constituted that the majority might desire to shirk discussion, and be disposed to hide themselves under the veil of a committee. He thought that it would be objectionable to pass a resolution which would allow of such a course. He believed that the common sense which prevailed in the Council was a sufficient guarantee that if it was desirable to go into committee it would be done. He objected to unnecessary restrictions, and believed that what the motion proposed was an unnecessary and an uncalled-for restriction.

Mr. SQUIRE said that he could not agree with the last two speakers. The motion would not bind the Council to go into committee; it simply required that it should vote at once upon the question. Those who did not want to go into committee could say so by their votes, but they need not waste three quarters of an hour in arguing the question. It seemed to him that the motion would save a great deal of time.

Mr. GOSTLING said that he should certainly vote for the motion brought forward by Mr. Savage, because it seemed to him that it would save a great deal of time. He believed that after a member had made a statement of his reasons for going into committee, the Council would be perfectly able to decide without discussion.

Mr. MACKAY said that he could not follow the objections which had been made against the motion. The proposal did not lay down a hard and fast line. He could not see how members would be bound to go into committee, seeing that they would be able to vote against it.

Mr. SYMES remarked that the motion said "without a discussion."

Mr. MACKAY: Precisely; but not without voting.

Mr. GREENISH said that he was sorry that he could not vote with Mr. Savage in this matter. He did not like to see the Council restricted, but would prefer that the same conditions should continue as had prevailed up to the present time. He had on many occasions seen a discussion on the question of whether the Council should or should not go into committee, and he thought that that discussion had been a benefit. It was objectionable to bind the Council with such a resolution as this.

Mr. BOTTLE said that he could not support his friend Mr. Savage in this matter. He should very much like to feel that the proposal formed part of the unwritten law of the Society rather than that it should be recorded in the statute book. There was this objection to it, that the mover of a proposition to go into committee might have a very weak reason for his proposal but somebody else might have a very strong reason, and the present motion would prohibit his stating that strong reason.

Mr. ATKINS said that it struck him that the motion itself was a very harmless one; but, at the same time, he could not support it. It would place too much power in the hands of the person who proposed to go into committee. There was a still stronger reason which had not been referred to. He hoped that the difficulty which no doubt was at the back of this motion would by-and-by be entirely removed, and that it was only a question of time for the reporting to be placed on more satisfactory grounds. They had better let matters rest as they were.

Mr. FRAZER thought that the motion was not wanted.

Upon a vote being taken, there appeared 6 in favour of the motion and 8 against it. The motion was therefore negatived.

DEATH OF MR. HASELDEN.

The SECRETARY announced that a message had just been received that Mr. Haselden, formerly President of the Society, had died that morning.

Mr. ATKINS proposed the following resolution on the subject:—

"That this Council having heard of the death of Mr. Haselden desire to express to Mrs. Sharp, the sister of the deceased gentleman, its most sincere sympathy at the loss which she has sustained, and at the same time to convey the assurance of the high esteem in which the late Mr. Haselden was held by the Council for the valuable services which he had rendered to pharmacy, and especially for the efficient manner in which he performed the duties of President of the Society."

Mr. SAVAGE said he had much pleasure in seconding the motion, having known Mr. Haselden very well, and having seen him frequently from the commencement of the attack of paralysis from which he had suffered, as he had been residing in Brighton.

Mr. ATKINS, in support of the motion which he had proposed, said that many gentlemen at that table had a more intimate and personal knowledge of Mr. Haselden than he had; but still, he knew him better than he knew some men of a former generation to his own. When he (Mr. Atkins) began to move more actively in pharmaceutical matters, he was brought into relations with Mr. Haselden and he learned to highly respect him for his integrity and straightforwardness of character, and for his urbanity as a man. The motion made no reference to Mr. Haselden's work as an examiner, but he believed that he had done an important work for that Society and for pharmacy generally in the examination room. He liked to think of Mr. Haselden as he liked to think of other men of the past who had more especially made their mark as pharmacists. Years ago he remembered reading with pleasure and profit Mr. Haselden's papers on pharmacy. They were pre-eminently practical papers, and they had sufficient accuracy and finish about them as scientific productions, and he believed that they would stand the most searching criticism; but they were pre-eminently papers that could be taken into their laboratories and shops and made useful for daily work. He felt that pharmacists owed a debt of gratitude to the memory of Mr. Haselden as an earnest, persevering, practical worker in pharmacy, and he was sure that they would all feel great pleasure in communicating an expression of their kindly feeling towards Mr. Haselden's sister as representing his family.

Mr. Frazer said that although not cognizant himself of Mr. Haselden's services as an examiner, he had heard of the value of them from other sources. He had a very high estimate indeed of Mr. Haselden, who was the first representative of that Council who officially visited Scotland. From the time of his visit, he (Mr. Frazer) had had much intercourse with him publicly and privately, and he had formed a very high estimate of his qualities, both personal and scientific.

Mr. Mackay said that he thought that there could not be a doubt as to what was the duty of the Council in this matter.

Mr. Greenish said that his knowledge of Mr. Haselden dated from the time when he (Mr. Greenish) became a member of the Council, and he had a very high opinion of the sterling character of that gentleman. As to his attainments as a pharmacist, he considered that they were of a very high order. The impression had been left on his mind that Mr. Haselden was a highly educated man.

Mr. Bottle said that he would like to add his expressions to those of the other members of the Council as to the services which Mr. Haselden had rendered. It was his privilege to be a member of the Council when Mr. Haselden was called upon to take the presidency under circumstances of some difficulty, and Mr. Haselden showed himself quite equal to the occasion. He had filled the office of President for two years, and acted for a short time during Mr. Sandford's absence. Those who had the privilege of being members of the Council at the time would bear in mind not only Mr. Haselden's value as a well educated and advanced pharmacist, but the urbanity with which he occupied the chair, and the kind consideration that he gave to every member of the Council.

Mr. Hills said that Mr. Haselden was an old friend and fellow student of his. He believed that he was on the Council for about fifteen years, and was ever active in the interests of the Society. It was with very great pleasure that he had been associated with him.

The motion was carried unanimously.

It was announced that Mr. Haselden's funeral would take place at Highgate Cemetery on the following Saturday. Some members of the Council expressed an intention to be present.

Weights and Measures Act.

The Secretary said that at the last meeting of the Council it was resolved to present a memorial to the Board of Trade, urging the necessity of a uniform practice under the new Act of marking measures in various parts of the kingdom. Since then the President had addressed the following letter to the Board of Trade, at Whitehall, on the subject:—

"Pharmaceutical Society of Great Britain,
"17, Bloomsbury Square,
"London, W.C.,
"*January* 14, 1880

"Thomas H. Farrer, Esq.,
"Committee of Privy Council for Trade,
"Whitehall Gardens, S.W.

"Sir,—The time having arrived at which the standards of apothecaries' weights and measures described in the Order of Council issued on August 14 last should come into operation, and there appearing to be much difference of opinion and divergence of practice in the various district offices at which such weights and measures should be verified and marked, I am requested by the Council of this Society respectfully to draw the attention of the Board of Trade thereto.

"Chemists having become acquainted with the various communications which have taken place between your Board and this Council, naturally appeal to us for information as to the steps necessary to be taken in order to bring themselves into accordance with the law, and they report the difficulties which arise in different localities in their endeavour to do so.

"In one metropolitan district the inspector gave notice to certain chemists that all weights and measures must be examined and stamped, and proceeded to verify and mark them accordingly, at least six months ago.

"As far as I can understand, the standards had not then been delivered to any district office, nor have they generally been distributed even now. That this is undoubtedly correct seems to be proved by the fact that various district inspectors, on being applied to, reply that they are not yet in a position to perform this part of their duty.

"In one very important district the answer was that only measures holding a given quantity when filled to the brim could be recognized. In another case the district inspector replied in writing, 'Glass measures cannot be stamped unless they are made partly of metal.'

"By the reading of the Act, especially section 46, these seem to be entirely misconstructions, and the standards themselves, which, by the courtesy of Mr. Chaney, I have been permitted to see at the Standards Office, in Palace Yard, show by their graduations and subdivisions that it is so.

"It appears that although the law is clear and well understood at the chief office, very much may be left in the hands of the district inspectors as to the method of carrying it into effect. It is on this point that I venture now to trespass on you and to suggest that somewhat definite instructions of detail should be issued to all officials.

"It would be easy to demonstrate, should you be pleased to grant an interview to me and one or two members of the Council of this Society, that it would be impossible for chemists to carry on their business with measures always filled to the brim or with measures not having many subdivisions graduated.

"I have the honour to be, sir,
"Your obedient servant,
"G. W. Sandford,
"*President of the Pharmaceutical*
"*Society of Great Britain.*"

In reply thereto, a letter had been received, under date the 5th of January, to the effect that Mr. Farrer would receive a deputation from the Council. In accordance with this reply, a deputation, consisting of the President, Mr. Williams, Dr. Paul, and the Assistant-Secretary, had had an interview with Mr. Farrer, of the Board of Trade, at Whitehall, and he would read the following report of the deputation, which had been prepared. If Mr. Williams and Mr. Sandford had been in attendance at the present Council meeting they would possibly have amplified that report.

The VICE-PRESIDENT suggested, before the report was read, that in the absence of the President and Mr. Williams it would be advisable to invite Dr. Paul to attend the Council, and he, together with the Assistant-Secretary, would then be able to afford the Council any further information that might be desired.

This having been agreed to, Dr. Paul and the Assistant-Secretary were called and asked to take seats at the Council table, after which the Secretary read the report, as follows:—

"*Report of the Deputation to Mr. Farrer, Board of Trade, January* 23, 1880.

"Present—The President, Mr. Williams, Dr. Paul and the Assistant-Secretary.

"The deputation submitted to Mr. Farrer various reports of the different readings of the Weights and Measures Act so far as regards apothecaries' weights and measures in different districts, viz., that in one district the inspector had declared that only measures full to the brim could be stamped, thereby ignoring all the graduations at present in use and necessary on glass measures.

"That in another district the inspector had decided that glass measures cannot be stamped unless they are made partly of glass and partly of metal. A two ounce measure was submitted with the following graduations only:—½, 1, 2, 3, 4, 8 and 16 drachms, ½, 1 and 2 oz., and it was pointed out that such a measure was altogether insufficient for the use of chemists. This measure had been verified and marked by the inspector of the Marylebone district. That another inspector had refused to verify 6, 8, 12, or 16 oz. measures, or anything above 20 oz. A 20 oz. measure would simply be marked 1, 2, 3, 4, 5, 10, 20 oz., only seven lines on each.

"That there was a discrepancy in the rate of charge in different districts for verifying graduations.

"The deputation urged on Mr. Farrer the great importance of uniformity of practice in all districts, and the consequent necessity of all inspectors being in possession of similar apparatus for testing weights and measures, with certain instructions as to their use.

"Mr. Farrer replied that the Board of Trade had no power to issue detailed instructions as to the carrying out of the Act of Parliament; it could only advise the local authorities.

"He was decidedly anxious that there should be uniformity, and suggested that if the points in doubt could be embodied by the Pharmaceutical Society in a memorandum addressed to the Board of Trade, the Board would give the matter full consideration, and send such a detailed answer as might possibly have great weight with the district authorities, and tend to bring about a better state of things if the Society would print and distribute amongst them copies thereof."

The VICE-PRESIDENT said that what the Council now required was to ascertain from Dr. Paul and the Assistant-Secretary what occurred at the interview, before any discussion took place on the subject.

Dr. PAUL said that the report which had been read embodied everything. The chief remark of Mr. Farrer was that the Board of Trade was almost entirely passive in the matter, and that it had no power to direct. It could only advise those local authorities who came to it for assistance. The local authorities, except in a few instances, did not seem to have applied for assistance from the Board of Trade.

Mr. SAVAGE asked whether the Board of Trade was not waiting for some communication from the Pharmaceutical Society. If he understood rightly, it was anxious that the Pharmaceutical Society should convey its specific views in connection with the question.

Dr. PAUL said that the Board of Trade was scarcely anxious, but Mr. Farrer said that if the Council thought there was a difference of opinion among inspectors, or those who had to deal with the carrying out of the Act, and if the difference could be shown to exist and to affect individuals in the exercise of their business, a representation to that effect might fairly be made by the Council to the Board; and, if that were done, the Board might advise some mode of proceeding.

Mr. MACKAY said he thought that there could be no doubt that the Council of the Society could guide the Board of Trade very much in this matter. The Council might get the Board of Trade to print and issue a circular without waiting for applications from the inspectors. It would not be too much to expect the Board of Trade to have instructions printed in the form of a circular and sent to the local authorities, with a request that their inspectors should act upon those instructions.

Dr. PAUL said he thought that the object of Mr. Farrer's suggestion was that some plan should be arranged for the Council to address itself to local authorities, but not to the inspectors at all. The inspectors were the last people to be communicated with about the operation of the Act.

Mr. GREENISH said he supposed they received their instructions directly from the Board of Trade.

Dr. PAUL said, No, but from the local authorities. The Board of Trade had no power to instruct anybody at all. It was suggested by Mr. Farrer that any action taken by the Society should be in the shape of a communication to the local authorities, who alone had the power to put the Act into operation.

Mr. ATKINS asked whether the difficulty with regard to the Weights and Measures Act was restricted to chemists and druggists, or was there any deadlock at present with regard to the whole of the legislation on the matter?

Dr. PAUL said no doubt there were some difficulties in other quarters; but in speaking to Mr. Farrer the other day reference was made, exclusively, to apothecaries' weights and measures.

Mr. SAVAGE asked whether the Act of Parliament was simply left for the adoption or otherwise of the local authorities.

Dr. PAUL: Precisely.

The VICE-PRESIDENT said that he took it that the result of the deputation was very much to this effect, that Mr. Farrer, speaking with the authority of his Board, was prepared to receive from the deputation or from some other deputation representing the Pharmaceutical Society any statement of difficult points about which the Society required something like an authoritative declaration, and that, as far as possible, the Board of Trade would give a definite opinion upon those points for the guidance of any who appealed to the Society for advice.

Dr. PAUL said that Mr. Farrer reduced the question to three heads:—First to state the difficulties that had been met with; then to show the mode in which those difficulties affected people in the exercise of their ordinary business; and thirdly, to suggest the establishment of a scale of charges.

Mr. BOTTLE asked whether he understood Dr. Paul, that Mr. Farrer suggested that the Council should draw up and circulate to local authorities some expression of opinion.

Dr. PAUL said he understood him so.

Mr. BOTTLE asked if the Board of Trade would not do so.

Dr. PAUL said it would not. Mr. Farrer's suggestion was that the communication in the first instance should be from the Council to the Board of Trade and that then, as a matter of ultimate procedure, there should be a communication from the Council to the local authorities.

Mr. MACKAY said that he understood that the suggestion was that the Council of the Society should get information from chemists and druggists in certain districts and embody it in some report to the Board o

Trade, and that then, if the Board of Trade was persuaded by what the Council put before it, it would issue a manifesto to the local authorities, and then those authorities should instruct their inspectors to do what common sense would guide them to do.

Mr. Atkins said that evidently the Board of Trade felt a difficulty in dealing with the technical points of the Act with regard to pharmacy.

The Assistant-Secretary, in reply to an inquiry by the Vice-President, said that the paper which had been read as the report of the deputation was drawn up by Mr. Sandford and himself immediately after the deputation took place, and it contained what they remembered about it. It practically embodied what Dr. Paul had said. The general impression left on his mind, and apparently on Dr. Paul's mind, was that the Board of Trade seemed quite passive, and that it could do nothing. Mr. Farrer said to the deputation, "It is no good for us to try to drive the local authorities, as we do not want to get into trouble with them. We can lead them better than we can drive them. If they come to us and ask us questions, we can answer them, but we cannot volunteer advice or tell them what to do."

The Vice-President suggested that the whole business connected with this subject, having already been placed in the hands of a small committee, should be further considered by it.

Mr. Hampson proposed that the matter should be referred to the Law and Parliamentary Committee.

The Chairman thought that it would be well to have a small sub-committee to take the matter in hand.

Mr. Atkins seconded the motion for referring the matter to a committee.

After some discussion,

Mr. Hampson withdrew his proposal to refer the question to the Law and Parliamentary Committee, and agreed to a reference of it to a committee.

A motion referring the subject to a committee consisting of the President, the Vice-President, Mr. Greenish, Mr. Squire, Mr. Hills, Mr. Williams and Mr. Hampson, was accordingly put forward, and carried unanimously.

Interchange of Visits between the Boards of Examiners.

On this subject being again mentioned,

Mr. Mackay said that he had considered it his duty to bring it before the Council, because he had an impression that there was a distinct motion to the effect that a deputation from the London Board should attend the examinations in Edinburgh, and that one from the Edinburgh Board should attend the examinations in London, every year. He reminded the Council that no deputation had gone from one place to the other since June, 1878.

Mr. Hampson asked whether Mr. Mackay would give notice of a motion on the subject for the next meeting.

It was eventually agreed that the question should be introduced by the Secretary into the agenda for the next Council meeting, and that, in the meantime, the opinion of the Boards of Examiners on the subject should be sought.

Parliamentary Papers.

A request from the Editor to be supplied with the entire sessional Parliamentary papers, instead of simply with the "Daily Votes and Proceedings," was referred to the Library and Museum Committee for consideration.

The Use of the Word "Pharmacy."

The Secretary read the following communication, which had been addressed to the President and Council of the Society:—

"8, The Strand, Torquay,
"*Jan.* 31, 1880.

"To The President and the Council of
the Pharmaceutical Society.

Sirs,—Some time ago, as an Hon. Local Secretary, I inquired from Mr. Bremridge whether a 'Minor' had a legal right to style his shop a Pharmacy or Pharmaceutical Laboratory.

"Mr. Bremridge having submitted my inquiry to the General Purposes Committee, informed me that the 'various members of the Committee held different views on the subject, but the Committee collectively declined to express an official opinion.'

"Under these circumstances, as the point seems to me not an unimportant one, possibly involving and affecting the rights of 'Majors,' I venture to draw the attention of the Council thereto, and to request their official opinion thereon.

"Very faithfully yours,
"Edward Smith,
"*Hon. Local Secretary for Torquay.*"

Upon a vote being taken upon the question whether the communication should be entertained, the Council decided to entertain it.

Mr. Hampson moved that the letter should be referred to the General Purposes Committee for consideration.

Mr. Squire seconded the motion.

The Secretary read the following extract of a letter which he had written to Mr. Smith on this subject on the 9th January:—"My dear Sir, You will remember when you were on the Council, that Mr. Flux over and over again advised us that it was not the business of the Council to interpret the law, but to administer it."

Mr. Robbins moved—

"That Mr. Smith's letter be handed to the Solicitor for his opinion on the question submitted to this Council."

It would be impossible for the Law and Parliamentary Committee to say more on the subject than the members of the Council could say themselves.

The motion was seconded by Mr. Frazer.

The Vice-President said that the question had been before the Committee, which came to the conclusion that it declined to interpret the law.

Mr. Atkins said, then it was a case for a lawyer.

Mr. Frazer seconded Mr. Robbins's motion that the question should be referred *simpliciter* to the Solicitor.

Mr. Squire asked whether the Society would have to pay the fee for the Solicitor's opinion?

Mr. Robbins: Certainly.

Mr. Atkins understood that the question was not put merely in a theoretical way, but that the difficulty was one which had really practically presented itself.

Mr. Hills said that he knew a case in point.

Mr. Hampson said that it was extremely unadvisable that the Council should ask the Solicitor to give an opinion on such a matter until it had a *bonâ fide* case brought before it. If there was a case of offence against the law, the matter might be brought before the Council, but in the present instance it was asked to give an opinion on a question of law which might have been proposed simply from a desire for information or curiosity.

The Secretary said that Mr. Flux had some years since given his opinion that members and members only could assume connection with the Society, and that persons who had passed only the Minor examination were not legally entitled to claim that connection.

Mr. Rimmington said that that opinion did not cover the present case.

Mr. Mackay said that no doubt Mr. Smith had a particular case before him. It was a very common thing for a person, instead of calling his establishment a chemist's shop, to call it a pharmacy.

The Vice-President did not think that the Council would be advancing much by getting a definite case.

Mr. Mackay thought that a special instance ought to be obtained before an opinion was taken.

The Vice-President said that that would not materially alter the opinion.

Mr. Mackay said that he would rather have a tangible case.

The SECRETARY said that he knew very well the case to which Mr. Smith referred.

Mr. ATKINS said that there were other cases. Perhaps a legal opinion could be obtained quite as well or better apart from a definite instance.

Mr. MACKAY said, that as he gathered from the Secretary that he knew the case upon which Mr. Smith had founded his question, he would withdraw his objection.

The SECRETARY said that he knew of scores besides the case in question, and he should be very glad indeed to have this question settled.

The VICE-PRESIDENT said that the taking of the Solicitor's opinion would not commit the Council to anything.

The SECRETARY said this was a much larger matter than appeared on the surface. There were many persons who passed the Minor and never went to the Major, and if these persons were allowed to imply that they were pharmacists it would detract in a very great measure from the importance and dignity of those who qualified themselves for the higher examination.

Mr. HAMPSON withdrew his motion for referring the question to the General Purposes Committee and moved instead the following as an amendment upon Mr. Robbins's motion:—

"That before obtaining the opinion of the Solicitor on the question of law, the case of infringement be brought before us and investigated."

The amendment was seconded by Mr. SQUIRE.

Mr. GOSTLING said that the Council would be much better prepared to listen to a case after having had the Solicitor's opinion. Therefore he should support Mr. Robbins's proposition.

The amendment, on being submitted, was negatived by a majority of 4. The motion of Mr. Robbins was then carried *nem. con.*

THE SALE OF FOOD AND DRUGS ACT.

Mr. ATKINS mentioned the case of a highly respectable young chemist who had been twice prosecuted under the Sale of Food and Drugs Act, and in each instance without the slightest foundation. He (Mr. Atkins) felt that it was quite time for the Society to make a very decided and outspoken protest against the action of local inspectors in dragging chemists into court in such cases. However innocent a man might be, if plenty of mud were thrown at him some of it would be almost sure to stick.

SALE OF NARCOTICS.

The Council then went into committee on the subject of the sale and use of narcotics.

PHARMACEUTICAL MEETING.

Wednesday, February 4, 1880.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT, IN THE CHAIR.

The minutes of the previous meeting having been read and confirmed,

The CHAIRMAN called on—

Mr. HOLMES, who, in describing the specimens on the table, said that the majority of them had been presented by Government through Sir Joseph Hooker, and formed a small portion of the materia medica collections which were originally in the India Museum. The specimens now exhibited represented only a portion of the donations that had been received by the Society. One or two of the specimens had been received from other sources. They were, specimens of tayuya and guaco, presented by Dr. Symes, which had been recently introduced into medicine in this country, the latter, he believed, being chiefly used by homœopaths for syphilis, paralysis and cancers. There was a singular resemblance between one of the Indian drugs on the table, viz., *Tinospora cordifolia*, and the tayuya in appearance, so that they might be easily mistaken for each other at first sight. There was also a specimen of some very astringent pods from South America, presented by Messrs. Curling and Co., which were imported into this country some time ago. When first received by the importers they were supposed to be the common locust bean. From the taste and appearance he should judge that they might be made available as a source of tannin. He could supply samples for investigation. Some of the Indian drugs on the table were very beautiful s pecimens, and were much better than those previously in the museum, while others were valuable acquisitions. Among these might be mentioned pods of *Mucuna pruriens*, showing the hairs (cowhage) *in situ*. Others were remarkable for their curiosity, especially one of trehala manna, as it was called. It consisted* of the cocoons of a small weevil, *Larinus maculatus*. These cocoons were the source of the peculiar sugar called trehalose. Two or three of the series of camphors were also of great interest; one was Ngai camphor, which was examined a short time ago by Mr. Plowman. Another was Borneo camphor, an excessively rare article in this country. Another, called ajwain-ka-phul, was a specimen of crystallized thymol, obtained during the distillation of ajowan seeds with water, the water being an official preparation of the Indian Pharmacopœia and used as a carminative. The crystals floated on the surface of the distilled water. Then there was a specimen of henbane from India which resembled that met with in commerce in this country, but the leaves were very much larger. They were not so deeply cut as those of the biennial kind. The odour was, if anything, more powerful in the Indian plant. It had occurred to him that as drugs from hot climates were generally more potent, and henbane was a very expensive and extensively used drug in this country, it might be profitable to obtain it from India. Then there was a specimen of wormseed from India, which to the naked eye closely resembled the Barbary wormseed in appearance. There was also a specimen of safflower-seed oil on the table. The seeds of the safflower were sometimes met with in drug sales in this country and were mistaken for sunflower seeds; under pressure they yielded a very pale limpid oil, which had a taste something like that of oil of almonds; whether it was a drying oil or not, he was not sure, but he should judge that it was not. There were also fine specimens of chiretta, one being false chiretta (*Ophelia angustifolia*) from Sylhet, in the north of India, and another being the genuine kind from the south of India. There were also two interesting specimens of assafœtida. One was the product of *Ferula alliacea*, and was never seen in English commerce. This was the kind mentioned by Dr. Dymock as being the only sort issued from the Government stores in Bombay, and as being a stronger and better assafœtida than the one which occurs in commerce in this country. The other kind of assafœtida, called candaharee hing, also was not met with in commerce in this country and, being rare and expensive, it was said to be used as a condiment only by the more wealthy classes in India. These specimens were, however, not so fine as those which had already been presented to the museum by Dr. Dymock. There were a few specimens of essential oils and aromatic herbs suitable for perfumery, to which it might be interesting to call attention. One of the oils, obtained from the flowers of *Lawsonia inermis*, better known as the henna plant, had an odour exactly like that of the tea rose. Another was the volatile oil of one of the screw pines, *Pandanus odoratissimus*, having a remarkable honey-like odour, resembling that of the flowers of Buddleia, and might, he thought, be used as an auxiliary to other perfumes to give them sweetness. The foliage of *Artemisia indica* was also very fragrant, and he should think that it might be used, in conjunction with another specimen which was on the table, in *pot pourri*. The latter, which appeared to be the leaves of some labiate plant, although erroneously labelled *Artemisia species*, had a

* See Hanbury, 'Science Papers,' p. 158.

remarkably pleasant odour. About two years ago this labiate drug came into commerce in London. He was rather interested in this drug, because the specimen he received two years ago came from Asia Minor, and the presence of it among Bombay drugs indicated that it might possibly, like other Arabian drugs, be originally produced in the latter country. The specimen he had originally received having been too comminuted to enable him to find an entire leaf, it had remained in his room for two years without his being able to identify it until the Indian specimen recently came into his possession. The exact species to which it belonged he had not yet determined. Then there were some specimens of what was supposed to be the aloes wood of Scripture (*Aquilaria Agallocha*), and also of the supposed spikenard of Scripture (*Nardostachys Jatamansi*), of which the museum previously contained some specimens. A small group of specimens which he had placed by themselves consisted chiefly of mucilaginous drugs. These were more largely used in India than in England, and some of them seemed to be worth a trial in this country. The spogel seeds (*Plantago Ispaghula*) were remarkably mucilaginous and were valuable in cases of diarrhœa in which a demulcent was required, and were said in the Indian Pharmacopœia to answer better in such cases than any other remedy. He believed that the seeds were taken mixed with water or other fluid and swallowed, and that in the intestines they gradually gave out mucilage, so that the action of the mucilage was continued for a long time. Another series of the specimens related to the manufacture of opium in India. There was a volume of the *Pharmaceutical Journal* (vol. xi.) in which the process had been described, and it might be referred to after the meeting. The jar on the table represented the jars in which the opium was carried into the factories. As a rule, these jars were surrounded by basket work, which was absent from this specimen. The wooden chest was a model of the chest in which the opium was packed. The opium was represented by balls of wood.

The CHAIRMAN said that he was glad to see the estimation in which Mr. Holmes held this collection of drugs, for which he believed the Society had to thank several persons, among whom was Dr. Cooke, whom he would presently ask to explain some few of the specimens, and who had done good service to the Society in helping to obtain for it a portion of the contents of the Indian Museum. Some members of the Society might very likely deplore the resolution which the Government had arrived at as to the distribution of that museum, but that resolution having been arrived at it was important that that portion of the specimens which touched upon pharmaceutical science should find its way within the Society's walls. He would now ask Professor Bentley to give some information upon the collection of specimens.

Professor BENTLEY said that he took a great deal of interest in the subject of Indian drugs and he was pleased to see on the table specimens of different kinds of assafœtida, different kinds of galbanum and other umbelliferous gum resins, as to which a great amount of our recent knowledge was due to the investigations of Dr. Dymock and the authors of 'Pharmacographia.' Those who were present that evening had an opportunity of seeing that the assafœtidas were very different in character from the kind that was known in this country. It was well known to those who were acquainted with the literature and science of the subject, that assafœtida varied in its character and was evidently derived from different plants. His colleague, Dr. Trimen, who was now on his way to Ceylon, and himself had figured in 'Medicinal Plants,' two plants which evidently yielded analogous products, *Ferula Narthex*, and *Ferula Scorodosma*. Besides these there was an assafœtida on the table from *Ferula alliacea* which presented a different character. The question of odour was one upon which persons differed. So far as he was concerned, he should prefer the odour of the assafœtida upon the table to the product which usually came to this country. The drug which we got in this country was considered in India to be an inferior assafœtida. Then there was a very interesting specimen of galbanum. Those who would take the trouble of comparing it with the galbanum known in this country would see that it was very different. There was no doubt that the two sorts were derived from different plants. There was the kind known as Levant galbanum, which was that which was ordinarily known in this country, and which was derived from *Ferula galbaniflua*. The present specimen appeared to be derived from a different species, probably *Ferula erubescens*, or that kind which was ordinarily known as Persian galbanum. It might be generally distinguished from it by the fact that in Persian galbanum there were generally found little portions of the stalks and fruits, whereas in the ordinary galbanum portions of roots were found. This matter was particularly interesting to him, for he and his friend, Dr. Trimen, had just brought to completion their work on 'Medicinal Plants.' It was only two days ago since that he had signed the index for the press. The work had occupied more than five years, and it might be conceived that he was glad to approach the completion of a work of that kind. Under these circumstances he was specially interested in seeing in the museum, under their energetic Curator, those specimens of drugs the plants yielding which had been figured in their book. As to the spogel seed, probably it might come into use in this country. He had no experience with regard to it, but he should judge that it was demulcent, as there was a great deal of mucilage in it. It was official in the 'Pharmacopœia of India.' It had the reputation of being useful in chronic diarrhœa. He must apologize for the remarks which he had made, which did not involve any new matter. He should not have ventured to make them had he not been called upon by the Chairman. He and Dr. Trimen had ventured to say in the preface of their forthcoming work that they believed that many of the plants which were now well known in India as yielding valuable drugs were worthy of much more attention than they had hitherto received in this country.

Dr. COOKE said that, having for eighteen years had charge of the botanical portion of the India Museum, he recognized a great many of these specimens as old friends. He had attempted to get into that museum as complete a series as possible of the drugs which were employed in all parts of India, whether those known to be of value or those which were used empirically. When it was resolved that the India Museum should be dissolved he took measures to put this Society into communication with the Secretary of State, in order that the whole of the materia medica collection might be transferred to the museum of this Society. He himself represented to the authorities the facilities which the Society afforded for exhibiting the drugs of the Indian Pharmacopœia, and those which were extra-officinal. Subsequently, official arrangements, of the nature of which he was even now totally unaware, were made, whereby the whole of the collections were transferred bodily to Kew. A guarantee to this effect was made in a speech in the House of Lords. They went to Kew accordingly, and there was an impression left behind at the India Office that no further assistance could be given towards the transfer of the collection to this Society. But he was under the impression that the whole of the special materia medica collection would ultimately be transferred to the Pharmaceutical Society. He must confess that he had been disappointed to find that what had been given to this Society was but a small proportion of that which he had hoped it would receive. He could only regret that the whole collection had not been disposed of in the best possible way. The samples of opium and of opium apparatus were parts of a collection, and he had no doubt that when this was understood at Kew the remainder would be sent. These were the metal mould in which the balls were made, and the earthenware mould in which the balls were dried. Then there was a large model of the stand on which the opium was dried of the ladles which were employed in baling it out, and of a press for making the opium into squares. There was also a peculiar "Hill opium" as it was called, containing rather more of the alkaloids than the generality of Indian opium. This was obtained from the northern district—Hyderabad and Scinde. There were two typical varieties of opium poppy cultivated in India—one with a short round capsule, and the other with an elongated capsule. So far as he had seen during a period of years, the scarification of the capsules in India was always longitudinal, and never transverse, whilst the Smyrna opium was divided in the contrary direction. The trehala which had been mentioned was the same as some specimens derived from that district some fifteen years ago. He took some specimens containing the beetle to Mr. Smith of the British Museum, and the insect was taken out and identified; and in one of the old series of the *Pharmaceutical Journal* would be found a note by him (Dr. Cooke) on the subject as the result of that examination. It was well to bear in mind that all the Indian drugs on the table, without exception, as far as he had observed, came from the Bombay side of India. It was important to observe, when drugs were received from India, whether they came from Bombay, Madras, or from Calcutta. He had noticed that a great many of the drugs coming from Bombay were those which were imported from Aden and from Africa, and they were drugs whose presence in India could not be accounted for under any other circumstances than their importation from Africa. One specimen was that of a drug which had been sent from India to the last Paris Exhibition. It consisted of the heads of *Gundelia Tournefortii*. Until then he had not seen it since he observed it in the Turkish collection in the first English Exhibition—that of 1851. The sample there exhibited was from Smyrna. The Kew authorities did not know it as an Indian plant, nor had heard of its being cultivated in India. Hence it was probable that the present specimen was one which had been imported from Aden into Bombay. As to the assafœtidas, he was pleased to see that the Society had one or two specimens; but there were five or six varieties of assafœtida in the Indian Museum and one was the peculiar kind to which he on one occasion drew Mr. Holmes's attention. It was a most peculiar ferruginous-looking, powdery assafœtida, such as he had never seen elsewhere. With reference also to sarcocolla, that was almost always sent to this country from Bombay or from Scinde. A short time since, he gave Professor Flückiger a portion of this substance for the purpose of investigating it as to its composition. His (Dr. Cooke's) own feeling was that it was rather more likely to be an umbelliferous plant than anything like penœa, to which it had hitherto been referred. He did not know whether Professor Bentley would agree with him in that opinion. The sample of *Coptis teeta* was a very fine one, and was larger than usual. It was better represented in the little cane bags, of which there was no sample on the table. In this form it was sent prepared by the hill tribes. He believed that it was only to be obtained from Assam. In all collections of drugs from India they got a large quantity of hyoscyamus seeds, which seemed to be employed in India as well as the hyoscyamus plant.

Mr. Holmes said with regard to the sarcocolla to which Dr. Cooke had alluded, he might say that a short time since he received some specimens containing fruits, from Dr. Dymock, of Bombay. They appeared to belong to the Leguminosæ, as had been stated by Dr. Dymock.

Mr. Gerrard remarked that a considerable number of the specimens of drugs of the late India Museum had been sent to University College, where there were a very large number of Indian students, and the collection would be properly displayed, and those students would be able, to some extent, to study the materia medica of their own country, and go home with at least some knowledge of the subject. Some of the drugs on the table seemed to be very fine specimens, and likely to prove of great value as curative agents. For instance, the conium fruits were exceedingly fine in form and size, and were uniformly bitter. The application of the rough test of a little potash solution developed the characteristic odour. Possibly these fruits might prove an abundant source of the alkaloid conia. There was also a specimen of the root of aconite. It was mentioned as *Aconitum palmatum*. He had found that this was bitter to the taste, but in no degree pungent, and it did not produce any of the irritating dryness of the throat which usually followed the swallowing or the chewing of a small quantity of European aconite. It was possible that this yielded atisine, an alkaloid found also in *A. heterophyllum*.

Mr. Holmes explained with regard to the specimen, that he put it on the table thinking it interesting in consequence of the occurrence of a recent case of poisoning by aconite, which was mistaken for horseradish. This was not one of the drugs recently received from Kew, and no specimen of it occurred in the collection presented from the India Museum. It had been presented some time since by Dr. Dymock, whose donations to this Society had been most valuable. With regard to this being a source of atisine, it might or might not contain it. Dr. Dymock had informed him that it contained a bitter alkaloid in quantity. At present some of the root was in the hands of Dr. Paul for examination. The aconite from which atisine had been obtained was *A. heterophyllum*, and was known as "atees," and not *A. palmatum*, the root of which was called "wakhma," and was quite different in character. The latter drug had a peculiar, cress-like odour, which was compared by Dr. Dymock to that of nasturtium. He thought that perhaps some of the aconite cultivated in gardens in this country might possibly have a similar odour, which might have led to its being mistaken for horseradish.

Mr. Greenish, said that he could confirm the remarks of Mr. Holmes with regard to the "wakhma." He had made sections of the two, and they were quite distinct. This aconite was one which in its character approached more to *Aconitum ferox*.

Dr. M. C. Cooke said that there was one feature in the root of *Aconitum heterophyllum* which was worth notice, namely, that, wherever it was broken transversely, the fracture exhibited a circle formed of vascular bundles. That was an unfailing test, whatever portion of the root was broken, these bundles were always visible.

The Chairman then asked Mr. Greenish to explain two instruments which had been placed upon the table, one being a polarimeter and the other a microscope.

Mr. Greenish stated that among the many pharmaceutical appliances of interest and value shown at the meeting of the German Pharmaceutical Society last year in Hanover, a microscope and a polarimeter, made by Schmidt and Haensch, of Berlin, especially claimed attention, and the makers were asked to send one of each for exhibition at one of the evening meetings of this Society, The microscope was mainly intended for the examination of the flesh of the pig, in search for trichina. The vertical spiral movement, by means of a slot in the outer body of the microscope, was, he thought, an improvement in the usual sliding body of such microscopes. The instrument was accompanied by two glass plates, one of them having five squares on it, each of one inch; in each of these squares was laid a piece of the flesh to be examined; this plate was then covered by the second, and both compressed by screws on the stage of the microscope. The stage was then moved by a lever, and the object, having traversed its full length of one inch, was, by a rack movement in front of the stage, advanced a little, but in the same plane, so that the return movement exhibited a new field for the object-glass. By this means, and with a few movements, every part of the suspected meat is brought into view. The examination of the five pieces on the one plate could thus be done with very great facility, and probably accomplish that which was said to have been done by some microscopists on the Continent—the examination of one pig per minute, or thirty pigs in half an hour. In one of the medical journals it was stated that in Germany flesh from the same pig was sent to one hundred microscopists for examination, and ten failed to detect the presence of trichina. With such an instrument as the one now before the meeting, with this mechanical arrangement, by which the entire surface must be brought under the object-glass, such a circumstance could scarcely have occurred. The polarimeter also seemed to be an instrument adapted to supply a want at the present time—that was, a well-made instrument at a moderate cost.

Dr. SYMES said that at the last Conference meeting at which he read the paper on the polarimeter, Professor Attfield pointed out that if the instrument could be produced at a cheaper rate, it would be more widely used amongst pharmacists. He (Dr. Symes) was of the same opinion. It would not only be useful in the examination of essential oils, as that was probably one of its least useful applications, the amount of rotatory power of those oils being a test, but one not to be taken alone, because rotation differed widely in different oils. He had examined samples of oil found in commerce and some which he had himself distilled, and found the rotation to vary very largely between the two samples. Following the idea of Professor Attfield he had had an instrument constructed by Messrs. Field, of Birmingham, who had undertaken to produce one for five guineas, to which price he had limited them, and he had insisted on its having a Jellett's prism, that being the best analyser. His instrument consisted of a double-refracting prism and analyser, and a lens for bringing the ray parallel, a tube to contain the fluid, and an analyser, consisting of a Jellett's prism. The ordinary prism consisted of a prism of calcspar, which had been cut into two, and then cemented together with Canada balsam; this was sufficient to throw one of the two rays out of the field. Jellett's prism was truncated, and then sliced lengthways in a line nearly parallel to its general axis, and the parts reversed. Professor Jellett pointed out that in this way he was able to get a sharper line of demarcation. The point which was read was the point of maximum density, and to determine that accurately it required an instrument which would give a large disc and show an even colour. The more sensitive it was the less the lateral movement that would be required to produce the change. Messrs. Field had accomplished their work very well, and made a very substantial and good instrument. He had had it in his hands less than a week; but he had examined it very fairly. He had tested tubes, and then sent them to a friend, who had examined them with two Laurent's instruments, one costing about £14 and the other £19. All the readings came out remarkably near, being less than half a degree out. The new instrument was produced at a very moderate price, and did its work very fairly indeed. The instrument ought to be supplied with a tube of 100 millimetres in length, as well as one of 200 millimetres. In highly rotating essential oils the rotation was far too great for a 200 millimetre tube, and the reading might possibly be got on the wrong side.

The CHAIRMAN expressed the thanks of the meeting to the gentlemen who had given the explanations of the exhibits.

A paper was then read on—

TINCTURE OF SENEGA AS AN EMULSIFYING AGENT.

BY HENRY COLLIER.

The paper is printed on p. 621, and gave rise to the following discussion:—

Mr. GREENISH said that Mr. Collier had stated in the early part of the paper that Bolly had considered saponin and senegin to be identical. But he (Mr. Greenish) thought that if Mr. Collier would read Bolly's account more closely, he would find that they were not identical, though there was very little difference between the reactions. Farther on Mr. Collier said, "I have not been able to find that since Bolly's work the saponaceous matter of senega root has been further chemically examined." He would call Mr. Collier's attention to a very elaborate paper on the subject in the *Archiv der Pharmacie*, 1875, by Christophson, who want very fully into the matter, and who found that the substances were not identical, though the quantity of senegin which he had at his disposal was not sufficient for ultimate analysis. Mr. Collier had said with regard to using liquor potassæ, "Occasionally, however, active substances are employed in small doses, and they are then considered not to have any detrimental effect." Liquor potassæ was not used as an emulsifying agent unless it was used on its own account, when its presence was required. He (Mr. Greenish) must make the same remark as he made at the Conference, that there were emulsions *and* emulsions, and, looking as a pharmacist at the specimens which had been shown by Mr. Collier, he would scarcely venture to call them good emulsions. Of course there might be a difference of opinion, but he simply expressed his own. The introduction of tincture of quillaia as an emulsifying agent might be admissible, and as far as he knew, tincture of quillaia did not possess any disagreeable properties in small quantities, but when they came to senega the case was altogether different. He regarded the introduction of senega as an emulsifying agent as utterly inadmissible, although the quantity of tincture of senega used as the emulsifying agent was only five minims. Of course, the fact that it would make an emulsion was interesting; but he was merely referring to its introduction into pharmacy. He had tried tincture of quillaia, and found that it answered better than tincture of senega; but it appeared to him that in neither case did they get what pharmacists considered a good emulsion. If solution of soap was used of the strength of the linimentum saponis of the Pharmacopœia, a better emulsion could be produced than with tincture of senega. He hoped that Mr. Collier would pardon him for these remarks; but it was better that these things should be criticized within the walls of the Society than that the criticism should reach the members from the outside.

Mr. GERRARD asked Mr. Collier whether he had any experience of the tincture of senega as an emulsifying agent upon tar. In that case he thought that the tincture of senega might be admissible. In his experience he had found that they might make most beautiful emulsions with powdered gum acacia. If a few grains were put to ½ an ounce of castor oil and 3 drachms of water poured upon it, and the mixture well stirred, in a minute and a half there would be obtained a beautiful white cream-like emulsion which would stand dilution with water to any extent, and it would stand for a week without separating one drop of oil. In the case of the tincture of senega emulsion described by Mr. Collier he had found that the oil separated after standing twenty-four or forty-eight hours, and formed a layer on the top. However, it was valuable to be made acquainted with the fact that senega and quillaia and preparations of those drugs would act as emulsifying agents.

Mr. COLLIER, in reply, said that as regards the examination made by Bolly, he certainly read the account very carefully; but perhaps he had made a mistake. As to liquor potassæ being used for making emulsions, it was a fact that it was so used when it was not required on account of any of its medical properties. In the Guy's Hospital Pharmacopœia it was used simply on account of its property of making an emulsion. As regards the property of emulsions, there seemed to be a doubt as to what an emulsion should be. Milk was regarded as a type of an emulsion, and this would, after a time, give a separation of cream. Mr. Gerrard had spoken of the separation of the emulsion after it had stood. Why should it not separate? It was part and parcel of the property of an emulsion to separate; but it separated, not into an oil, but into a cream. The principle of the action of quillaia and of saponin as emulsifying agents, was that they had the property of, as it were, getting between the particles of the oil and preventing their ever coming together again. As regarded tar, he had made an emulsion of it perfectly well by means of quillaia, and this was mentioned in the 'Rapport.' He had prepared an emulsion of tar, and in Guy's Hospital it was being used as an outward application. The advantage which senega possessed over quillaia was that quillaia had an unpleasant taste even in the small quantity of five grains, but in senega there was no taste that could be detected.

Professor ATTFIELD said he presumed that the action of the solution of potassa would be to make a soap with the oil.

Mr. COLLIER said that there was no doubt that it formed a sort of soap.

The CHAIRMAN said that he was sure that the meeting would wish to convey its thanks to Mr. Collier for his suggestive communication.

The next paper to be read was on—

THE DIFFUSIVE PROPERTIES OF SOME PREPARATIONS OF IRON IN RELATION TO DIALYSED IRON.

BY PROFESSOR REDWOOD.

The CHAIRMAN said that the time left was not sufficient to do justice to the paper, and therefore he would ask Professor Redwood to give an outline of it so that they might consider the subject before the next meeting.

PROFESSOR REDWOOD said the proposal that he should give an outline of the paper was one which entirely met his views. The paper was a long one; and it presented several points upon which an interesting discussion might take place. There had been recently brought to the attention of pharmacists a statment which was made by M. Personne to the French Academy of Medicine, upon the subject of dialysed iron.* This had led him (Professor Redwood) to think that it might be desirable to lay before the Society the result of a great number of experiments which he had made during several years, and the results of which had never been published. M. Personne stated that, having made an examination of that form of iron which had been recently prominently introduced to the medical profession under the name of dialysed iron, he had come to the conclusion that it was a very inert preparation. Such a statement as that going before the pharmaceutical world was calculated to induce them to make an inquiry as to whether the same character of worthlessness would apply to some other preparations which might be supposed to bear a close analogy to dialysed iron. Dialysed iron was really iron the oxide of which had been brought into a condition in which it remained apparently in a state of perfect solution; and that oxide of iron might be rendered almost entirely free from any salt radical such as chlorine. But in the preparations which were commonly sold it was not so entirely deprived. If it was entirely deprived it was very liable to lose its apparent solubility. It was, in fact, in what was designated the colloidal state of iron. Iron which was in that colloidal condition was characterized by its being free from the inky taste which salts of iron usually possessed, and free also from any strong styptic character. This was one of the characteristics which had caused dialysed iron to be very strongly recommended. There had, however, long been used in medicine certain other preparations of iron which possessed the same characters, namely, the scale preparations of iron—the citrates and the tartrates and other preparations of that class. Graham, who originally investigated this subject of dialysis, gave the names which were now applied in connection with the process, the preparations which were very low in their diffusing powers being styled colloidal, and those which diffused more freely being termed crystalloidal. Graham, moreover, observed that colloidal substances—those which were very deficient in diffusive power—were all uncrystallizable, aud generally speaking formed gelatinous hydrates, and were very free from taste; whilst, those substances which possessed in a high degree the power of diffusion usually belonged to the class of crystalline substances, and hence the names colloidal on the one hand, and crystalloidal on the other. As long ago as the year 1862 when he (Professor Redwood) had the honour of submitting a communication to the Society on the subject of dialysis, he stated, as the result of experiments which he had then made, that although it might be said that colloidal substances were always uncrystallizable, it could not be said that all uncrystallizable substances were colloidal. He had proved that fact at the time, and in the further carrying out of the subject he had from that time up to the present made a great number of experiments with different preparations, taking for instance, some of the preparations of iron which were entirely uncrystallizable, such as the scale preparations to which he had referred, and taking, on the other hand, the crystalline salts, and comparing their respective powers of diffusion. These experiments he had accumulated, and it was these that he proposed to bring forward in his paper. He might state broadly that the results of his experiments were to the effect that taking the scaled preparations of iron, such as the citrates of iron, and especially ammonio-citrate, it could not be said that those preparations were at all deficient in diffusive power. It might be said that they diffused even rapidly when they were submitted in the first instance to the process of dialysis; and, in point of fact, the best specimens of them appeared to diffuse as rapidly or nearly so as the crystalline salts, taking sulphate of iron, for instance, as a representative of the crystalline salts of iron. He found that at the commencement of the operation of dialysis, the uncrystallizable scale preparations in solution would pass through the septum freely and readily up to a certain point, but that a point was always reached when they ceased to diffuse further. One very important feature in the results of the experiments was that apparently some change of composition, the nature of which he was not at the present moment prepared to explain, took place in the salt during the process of diffusion. For instance, if he commenced with an ammonio-citrate of iron, which contained say 30 per cent. of oxide of iron, which was the usual proportion contained in a good scaling sample, it was always found that during the first two days it would diffuse freely, and that the salt which passed through the septum at first starting would contain rather a smaller proportion of oxide of iron than was contained in the salt before starting. That would occur to a slight extent; but after that first diffusion, the salt that passed through the septum would be richer and richer in the base, and would become more and more basic to the very end of the process. It was remarkable that while that increased basicity took place in the diffusate, the contents of the dialyser became very much more basic at the same time, so that, for instance, if they started with citrate of iron, which contained 30 per cent. of oxide, that which passed through the septum before the diffusion stopped would commonly contain, instead of 30 per cent., say something like 40 per cent. of oxide. And when the process at last stopped, and no further diffusion would take place, which would occur when about three-fourths of the salt had passed through, the contents of the dialyser would be found to be very rich in oxide of iron, and usually to contain about 60 per cent. —twice as much as was contained in the salt at starting. That seemed to be the condition which the salt acquired when, in point of fact, diffusion ceased, namely, that it became a highly basic salt; and when that great degree of basicity was arrived at, the iron was found to be in the colloidal state. But the remarkable part of the experiment was that, whilst the salt in the dialyser became more and more basic, the salt outside which had passed through underwent a similar change. Therefore, there seemed to be some change which yet remained to be in-

* See before, page 427.

vestigated. That was one point in the paper which he purposed to lay before the Society. He would give a series of results, which had been obtained day by day, showing the effect which he had mentioned. Of course he had not confined himself to ammonio-citrate of iron; but potassio-tartrate of iron had also been operated upon; and he might say generally that the result at which he had arrived was that potassio-tartrate of iron did not diffuse so readily as ammonio-citrate of iron, and this applied especially to the iron as a component part. A comparatively smaller proportion of the iron passed through than was the case with reference to the ammonio-citrate. Finally, he had been making some comparisons with regard to the iron in the state in which it existed in the dialysed iron. He was not going to express a decided opinion as to the value of dialysed iron in medicine, although M. Personne considered it very inefficacious. It was well known that if a few drops of dialysed iron were added to common water, the small quantity of saline matter contained in the water supply of London—about 20 grains to the gallon—decomposed the dialysed iron, and all the oxide of iron that was in it was precipitated. The dialysed iron could be diluted with pure distilled water, but it could not be diluted with common water. A few drops of dilute sulphuric acid, or of common sea salt, put into the dialysed iron would produce the same effect. M. Personne pointed out that in the stomach there was usually saline matter present in sufficient quantity to cause a decomposition of the dialysed iron, and he referred to experiments that had been made upon animals, showing that almost immediately dialysed iron was put into the stomach the iron was precipitated. Personne went further, and stated that iron so precipitated was insoluble in acids, and that was one of the characteristics of colloidal iron. Personne started by saying that the dialysed iron itself did not contain the iron in a real state of solution, but contained it in what he called a pseudo-solution, or a false solution, the solution not being absolute and perfect. He said that iron in that state would pass through the intestines and could not be absorbed, and therefore it could be of no real avail as a medicinal agent. What he (Professor Redwood) had ascertained with reference to this was, first, that when the oxide of iron had been precipitated in the way described, as it readily was, if it was collected and washed it would be apparently soluble in some acids. On the table was some which had been dissolved in a little acetic acid, and also some which had been dissolved in a little hydrochloric acid. The oxide so treated formed a perfectly clear solution which would pass through a filter. Then the question was, "Is that really in a condition in which it can be absorbed, in which it is capable of passing through a membrane or septum?" His experience certainly went to show that it was not. On the table was some of the precipitate which had been got from dialysed iron, and which had been again dissolved so as to make, apparently, a solution with hydrochloric acid, but what Personne, no doubt, would call a pseudo-solution. This had been for two days in a dialyser, and not a particle of the iron had diffused through the diaphragm. Hence it was seen that something more was to be considered than the question of whether oxide of iron would be separated in the stomach. It might be supposed that if the oxide of iron was separated in the stomach, it would be taken up again or re-dissolved by the hydrochloric acid which was present. There was certainly an appearance of such a result, but if the iron was again brought into a state of solution, the solution contained the iron in a state in which, as far as his experiments had gone, it could not be absorbed. He admitted that he had not made many experiments in that direction with dialysed iron. He hoped to have more to bring before the Society when the paper was read. This subject involved some points which appeared to him to present features of great interest and to call for investigation, more especially with regard to the change which the citrates and similar preparations appeared to undergo in the process of dialysis and the peculiar condition which the iron itself acquired. Observe how dialysed iron was obtained. They took the chloride of iron, which was, no doubt, in the crystalloidal state and which would diffuse and pass through the septum; but they began by making that chloride of iron as basic as possible by dissolving a large quantity of excess of oxide of iron in it. That would not render it completely colloidal, but they put it into the dialyser, and a great part of the hydrochloric acid with, in the first instance, a little of the iron, diffused away, and the salt became more and more basic. When, at last, it had acquired a very high degree of basicity, it was found to be in the colloidal state. It was a very remarkable fact if, as appeared to be the case, the very nature of the iron, as oxide of iron, should undergo a change during that operation, so that, whereas they started with oxide of iron which, combined with an acid, possessed the property of a crystalloidal substance and was capable of diffusion, it lost that property during the operation of dialysis, in which it became highly basic. That raised a question, which was one of the questions put forth in his paper, with reference to such preparations as ammonio-citrate of iron. Taking the best specimen of ammonio-citrate of iron, it was obvious from the experiment that, if they put a solution of it into a dialyser, a part of it, varying from a little more than half to three-quarters, would pass through and diffuse, and then what was left would be colloidal. The question was, did any of the iron exist in the colloidal state in the specimen originally; or might it not be conceived that the whole of the iron was originally in the crystalloidal state, in such a condition as they felt confident the whole of the iron would be in any sample of, for instance, chloride of iron, and that it was only during the process of dialysis that part of it became colloidal? Hence it was possible that, in the case of the scale preparations, the whole of the iron in the preparation itself might be in its normal condition crystalloidal, seeing that the diffusion commenced very freely and rapidly, and that the colloidal state which was at last found in part of the preparation was only the result of the operation to which it had been subjected.

Mr. Martindale said that he should like to make a remark lest it should go forth that dialysed iron was, in Professor Redwood's opinion, almost useless as a medical preparation. It had been suggested that the digestion of iron went on not as a chloride but as a chloro-albuminate, and it was possible that dialysed iron dissolved in the hydrochloric acid of the stomach would make a combination with the albumen. Experiments made by Dr. Gower in that direction had been published in the *Lancet*. Dr. Gower had put some patients for some weeks under chloroxide of iron, made by precipitating 4 parts of perchloride of iron with an alkali and dissolving the oxide in solution of perchloride of iron to form a basic oxychloride solution. He counted the number of red-blood corpuscles at different stages of the period during which the patient was under treatment with the iron. He tried the experiment with chloroxide of iron, with phosphorus, and with one or two other preparations. The blood corpuscles were counted by diluting the blood with a certain definite quantity of water and spreading it on a glass and using a microscope. The improvement in the patients was undoubted. He (Mr. Martindale) assumed that Professor Redwood agreed with Personne, that dialysed iron was almost useless as a medicinal agent; in this he differed from him.

The meeting was adjourned to March 3.

Communications, Letters, etc., have been received from Messrs. Henry G. Brown, B. Newham and Co., Hucklebridge, Savage, Turner, Gwalkin, Thresh, Griffiths, Wearing, Postans, Chichester, Inquirer, Cherry Laurel, Jacque, Ipecac, Blue Pill, Otto, L. W., J. T. C., J. J. B., S. B., J. S.

In consequence of the length of the official reports we are compelled to defer noticing several communications.

SIMPLE METHOD OF PREPARING A SOLUTION OF THE DOUBLE IODIDE OF BISMUTH AND POTASSIUM FOR USE AS AN ALKALOIDAL REAGENT.

J. C. THRESH.

Although it has been long known that a solution of the iodide of bismuth and potassium forms an exceedingly delicate reagent for detection of alkaloids, yet on account of the trouble involved in making such a solution it is not frequently employed; moreover in the majority of text-books it is not even mentioned.

Such a solution may almost instantly be prepared as follows:—

Take of—

Liq. Bismuthi, B.P.	℥j.
Pot. Iodid.	ʒiss.
Acid. Hydrochlor.	ʒiss.

Mix.

The resulting fluid is of a rich orange colour and when added to cold solutions containing an alkaloid produces immediately an orange red precipitate, which appears to be almost totally insoluble in cold water, though somewhat readily soluble therein when hot. In point of delicacy, it is at least equal to the solution of phosphomolybdic acid, which is both troublesome and difficult to properly prepare. One part of strychnia may be detected in 500,000 of water, and one of morphia in 20,000. All the other alkaloids examined fall between these extremes.

In presence of other organic matter I am inclined to think this reagent is more reliable as an indicator of the presence of an alkaloid than any of the solutions used for that purpose. It appears also to be applicable for volumetrically estimating the strengths of alkaloidal solutions, and the author is at present engaged in devising such a process.

THE DETECTION OF TRACES OF BISMUTH.

BY J. C. THRESH.

In testing for bismuth according to the methods usually given in the text-books of practical chemistry, the presence of large traces may very easily be overlooked, more especially when much lead is also present. A method devised by Professors Abel and Field (*Chemical News*, December 14, 1877; abs. Y. B. P., 1878, page 45), and which is exceedingly delicate, consists in adding part of the solution to be examined to a boiling saturated solution of lead iodide containing excess of potassium iodide. In the absence of bismuth the lead iodide is redeposited upon cooling in golden yellow scales, whereas when bismuth is present the deposited iodide is of a dark orange or crimson colour, according to the quantity of the metal in solution. By this reaction ·00025 gram of bismuth may be detected.

Recently, whilst engaged in making a solution of bismuth and potassium iodide for use as an alkaloidal reagent, I found much more minute traces of the metal could be detected without the addition of another special reagent to the already overstocked shelves of the chemist's laboratory.

This method consists in adding to the fluid containing free hydrochloric or organic acid only a little potassium iodide, when instantly a rich more or less deep orange coloured solution is formed. With 1 part of bismuth in 10,000 of water the colour is a distinct orange, with 1 in 40,000 the tint is still discernible in 1 c.c. of the solution, and with 1 in a million a decided yellow tint is evident when about 20 c.c. (·00002 gram) are placed in a nesslerizing cylinder.

To ascertain the effect of the presence of other metals a number of different solutions were made and examined, but in all cases the bismuth was detected with ease. Lead, antimony and mercury alone are likely to interfere, but the addition of an excess of potassium iodide dissolves the mercuric iodide first precipitated when mercury is present, and lead iodide is soluble in boiling water; in both cases the supernatant or resulting solution is colourless unless bismuth also is present, when the colour of the double iodide of potassium and bismuth is very evident.

With strong solutions of antimony containing much hydrochloric acid, iodide of potassium produces a reddish-yellow colour when added in excess. A small quantity of this reagent has no effect, whereas, when a trace of bismuth is also in the solution, a single drop of the reagent strikes the characteristic tint.

By aid of standardized solutions of bismuth and lead it was found that 1 part of the former in 10,000 of the latter could readily be detected, it only being necessary to add, first, excess of hydrochloric acid, and after filtration to pour a few drops of solution of potassium iodide into the heated fluid.

In neutral solutions (as in liq. bismuthi, B.P.) the iodide of potassium gives no precipitate or coloration; but if hydrochloric or any organic acid is now added a rich orange tint appears. When sulphuric or other strong mineral acid is present a dark brown precipitate falls, unless the acid is exceedingly dilute, in which case a red colour, but no precipitate, is produced. It is therefore advisable when a solution is strongly acid (the acid being mineral and other than hydrochloric) to add ammonia to slight alkaline reaction, and then excess of hydrochloric acid. After the orange colour has been developed the addition of the stronger acids is without effect; but ammonia at once decolorizes the fluid.

In analysing a complex mixture of inorganic salts, therefore, to detect bismuth, dissolve in hydrochloric acid the precipitate thrown down by addition of ammonia to the nitric acid solution of the sulphide insoluble in ammonium sulphide, and divide into two portions. To one add a little sulphuric acid (to detect lead) and to the other solution of potassium iodide. The merest trace of bismuth cannot by this method possibly be overlooked.

KOETTSTORFER'S PROCESS FOR THE ESTIMATION OF FOREIGN FATS IN BUTTER.*

BY A. F. DIMMOCK.

This process, which appeared in the *Zeitsch. für Anal. Chemie* (1879, p. 199), is a volumetric one, depending upon the fact that different fats require different quantities of potassium hydrate for their complete saponification. The process consists in treating the butter with a measured quantity of an alcoholic solution of potassium hydrate, saponifying,

* Read at a Meeting of the School of Pharmacy Students' Association.

then determining the amount of uncombined potassium hydrate present in the mixture by means of a standard solution of hydrochloric acid.

The solution of potassium hydrate contains 28 grams in 1 litre of alcohol, and the solution of hydrochloric acid 18·25 grams in 1 litre of water. The solutions should exactly coincide, *i.e.*, 10 c.c. of the hydrochloric acid solution should exactly neutralize 10 c.c. of the potassium hydrate solution, and should be verified from time to time. An alcoholic solution of phenol-phthalein (1 in 50), which in alkaline solution is of a rose-red colour, and colourless in neutral or acid solutions, is employed as an indicator. Two or three grams of the butter are weighed in a small beaker, and from 30 to 40 c.c. of the solution of potassium hydrate added, the beaker placed on a water-bath, and stirred until saponification is complete, when the beaker is covered with a watch-glass, and allowed to remain on the water-bath for fifteen minutes. About 5 c.c. of the solution of phenol-phthalein are added, and the liquid titrated with the standard solution of hydrochloric acid until the liquid is of a yellow colour. From the quantity of hydrochloric acid required the amount of uncombined potassium hydrate is calculated, and from that the amount of potassium hydrate combined with the fat. Koettstorfer found as the result of thirteen determinations of pure butter that for 1 gram from 0·2215 to 0·2324 gram of potassium hydrate was required for complete saponification. I have examined a sample of pure butter by this process, and found that 1 gram required 0·224 gram of potassium hydrate. The specific gravity of this sample of butter was 911·0. Koettstorfer also examined other fats by this process, thus:—

1 gram of stearin required 0·1888 gram of potassium hydrate.

1 gram of olein required 0·1900 gram of potassium hydrate.

1 gram of palmitin required 0·2080 gram of potassium hydrate.

1 gram of lard required 0·1970 gram of potassium hydrate.

Experimenting on these substances myself I obtained the following results:—

1 gram of olein required 0·1930 gram of potassium hydrate.

1 gram of palmitin required 0·2016 gram of potassium hydrate.

1 gram of lard required 0·1960 gram of potassium hydrate.

As lard, beef-fat, dripping, tallow, olein and margarin all require about the same amount of potassium hydrate, the average being represented by the number 0·1955, this number may be taken as the basis for calculating the amount of adulterant of a sample of butter. From the results obtained by Koettstorfer from pure butter, 0·2215 and 0·2324 gram, the two extremes, the mean 0·227 is taken as a standard of pure butter. If x = the percentage of admixed fat, and n the amount in grams of potassium hydrate required for complete saponification, then—

$$(\cdot 227 - \cdot 1955) : (\cdot 227 - n) = 100 : x.$$

If, for instance, the sample of butter required ·2016 gram of potassium hydrate, then—

$$(\cdot 227 - \cdot 1955) : (\cdot 227 - \cdot 2016) = 100 : 80\cdot 6.$$

The butter then contained 80·6 per cent. of admixed fat.

PREPARATION AND PROPERTIES OF PURE EMETINE.*

BY DR. PODWYSSOTZKI.

The author having examined specimens of commercial emetine obtained from several German manufacturers (*emetinum purum* and *emetinum album*) found them to consist of a dirty light grey coarsely pulverulent mass, which upon standing in the light gradually became darker and yellow coloured, and with solvents (dilute acids, alcohol, etc.), gave clear yellow solutions. If a particle of such a commercial emetine be moistened with ether or alcohol it runs together to a dirty brown-black extractive-like mass which assumes an intensely dark grey colour with a drop of perchloride of iron solution. These few simple reactions the author considers suffice to show that such commercial emetine is not the chemically pure alkaloid.

The quality of these impurities and the exact estimation of the constituents of ipecacuanha were used as indications of the direction in which the method of obtaining emetine requires to be modified. It was especially desirable that not the smallest quantity of tannic acid should remain in the emetine and that none of the colouring matters of the ipecacuanha or of the products of its composition should be mixed with it. The quantities of tannic acid occurring in various sorts of ipecacuanha were found to be very considerable, and the contamination of the emetine by it in the methods of preparation usually followed is, in consequence of its solubility in the most diverse solvents, unavoidable. But by treatment with perchloride of iron this tannic acid can be converted into a compound that is perfectly insoluble in ether and petroleum spirit, and the author utilizes this reaction in the preparation of pure emetine in the following way:—

The ipecacuanha powder is extracted with sulphuric ether in order to remove from it the liquid oil and a thick fatty or wax-like substance, as well as all colouring matters soluble in ether. The extraction with ether is a most important part of the process and must be continued until a drop of the extract evaporated on a watch-glass leaves neither a fatty nor a coloured spot behind. Towards the end of this operation petroleum spirit may be used and heat applied, by which it is more rapidly and perfectly completed.

Ipecacuanha treated in this way yields an ethereal extract containing a peculiar colouring matter, characterized by its forming a beautiful purple-red compound with alkalies, especially with barium hydrate. This colouring matter was isolated from the barium compound in the form of an acid, crystallizing from chloroform in intensely straw-yellow coloured needles, to which the name of erythrocephalein has been given. It was found to be present in the largest proportion in roots which yielded the greatest amount of emetine.

After the ipecacuanha powder has been freed from the remainder of the ether or petroleum spirit by evaporation, it is exhausted with moderately warm 85° alcohol, without acid being added. This treatment requires to be repeated two or three times, as the ipecacuanha does not readily yield to the alcohol and water the whole of the emetine contained in its cells, where it is combined with organic acids and surrounded by a large quantity of dextrin. The alcoholic extract is coloured by colouring matters insoluble in ether and contains also a considerable quantity of tannic acid coloured green by perchloride of iron. The alcohol is almost entirely removed by evaporating or distilling to a syrupy consistence, and then perchloride of iron dissolved in a small quantity of water is added in the proportion of 10 to 13 per cent. by weight of the ipecacuanha used. The point when a sufficiency has been added may be ascertained by placing a small portion of the extract on a porcelain dish and touching it with solid perchloride, when

* *Pharmaceutische Zeitschrift fur Russland*, xix., i.

no further green coloration should be produced. The whole then it thoroughly mixed in order that all the tannic acid may enter into combination. To the extract thus treated carbonate of soda in powder or concentrated solution is added—taking care to keep the mixture as thick as possible—until it has a strongly alkaline reaction, and acquires a chocolate colour. A large excess of soda is indispensable, and the compound of the ipecacuanha tannic acid with the iron is not decomposed by it.

To the alkaline mixture is now added a suitable quantity of petroleum spirit and the whole is placed in a retort in a water-bath, and frequently shaken while the spirit is boiling. The emetine dissolves in the hot spirit and from time to time some of the spirit is removed and tested. This is done by placing it in a watch glass and blowing through a glass tube a thin stream of atmospheric air into the solution. When the emetine falls as a white powder and remains as a deposit at the bottom, the hot petroleum spirit saturated with emetine is filtered and a fresh quantity of spirit added, and this is repeated until the petroleum extract only yields traces of emetine. When such a petroleum spirit extract is very rich in emetine the greater part of it is deposited spontaneously, after twelve hours standing in a cool place, as a white precipitate. From less concentrated solutions of emetine in petroleum spirit the alkaloid is not spontaneously deposited. It may then be obtained very pure and white by blowing air for some time through the solution, when it separates in the form of white flocks. The author has not obtained a perfectly white emetine by slow evaporation of the solution or by evaporation over a water-bath.

Since emetine as thus prepared is readily soluble in cold sulphuric ether this process may be modified in first treating the ipecacuanha powder made with a little hydrochloric acid into a thick paste with a sufficiency of perchloride of iron, then adding the carbonate of soda, and after standing some time again extracting the pasty mixture with renewed quantities of sulphuric ether. Upon shaking the united ethereal extracts with a small volume of water acidulated with acetic, sulphuric or hydrochloric acid, the alkaloid passes into solution, and the united acid solutions are treated with excess of soda and boiled with petroleum spirit, after which the alkaloid can be isolated as before described.

The emetine, either spontaneously precipitated or by the blowing of air, is rapidly collected upon a filter and then dried in a dark place over sulphuric acid.

In this manner the author obtained from the better sorts of ipecacuanha $\frac{3}{4}$ to 1 per cent of pure snow-white emetine, but from the inferior sorts only $\frac{1}{4}$ to $\frac{1}{2}$ per cent.

Emetine thus prepared has the following properties:—It dissolves readily in cold sulphuric ether, in chloroform, acetic ether, methylic, ethylic and amylic alcohols, carbon bisulphide, in spirit of all strengths, in oil of turpentine and essential oils, and in considerable quantity in fatty oils and fats, and in oleic acid. It is difficultly soluble in cold petroleum spirit and benzine, but easily soluble in them when heated, a portion of the emetine from such concentrated solutions being again precipitated on cooling. It is still more difficultly soluble in cold water (1 in 1000). From sulphuric ether, petroleum spirit, fatty oils and similar liquids insoluble or nearly so in water, it is precipitated by acids.

Its taste is very bitter and somewhat astringent, and the same is true of its salts. By the action of sunlight it becomes coloured yellow, which is specially intense if simultaneously long exposed to the air. When protected from direct rays of light it remains white, large fragments remaining white internally after becoming coloured on the outside. When an ethereal or alcoholic solution is allowed to evaporate very slowly it is deposited in extremely thin flakes, which being viscous agglutinate together into lamellæ; but when the solutions are more rapidly evaporated it is deposited in extremely small granules, which afterwards appear as a very fine powder. Its melting point is between 62° and 65° C. In water at this temperature it runs together into lumps having the colour of gum arabic; whilst warm these can be rolled into pellets, but after cooling they can be crushed to a sand-like powder.

If a very concentrated solution of emetine in petroleum spirit, ether or benzine be evaporated very slowly upon a paper filter there is formed on the edge of the filter an extremely delicate snow-white crust, which under the microscope is seen to consist of fine, very slender, fragile, acicular crystals, sometimes showing a stellar arrangement and sometimes irregularly disposed and interlaced with an apparently amorphous mass, consisting of transparent spherical bodies. This crystallized emetine is also quickly coloured superficially an intense yellow when exposed to the light.

Emetine has a strongly alkaline reaction, and is neutralized by acids, with which it forms salts. These salts do not crystallize in a regular form and can only be obtained in shining almost colourless lamellæ, by evaporating in a vacuum; when evaporated in the air they form a dark yellow lac.

The salts dissolve readily in water, spirit and fatty oils, but are insoluble in sulphuric ether, petroleum spirit and benzine. Only with tannic acid does emetine form a compound almost insoluble in water as an amorphous white powder; but the salts formed with gallic and other acids are readily soluble in water. All the salts of emetine, like the free base, gradually become yellow in the light, with the exception of the compound with tannic acid which does not undergo the least change. If a current of carbonic acid gas be passed through a colourless solution of emetine in ether to which water has been added the lower aqueous layer gradually acquires a yellow colour and in this way the emetine can be completely carried from the ether into the water as a carbonate. From aqueous solutions emetine is precipitated by all salts of the fixed alkalies or earths as a white or coloured powder, partialle soluble in an excess of the added salt. The chromate and nitrate of emetine are among the more difficultly soluble compounds, but they also dissolve when the liquid is warmed. Carbonates and caustic alkalies precipitate the alkaloid in the form of a more or less white powder, which can be washed on a filter, but always with some loss on account of its partial solubility in water.

When treated with concentrated sulphuric acid emetine gives, as has been observed by previous authors, oxalic acid. When heated with weak sulphuric acid in a sealed tube to 150° C. during three hours it is partially converted into a blackish-brown body, not having a bitter taste, whilst the remaining liquid contains a considerable quantity of undecomposed emetine.

With all the alkaloid reagents emetine gives, even after long standing, non-crystallizing precipitates. A drop of a freshly prepared saturated solution of phosphomolybdate of soda in concentrated sulphuric acid brought into contact with a particle of the alkaloid colours it brown, and if a drop of concentrated hydrochloric acid be then at once added, the brown rapidly passes to an intense indigo blue colour. This test has also been observed by the author to give characteristic reactions with other alkaloids.

THE PITURI PLANT.

The following is an extract from a letter written by Mr. Sylvester Brown and quoted in a paper read recently before the Queensland Philosophical Society by Dr. Bancroft:—

"I have during the last few months passed several times through the belt of country in which pituri has hitherto only been found. It is situated, so far as my means of observation serve, with the 138th meridian of east longitude passing through the belt about the middle, and I have met with the shrub anywhere in the vicinity of the longitude mentioned between the 23rd and 24th parallel south latitude, with a depth of fifty miles east and west. The pituri shrub, when full grown, is about 8 feet high, and the wood at the thickest part of the stem is up to 6 inches in diameter. When freshly cut the wood has a decided smell of vanille. It is very light and close-grained; colour, lemon. Dr. Bancroft's guess as to the seed is so far correct that the berry (which, when ripe, is black and like a small black currant) has inside very minute kidney-shaped seeds. I have secured some of the seed, picked by myself from the growing tree, and hope, when passing through Brisbane, to let Dr. Bancroft have an opportunity of continuing his investigation of this rare plant by endeavouring to grow some of it. I have also cut some samples of the wood, which I shall bring down unless absorbed, specimens and all, by early floods *en route.* I formerly heard many wonderful accounts of the rarity of pituri and the great difficulty of procuring it. These absurd reports were strengthened by the extreme value placed on it by inside blacks, who could only obtain it by barter. 'It grew on a rocky mountain in the Stony Desert, jealously guarded by the owners of the soil, who, in their periodical trips to obtain a supply, would have to carry three days' water in coolimans and paddymelon-skin water-bags.' I also heard that it 'grew only on a small extent of ground not exceeding twenty square miles;' whereas the fact is that it grows on the ridges of high spinifex sand-hills, and which sand-hills contain many cool springs and lakes, which will hold water much better than the fabulous stories told of pituri.

"There is one beautiful lagoon, with two smaller ones, just about the South Australian border, on or about the 23rd parallel of latitude, which—the blacks averring that it had never before been visited by white men, or 'pirri-birri,' as they call them here—I took the liberty of naming 'Pituria lagoons.' The water in these lagoons is beautifully clear and soft, and when full they will last nearly, if not quite, two years. Pituri grows on the sand-hills round them. Should the Government wish to make a pituri reserve, here is the place for it. The country in the vicinity is of no use for pastoral purposes, so a reserve of about 20 miles square, or 400 square miles, would be a cheap concession.

"The blacks break off the pituri boughs and tie them up in netting till dry; then, when thoroughly dry, they break the leaves up and enclose them in closely netted bags in the shape of a crescent. These are easily carried for the purpose of barter, which is carried on as far as Cooper's Creek and the Barcoo. Before chewing they burn the leaves of a shrub they call 'montera,' and moistening the ashes mix and chew. I have not noticed any abnormal result from the habit, though I have heard that a black unaccustomed to the weed becomes intoxicated thereby. I have some young plants in a box, which, if they grow, I shall endeavour to bring down, but as they have a journey of 1000 miles before them overland, the result is more than problematical, even should they elect to grow in the box. I am rearing one plant, which seems to be growing well, in my garden at the station. The seeds, however, may grow, and to facilitate selection of a proper soil I shall bring down a sample of mother sand for analysis. The suckers grow from long rough roots, which run about under the sand and throw up shoots as they go."

Dr. Bancroft remarks that the seeds did not germinate, though cared for diligently. He thinks that probably they were immature and that the berries of the pituri bush most likely fall off directly they ripen, as he finds this to be the case with *Duboisia myoporoides.*

THE HECTOGRAPH.

The following information, quoted from *New Remedies,* is supplementary to that previously published on the subject (see before, p. 486):—

A very good elastic copying mass will be obtained by using the following proportions: glue or gelatin, 1 part; water, 2 parts; glycerin, 4 parts; to this is to be added a few drops of carbolic acid, and enough whiting or white lead to make the whole milky. Other formulæ are said to be: glue or gelatin, 1; sugar or glucose, 1; glycerin, 6; barium sulphate ("terra alba"), 3½ parts.

The addition of barium sulphate and of dextrin facilitates (?) the removal of the writing with cold water. The so-called chromograph composition is made as follows:—100 grams of finest gelatin are melted with 400 to 500 cubic centimetres of moist barium sulphate, in a capsule, on the water-bath. 100 grams of dextrin are then added, under constant stirring, and finally, 1000 to 1200 grams of glycerin. The mass is then removed from the water-bath, stirred occasionally (to prevent the barium sulphate from precipitating), and cooled as much as possible, taking care, however, to have it still barely fluid. It is now poured into flat tin dishes, and rapidly cooled off. The above proportions need not be exactly followed with every kind of gelatin, since they all require somewhat different quantities of liquid to produce the same consistence. If the mass turns out too hard, more glycerin must be added; if the writing can be removed only with difficulty, even with lukewarm water, more filling (barium sulphate) or dextrin is necessary. The best and sharpest impressions are obtained by using the finest English gelatin, glycerin, and pure precipitated barium sulphate, washed by decantation, without dextrin.

A correspondent of the *English Mechanic* says:—"I have not been successful with the ink prescribed: 1 violet methylated aniline (Hoffman's purple?), 7 distilled water, and 1 alcohol; so I have bought it at the most extravagant price of 1*s.* per ½-ounce bottle; but acetate of rosaniline (roseine), boiled down in alcohol until it does not run in writing, forms a capital red ink. The purple ink is dosed with oil of almonds, I suppose, to mask its real composition.

"To use the process, write on any kind of paper with the ink, taking care that the writing is thick enough to show a green lustre on drying. When dry, place, it face downward, on the jelly, rub it gently to bring it well in contact, and leave for one or two minutes (five minutes are better); then peel it off. It will leave a large portion of the ink neatly transferred to the jelly; then place the paper to be printed on the writing, and pass the hand over it; bring it well into contact as before, peel it off, and it will bring away a perfect copy of the original. In this way, sixty to eighty copies may be made. By using a thick pen and plenty of ink, one hundred good prints may be taken."

THE RESINS CONTAINED IN JALAP.*

BY ALEX. F. STEVENSON, PH.G.

The U. S. P. officinal "Resin of Jalap" is obtained by evaporating an alcoholic tincture of jalap to a small bulk, pouring this into water to separate a small amount of accompanying aqueous extract, washing the precipitate several times with water, and finally straining and drying with a gentle heat. The title "Resina Jalapæ" does not seem to be quite appropriate; "alcoholic extract" would be a more proper name for it, as it certainly consists of two distinct resins, namely, "Convolvulin" and "Jalapin," which are not only physically, but chemically and therapeutically distinguishable the one from the other, as the following experiments and trials executed by myself, for the most part in the laboratory of this College, will, I hope, tend satisfactorily to show.

Having for this purpose procured some of the best "Resina Jalapæ" of the Pharmacopœia that the market afforded, I proceeded to free it of any mechanical

* Abstract of a thesis presented to the College of Pharmacy of the City of New York. Reprinted from *New Remedies,* December, 1879.

impurities that it may chance to contain (subsequently found to be silicious and ligneous matter, in small but unimportant quantities) by dissolving it in absolute alcohol, filtering, evaporating, and drying. Having thus got rid of the above impurities, I reduced it to a fine powder, and thoroughly incorporated with it an equal bulk of sand (which I had previously purified by boiling with acid and washing); to this mixture I again added its bulk of the same sand with similar precautions.

The reason for mixing sand with the commercial article was the better to facilitate the separation of the "jalapin" from the "convolvulin" by the method of percolation below described.

I may here state that the undermentioned process succeeded remarkably well, not only in the more important point, viz., of effecting a complete separation of the above resins, but also in offering a method so much quicker, cleaner, and more easily managed than that of precipitation, as usually followed in such manipulations.

Then, having divided the mixture into six portions, I carefully and tightly packed them into as many small numbered funnels, the necks of which were loosely stopped with cotton and fitted to small glass flasks by the aid of corks. They were also kept carefully covered with glass plates to prevent evaporation during the process. I then passed ether through No. 1, and the percolate through No. 2, and that of No. 2 through No. 3, and so on, continuing to pour fresh ether on No. 1, until, on evaporating a small quantity on a watch-glass, it left no residue; then adding the fresh ether to No. 2, and then to No. 3, and so on, as they successively became exhausted, and until a small portion of the menstruum passed through all the funnels showed no colour and left no residue on evaporation.

I then mixed the percolates and set the liquid aside, and having removed all the residues from the funnels, and thoroughly dried and repacked them as before, I continued the percolation with absolute alcohol in the same manner and order as above described, until completely exhausted.

Thus having completely separated the resins by means of these solvents, and removed the ether from that of the ethereal percolates with the aid of a water-bath, I obtained a dark-coloured "soft resin," of the consistence of thick molasses, having all the colour, odour, and taste of the resin of the Pharmacopœia, but differing from it and that of the alcoholic percolates mentioned below, in being totally soluble in ether, petroleum naphtha, carbon disulphide, and oil of turpentine, and also in possessing cathartic properties.

This is no doubt the jalapin of Mayer (formula, $C_{34}H_{56}O_{16}$) and the pararhodeoretin of Kayser.*

On evaporating the alcoholic percolates to dryness, I obtained a "hard resin," odourless and tasteless, but having the consistence and colour of that of the Pharmacopœia, and also retaining its therapeutic properties, but with the important difference of being entirely devoid of that disagreeable tendency to griping which almost always accompanies the catharthic action of jalap.

It also differs chemically from the officinal resin and that mentioned above as "jalapin" in being insoluble in ether, petroleum naphtha, carbon disulphide, benzol, and oil of turpentine, and also in giving off an odour much resembling whiskey when its solution in caustic potassa is slightly heated.

This is without doubt the convolvulin of Mayer (formula, $C_{31}H_{50}O_{16}$), and the rhodeoretin of Kayser.†

These experiments, which were at first made upon good commercial resin of jalap, were afterwards repeated so as to apply them to resin of jalap, prepared by myself from good commercial samples of whole as well as powdered jalap, and the results obtained were similar to those detailed above.

The following is a tabular statement of reactions distinguishing "jalapin" from "convolvulin" with the reagents mentioned:—

1. *Solvents.*

Solvent.	Jalapin.	Convolvulin.
Chloroform	Readily soluble.	Slightly soluble.
Ether	Very soluble.	Insoluble.
Petrol. naphtha	Slightly soluble.	Insoluble.
Oil turpentine	Slightly soluble.	Insoluble.
Benzol	Slightly soluble.	Insoluble.
Carbon disulp.	Easily soluble.	Insoluble.
Water	Slightly soluble.	Slightly soluble.
Muriatic acid	Slightly soluble.	Readily soluble.
Sulphuric acid	Very soluble, with production of maroon colour, changing to black.	Readily soluble, with production of bright-red coloration.
Caustic potassa	Easily soluble.	Easily soluble with production of odour of whiskey when heated.
Ammonia	Readily soluble, more so than convolvulin.	Slightly soluble.

2. *Reactions with oxidizing agents* on convolvulin and jalapin dissolved in sulphuric acid (conc.).

Agent.	Jalapin.	Convolvulin.
K_2CrO_4,CrO_3	Produces odour of rancid butter and reddish-brown colour.	Produces odour of rancid butter and olive-green colour.
$K_2Mn_2O_8$	Same reactions.	Same reactions.
KNO_3	Same reactions, but not so strong.	Same reactions.
$KClO_3$	Same reactions, but not so strong.	Same reactions.
MnO_2	Same odour and colour dark green.	Same odour and colour rose-pink.

In conjunction with this subject I also made several experiments in extracting the resin from the powdered drug, with alcohol of different sp. grs., especially those of 0·796 (absolute), and 0·835 (officinal), for the purpose of ascertaining if the yield would be thereby affected, and if so, which way, and also to determine the quantity of alcohol, sp. gr. 0·796, that would be required to completely exhaust the drug.

After six repetitions of the experiment on as many portions of the same sample of the drug, I found that the yield of resin was the same in every case, and that the measure of menstruum was also alike for each experiment, whether of sp. grs. ·835 or ·796, although the loss in weight of the drug after being exhausted, removed, and thoroughly dried was found to be greater in proportion as the alcohol was diluted.

* L. Gmelin's 'Chemistry,' vol. xv., page 345, and vol. xvi., page 405. Wöhler's 'Organic Chemistry,' "Remsen," p. 421. Watt's 'Dictionary of Chemistry,' vol. iii., p. 438, Husemann, 'Pflanzenstoffe,' p. 886.

† L. Gmelin's 'Chemistry,' vol. xv., p. 342, and vol. xvi., p. 154. Wöhler's 'Organic Chemistry,' "Remsen," p. 420. Watt's 'Dictionary of Chemistry,' vol. ii., p. 15. Husemann, 'Pflanzenstoffe,' p. 883.

The terms jalapin and convolvulin, particularly the former, have often led to misunderstanding. "Jalapin" is now applied only to the resin obtained from Orizaba root or Male Jalap, or from Scammony.

HOW URARI IS MADE.*

Dr. Richard Schomburgk, the director to the Adelaide Botanical Gardens, has just published a *brochure* in which he states what is known as to the method of preparing urari or curare, the famous deadly arrow-poison of some of the Indian tribes in British Guiana. His brother, in 1837, vainly endeavoured to witness the manufacture of this poison; but Dr. Schomburgk himself, in a visit to the Canuku Mountains, near Pirara, in 3° 33′ N. and 56° 16′ W., succeeded in getting an old Macusi Indian to show him the method of manufacture among that tribe. The Indian, after promising to comply with Dr. Schomburgk's request, tried every possible means of evasion, but the addition of more powder and knifes brought him to the scratch. The process was carried out in a small hut in the village, known as the urari-house. The Indian began first to take the bark from the strychnos, which they had brought from the Ilamikipang, and then produced the other ingredients and separated the required quantities. The native names of the other plants used are tarvieng, wakarimo, and tararemu, to all appearances species of strychnos. The Indian said they grew far away in the mountains at five days' distance. The preparation of the several ingredients would be according to weight as follows:—Bark of *Strychnos toxifera* 2lb; *Strychnos Schomburgkii*, ¼lb; arimaru (*Strychnos cogens*), ¼lb; wakarimo, ¼lb; root of tarvieng, ½oz.; root of tararemu, ½oz.; the fleshy root of muramu (*Cissus spec.*); four small pieces of wood of a tree of the species of Xanthoxyleæ, called manuca. The old Indian, having finished his preparations, went to his hut and returned with a new earthern pot, holding about seven quarts, and two smaller ones, also quite new, formed like flat pans. In the first vessel the poison was to be boiled, in the other it was to be exposed to the sun for condensation. The great strainer or funnel, made out of palm leaves, was cleaned, and fresh silk-grass was put into it to strain the fluid; a great block of wood sunk into the ground to serve as a mortar was cleaned, and in it the several ingredients were crushed. The urari preparer, after having arranged everything, built a hearth with three stones, laid the wood ready to light the fire, and went away to fetch (as Dr. Schomburgk was informed, for he had not exchanged a single word with the old Indian) the utensils to light the fire, though there was a large fire burning, which was of no use, having been lighted by profane hands. Neither dared the Indian use any water except that brought in the pot to be used for the operation; in fact, no other implement could be used but such as had been made by the cook, neither would he have assistance from any of the inhabitants. Any transgression of the sacred rules would nullify the operation of the poison. In addition to the fleshy root of the muramu, he crushed the several kinds of bark, but each one singly, on the mortar, lighted the carefully piled-up wood, and then threw first into the pot, which was filled with water, the bark of the *Strychnos toxifera*. As soon as the water began to boil the Indian added at certain intervals a handful of the other ingredients, except the muramu root. In doing so he bent his head over the pot, strongly blowing into the mixture, which he said afterwards added considerably to the strength of the poison. During the process he only kept as much fire as was necessary for slow boiling, carefully skimming the foam collecting on the extract. Within the next twenty-four hours the old man left the fire only for one moment, keeping the mixture at an equal heat. After the lapse of twenty-four hours the extract became thick, and was reduced by the boiling to about a quart, the colour being that of strong coffee. The old cook then took the extract from the fire and poured it into the strainer, the extract trickling slowly into another flat vessel, and left the remainder in the silk-grass. After exposing the strained extract to the sun for about three hours, he added the slimy juice pressed out of the root of the muramu, which had previously been soaked for a short time in the boiling poison, and then had been pressed out. The poison immediately exhibited a remarkable alteration, curdling to a jelly-like substance. After this peculiar process he poured the poison into earthern vessels, flatter than those before mentioned, for the purpose of bringing the poison to a consistence equal to that of thick treacle by exposing it to the sun. Afterwards it was poured into the peculiar small calabashes, or half-round earthern vessels, manufactured only for that purpose, where it ultimately changed to a hard substance. On the third day the poison was ready, when the cook, satisfied with the product, tried the strength of the poison on some lizards in Dr. Schomburgk's presence. He dipped the point of a pin into the poison, let it dry, wounded one of the lizards in one of the toes of the hind foot, and then let it run. In nine minutes the peculiar symptoms of the poison made their appearance, and one minute after the slightly-wounded animal was dead. A rat died in four minutes, and a fowl in three. The Indians declare the poison loses its effect after two years, but its power can be destroyed by pouring some manihot juice upon it. Dr. Schomburgk took some of the urari to Berlin with him, and made several experiments with it, when he found that it frequently took from fifteen to twenty minutes, according to the tenacity of life, before death ensued. A commission of scientific men was appointed by the German Government to report on the effects of the poison, and many experiments were made, from the frog to the horse. Professor Heintz made a careful analysis of the poison, and, though it was made from strychnos, he found it contained no strychnine. From experiments made by Professors Virchow and Münter they conclude:—1. That the urari kept dry will, after the lapse of five years, retain its intense and rapid efficiency. 2. That it has no effects like those of strychnine. 3. That it is not a tetanic poison, but operates by stupefying. 4. That urari causes palsy, produces a discontinuance of the voluntary movements of the muscles, with continued functions of the involuntary muscles of the heart, intestines, etc. 5. That the external application of urari is not fatal, but only when absorbed through a wound. 6. That death is not the direct result of poisoning, but of the discontinuance of the mechanical action of respiration. Urari, Dr. Schomburgk states, has been successfully used both in tetanus and hydrophobia.

* From *The Times*.

A HOMELY SUBSTITUTE FOR COD-LIVER OIL.*

Dr. Thomas Addis Emmet ('Principles and Practice of Gynæcology') recommends as a good substitute for cod-liver oil the fat of pork. For its proper preparation he gives directions as follows. A thick portion of a rib piece, free from lean, is selected and allowed to soak in water for thirty-six hours before being boiled, the water being frequently changed, to get rid of the salt. It should be boiled slowly and thoroughly cooked, and, while boiling, the water must be changed several times by pouring it off, and fresh water, nearly boiling, substituted. It is to be eaten cold, in the form of a sandwich, made from stale bread, and both should be cut as thin as possible. It is very nutritious, but it should only be given in small quantities until a taste of it has been acquired. It is the most concentrated form in which food can be taken in the same bulk, and Dr. Emmet has frequently seen it retained when the stomach was so irritable that other substances would be rejected. For this condition of the stomach, it may be rubbed up thoroughly in a porcelain mortar, and then given in minute quantities at a time. It is made more palatable by the addition of a little table-salt, and this will be well tolerated, while the salt used for preserving the meat, having become rancid, if not soaked out, will produce disturbance, even in a healthy stomach.

* From *The British Medical Journal*, January 17, 1880.

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APOTHECARIES' WEIGHTS AND MEASURES.

SOME weeks since we suggested that it would be useful if the Society's local secretaries or the secretaries of provincial associations were to communicate with the local authorities of their several districts respecting the steps to be taken under the new Weights and Measures Act, 1878, for the verification and inspection of apothecaries' weights and measures. At the same time we intimated that we should be glad to learn what progress was being made; but with one or two exceptions we have not heard anything further, except complaints of the inconvenience experienced in consequence of the uncertainty that prevails as to the carrying out of the Act in so far as it applies to apothecaries' weights and measures.

At the last two meetings of the Council this subject has been under consideration, and in pursuance of the resolution to present a memorial to the Board of Trade, urging the necessity of a definite and uniform practice under the new Act, a deputation waited upon Mr. FARRER at Whitehall last month. On this occasion it was represented that there was a very great discrepancy between the readings of the Act as regards apothecaries' weights and measures, and that some of the views adopted by inspectors in various places would, if enforced, place chemists and druggists under considerable inconvenience in the exercise of their business.

The reply received from Mr. FARRER was mainly directed to explaining the passive position of the Board of Trade in regard to the carrying out of the Act, and the absence of any power to give instructions, except to those local authorities that applied to the Board of Trade for assistance and direction. At the same time it was indicated that there was every disposition on the part of the Board of Trade to render any assistance required, and to support the Pharmaceutical Society in the endeavour to protect the trade from inconvenience by bringing about a definite and uniform mode of procedure for the verification and inspection of apothecaries' weights and measures.

Though this subject has been again referred to the further consideration of a Committee of the Council, it may not be out of place to point out the circumstances which render action by the Council desirable in the interests of the trade. In the first place it is to be remembered that, according to the provisions of the Act, any persons who have in their possession for purposes of trade weights and measures that have not been verified and are not stamped with proper marks of verification are liable to penalties of no inconsiderable amount. Consistently with these provisions chemists and druggists are liable to be summoned before a court of summary jurisdiction, and fined, and their weights and measures confiscated if they are not what they should be. After what has already been published in this Journal on the subject now referred to, it would be superfluous to waste much time in the endeavour to show that it is still practically an open question what apothecaries' weights and measures should be, and that herein lies one of the sources from which danger of inconvenience is to be apprehended. We do not believe there is anything in the Act itself to justify doubts or differences of opinion in regard to this question, but it is quite certain the inspectors of weights and measures in different localities do not agree in their reading of the Act.

This brings us to the most important circumstance to be considered in regard to the interest of chemists and druggists, viz., the course taken by the inspectors with apothecaries' weights and measures. Some simply say, "We have no instructions how to carry out "the verification and inspection of those weights and "measures; we have not been furnished with stan"dards for the purpose, and, therefore, we are not in a "position to do anything in carrying out the provi"sions of the Act." Others, again, take a different view and are ready to act, not upon any uniform system, but according to their individual interpretation of the Act. This is a state of things that ought not to be allowed to continue, and it cannot be expected that anything but trouble and vexation can be the consequence of such discordant opinions as have been expressed by the inspectors in different places.

According to our view of the matter, however, it seems more than probable that in most instances the inspectors of weights and measures are as yet without any adequate authority for dealing with apothecaries' weights and measures at all. If we refer to the Act itself, it will be seen that under the head of Administration, it lies with the local authorities to take the initiative in carrying out the provisions of the Act as to local verification and inspection of weight and measures. Section 50 states that for the purposes of this Act "the local authority" shall mean the authority mentioned in the fourth Schedule to the Act in respect to each of the different areas there mentioned, and on referring to the Schedule we find the local authority for a county consists of the justices in general or quarter sessions assembled, for a borough it consists of the mayor, aldermen and burgesses, acting by the council, and for the city of London it consists of the court of the Lord Mayor and aldermen of the city.

These several local authorities are empowered to provide local standards and places for their keeping, also proper means for verifying weights and measures by comparison, and for stamping weights and measures so verified. The local authorities are also empowered to appoint inspectors, and define their duties. To that end the local authorities are empowered to make, revoke, alter and add to bye-laws for regulating the work of verification and inspection. Until such action is taken by the respective local authorities of different districts and places in reference to apothecaries' weights and measures, it would appear that the inspectors have not really any authority to act or in any way to attempt to carry out the provisions of the Act respecting these weights and measures.

So far as we have been able to obtain any information, it does not appear that the local authorities throughout the country have generally, if at all, proceeded to take such action as would be necessary for authorizing their inspectors to deal with apothecaries' weights and measures. Why that should be the case we are at a loss to imagine, for though there are no provisions in the Act to enforce its being carried out, or for inflicting penalties for its not being put in force by the authorities empowered to carry it out, we cannot suppose that persistent disregard of the duties assigned to local authorities would be allowed to remain unprovided for by further legislation.

Under these circumstances there seems to be ample reason for the Council of the Pharmaceutical Society to communicate with some, if not all, of the local authorities corresponding to different districts and places throughout the kingdom, with the object of making known to them the inconvenience resulting from the uncertainty how the Act is to be carried out in its application to apothecaries' weights and measures, the need for some uniform procedure in the verification and inspection, and for the adoption of a suitable scale of fees. It is satisfactory to find that the Board of Trade, recognizing the importance of the interests involved and the desirability of protecting the trade from inconvenience, is willing to assist the Council in its application to the local authorities, and thus to give additional weight to its representations.

THE LIMITS OF A PUBLIC ANALYST'S DUTIES.

In the report of the annual dinner of the Sheffield Pharmaceutical and Chemical Society, at p. 651, it will be found that Mr. A. H. Allen, the public analyst for the borough of Sheffield and for the county, has furnished a striking illustration of the truth of the proverb *qui s'excuse s'accuse.* We have no intention of questioning Mr. Allen's desire that his pleasant intercourse with the pharmacists of Sheffield should suffer no diminution, and we heartily wish that it may be gratified, but we cannot agree with him in thinking that such a result is to be promoted by what he terms "his very outspoken remarks" as to his performance of the duties of public analyst. Those remarks appear to have been offered in reply to others indicating, as Mr. Allen thought, an impression that he was in the habit of initiating prosecutions under the Sale of Food and Drugs Act. Mr. Allen assured his audience nothing could be further from the truth, and that he held the public analyst had nothing to do with the initiation of proceedings. We are thoroughly in accord with the opinion expressed by Mr. Allen in the latter part of this sentence, but we cannot read his subsequent outspoken remarks without a misgiving as to the former part being borne out by them. At any rate his reference to cases in which he had been concerned appears to convey a different impression, especially the instance where he volunteered the opinion that a particular sample was not one to take proceedings about, and where the magistrates informed him that it was their business to decide that point, and his business was merely to state the results of his analysis. This view seems to us a very proper one, for although magistrates may not always be the best able to judge as to the propriety of instituting a prosecution, and though a public analyst may sometimes happen to have sounder opinions on this point, the expression of that opinion is in no way consistent with his official position. No doubt there is often a need of sound opinion to guide the authorities as to the propriety of prosecuting; but we think public analysts, out of regard for their office, and for the sake of maintaining a character for impartiality, should abstain from giving any such opinions, even when asked to do so.

In this sense we take exception to Mr. Allen's practice of "unhesitatingly condemning" spirit of nitrous ether even when it is extensively watered, inasmuch as by that proceeding he superadds to the functions of the public analyst those of the magistrate or of some other authority competent to decide whether prosecution is desirable. So long as public analysts commit such errors, they will continue to be subject to much adverse criticism, and we will even admit to unfair criticism, perhaps, but they are themselves to blame for that, and the disadvantage of such criticism is not to be done away with by self-laudatory assertions. We do not expect public analysts to be infallible, and would even be willing to pardon them for an occasional mistake, if they would only confine themselves to their own business and not muddle themselves with pharmacopœias present or past, with assumptions as to pharmacopœia standards for drugs being a rule for other purposes than they are intended for, and with the decision of such questions as that relating to milk of sulphur; if in short they would do their work as analysts thoroughly and well and leave other people to mind their own business.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

Wednesday, February 4, 1880.

Present—Charles R. O. Tichborne, LL.D., Ph.D., President; Mr. Bennett (Kingstown), Mr. Doran (Bray), Mr. Hayes.

Proposed by the President, and seconded by Mr. Bennett—

"That the meeting of this Council do stand adjourned to the ordinary day of meeting in March, in consideration of the death of Sir Dominic Corrigan, Bart., their late President, and that a letter of condolence be forwarded to Lady Corrigan expressing the great regret of the Council at her bereavement."

The President, in putting this motion, remarked that this was the second death within the last few months which was thinning off the original promoters of the Pharmaceutical Society of Ireland. If there was one person who had been associated with that Society more than another, or who had taken more than ordinary interest in its welfare, it was Sir Dominic Corrigan. His name had added lustre to their position, and even after ill-health had compelled him to resign his position on that Council, he had never forgotten them. He (the President) had, some few months before Sir Dominic's last illness, received a note from him asking news of the old Society, and he was sure that every member of that Council would feel with him (the speaker) that his loss meant something more than the loss of a public man—that it was the loss of a friend in council.

The motion was carried unanimously, and the meeting was adjourned to March 5.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The eighth general meeting was held at the Royal Institution, on Thursday evening, January 29, the President, Dr. Charles Symes, in the chair.

The minutes of the previous meeting were read and confirmed.

The following donations were announced:—

The current numbers of the *Pharmaceutical Journal*, from the Society, and the *Canadian Journal of Pharmacy*, from the editor.

A paper was read, entitled

Coal Tar and its Distillation.

BY ALBERT KEHLSTADT, PH.D.

In distillation of coal, three principal products are obtained,—gas, tar and coke. Not much more than twenty years since the coal tar, which is now the basis of an extensive industry, was looked upon as a nearly worthless substance, to get rid of which the manufacturers were glad. The tar was a large source of inconvenience, as well for the gas works as for the habitations around them. Nobody thought of obtaining anything valuable out of it. The only use made of it was the use of its great antiseptic power, which is formed in the large amount of phenols it contains. It was used (and is yet) as a paint for iron and other metals, for wood, and in the manufacture of felt for roofing, etc. Efforts were made, and not very long ago, to obtain gas from it, by heating it again, but without satisfactory results.

In 1858 the tar became of great importance, as it was found to be a great source of all raw materials for the manufacture of artificial dyes. Already in 1842 Leigh, in Manchester, found benzene (discovered 1825 by Faraday) in the coal tar. In 1845 Hoffmann also detected the presence of benzene in the light coal tar oil and showed its identity with the substances discovered by Faraday (in the light oils arising from the manufacture of gas from oil) and Mitasherbich, who in 1835 got benzene by distilling benzoic acid with lime. In 1847 Charles Mansfield succeeded in obtaining benzene in larger quantities out of the tar, which he proved would be an inexhaustible source for this hydrocarbon. The use then made of benzene was principally the manufacture of nitrobenzene, employed as essence of mirbane in perfumery.

But it is to the valuable discovery, made by Perkins (London) in 1856, when he tried the action of oxidizing agents on certain salts of aniline and thus discovered the mauveine or aniline violet, that is due the enormous increase in the manufacture of coal tar products. Already in 1859 the aniline red or fuchsine was discovered by Verguin and Renaud Brothers, dyers, at Lyons. Since then every year has added new and useful applications, and science has gone on hand in hand with the astonishing development of the new industry, so that now all alizarine is produced in the artificial way out of coal tar products, which is certainly not one of the least triumphs of chemical investigations.

The tar as it is obtained by the distillation of coal is a heavy black or brownish-black thick and oily fluid, insoluble in, and more dense than water, and of offensive smell. It consists of a great number of very different bodies, differing in their physical and chemical characters. There are contained in it acids, alkalies and entirely neutral substances. The last mentioned compose the greatest part of the tar in relation to its weight and to its industrial importance. They are binary compounds consisting only of carbon and hydrogen and are therefore called hydrocarbons.

The following compounds have been found in the coal tar:—

C_5H_{10}, Amylene.
C_5H_{12}, Quintane.
C_6H_{12}, Hexylene.
C_6H_{14}, Sextane.
C_7H_{14}, Heptylene.
C_7H_{16}, Septane.
C_7H_{18}, Octane.
$C_{10}H_{22}$, Decane.
CnH_{2n+2}, Paraffin.
C_6H_6, Benzene.
C_7H_3, Toluene.
C_8H_{10}, Xylene.
C_9H_{12}, Cumene.
$C_{10}H_{14}$, Cymene, etc.
C_8H_8, Styrolene.
C_8H_{10}, Styrol.
$C_{10}H_8$, Naphthalene.
$C_{10}H_{10}$, Hydride of Naphthalene.
$C_{14}H_{10}$, Anthracene (Phenanthrene).
$C_{14}H_{12}$, Hydride of Anthracene.
$C_{12}H_{10}$, Azenaphthene.
$C_{16}H_{10}$, Pyrene.
$C_{18}H_{16}$, Chrysene.
Bitumene.
Benzerythrene.

Of acids and substances acting like acids have been found—

$C_2H_4O_2$, Acetic Acid.
C_2NS_2, Sulphocyanic Acid.
CS_2, Bisulphide of Carbon.
C_6H_6O, Phenol.
C_7H_8O, Cresol.
$C_8H_{10}O$, Phlorol.

Of alkaline compounds we find—

NH_3, Ammonia.
$C_6H_5NH_2$, Aniline.
C_5H_5N, Pyridine.
C_6H_7N, Picoline.
C_7H_7N, Lutidine.
$C_8H_{11}N$, Collidine.
$C_9H_{13}N$, Parvoline.

$C_{10}H_{15}N$, Corridine.
$C_{11}H_{17}N$, Rubidine.
$C_{12}H_{19}N$, Viridine.
C_4H_5N, Pyrrol.
C_9H_7N, Leucoline, isomer with Chinoline.
$C_{10}H_9N$, Lepidine.

This list cannot claim to be a complete one, for it is constantly growing.

It is at present extremely difficult to state the exact relations between the nature of the numerous bodies resulting by the distillation and the immediate composition of the coal. Though the physical qualities of the coal have a great analogy with those of carbon, coal is not carbon at all, not even impure carbon ; it is no simple substance; it is to be considered as the result of the association of several immediate principles, which are probably polymeric derivatives of the immediate principles composing plants. It has been tried at different times, and by different chemists, to treat coal with various solvents, acids, alkalies and neutral solvents, such as alcohol, ether, benzene, chloroform, etc., but without obtaining satisfactory results. The two first mentioned kinds of reagents are without action on coal, the latter extract only minimum quantities of the substances of the coal, which have not been made the subject of a thorough examination.

It is probable that more conclusive results would be arrived at if, instead of taking these easily volatile solvents, heavy coal tar oils of known composition were taken and the treatment of the coal effected under higher pressure than the atmosphere. Other reasons, quite independent of the above mentioned, are sufficient to account for the fact, that a question of such high interest as well for science as for manufacture has not yet found its solution. These are the great varieties of composition of the coals distilled and the widely-differing conditions under which the distillation takes place. For instance, the distillation of Boghead coal and of coal from St. Etienne (near Lyons) will give very different tars both in quantity and quality. Boghead gives about 20 per cent. of its weight in tar, very rich in paraffin, whilst St. Etienne coal yields scarcely 5 per cent. of tar, containing no paraffin at all. Tar from Newcastle coal scarcely contains anything else than naphthalene. Wigan cannel coal yields tar, containing chiefly benzene and phenol. Generally, coals rich in hydrogen yield the greatest amount of tar.

The different rapidities of raising the temperature to red heat can also cause notable changes in the succession and nature of the decompositions displayed in gas retorts, even in distilling coal of the same quality.

In what manner and in what degree these changes take place has yet to be determined, only experiments having yet been made with scientific skill and precision. The empirical observations have only arrived to the result, important by its general value, but very vague, that the same quantity of coal distilled at a high temperature yields more gas and less tar, and at a low temperature yields more tar and less gas.

The principal purpose in distilling coal is to get as much gas as possible, and the distillation therefore takes place under the influence of heat, increased quickly to redness, and this great heat is allowed to act on the products formed at lower temperatures. These conditions are not favourable to the large proportion of tar, but on the contrary favour the formation of gas on the one side, and of the least volatile product on the other side. The formation of the latter ones can go as far as to the carbon itself, which we find therefore always deposited in the retorts as retort coal. To diminish this decomposition and with it the loss of gas, all the products of the distillation are continually sucked out of the retorts by means of exhausters.

It has been proved by Berthelot that the higher and heavier hydrocarbons contained in coal tar, namely anthracene, naphthalene and chrysene, are produced by the action of red heat on the simpler ones, viz., toluene, etc.

The basic substances like aniline, etc., are very likely formed by the action of ammonia on the hydrocarbons *in statu nascenti*, and in the same way the acids might have been formed by the action of binoxide of carbon at these high temperatures.

We may expect, as soon as tar shall become the chief subject of the distillation, instead of being only a bye-product of another industry, that all scientific questions as to the way of the formation of each compound will soon be cleared up.

Should the electric light really be able to supersede the lighting by gas, then, of course, coal ought to be distilled for the purpose of getting tar. The manufacturers would then very soon, in their own interest, seek to fix the peculiar conditions under which such substances are produced, whilst others are not, or at least when the largest quantity of the desired substance is produced. They would take notice of the relations between coals of various sources and composition, and the quantity and quality of the produced tar. All this would in a short time furnish a valuable material, enabling science to complete her building.

The very great complexity of the tar, which contains simultaneously products of quite a contrary character, liquids and solids, acids, bases and neutrals, aqueous and oily, indicates clearly that, before being of any use, these components have to undergo a preliminary classification. After being freed from water the liquids have to be separated from the solids. The liquids again have to be subdivided into two classes, light oils or naphtha and heavy oils. The solids are classified into hard pitch, soft pitch, and asphalt (liquid pitch).

This classification is done by the distillation, and the separation is completed by supplementary processes chiefly consisting in alternative treatments with acid or caustic liquor.

Distillation.—The tar, being generally condensed together with the ammonia-water retains always mechanically enclosed, on account of its dough-like consistance, certain quantities of water. In cases where this quantity would be large, the tar has first to be freed from it, for it could become a cause of danger during the distillation. This is done by heating in stills for about twenty to thirty hours to 176° or 194° F., then the water is drawn off and the tar brought into the stills where it has to be distilled.

The tar worked up in the Liverpool Tar Works does not require this precaution; the small quantity of ammoniacal liquor goes over together with the naphtha.

Different kinds of stills are in use, horizontal cylinders, rectangular stills, or vertical cylinders with vaulted bottom, whose diameter is larger than the height. The volume of the tar diminishing considerably during the operation, so that the pitch at the end occupies only half the volume of the introduced tar, there would be a risk of burning the walls of the stills or superheating them, if the heat were allowed to act higher up on the walls of the still than to the level attained by the residue of the distillation. The pitch would then spontaneously catch fire and cause terrific explosions. The still must further not be heated by direct fire, for when the pitch is allowed to be too much heated, it deposits carbon, which would cause a loss of volatile products and a deterioration of the pitch.

The still, slightly inclined against the side opposite to the furnace, has on the bottom of this side a large stopcock and pipe to let the pitch run off. This stopcock has to be quite isolated from the still by a wall of bricks, in order to prevent the heavy vapours always accompanying the running off of the pitch from being drawn back by the strong draft of the chimney and thus being ignited. On the top the still has a man-hole and a still head, communicating with the condenser. The latter one, as used in the above-mentioned works, is an iron worm of about

8 inches inner diameter and cooled by fresh water running in the opposite direction to the vapours.

The stills are mounted in large furnaces and covered on the top with bricks, to avoid a loss of heat by radiation and the noxious influence of the atmosphere. They are charged twice a week with tar, 4000 to 8000 gallons, varying according to the size of the still.

By heating slowly, the very light oils pass over together with the ammoniacal liquor; these oils constitute the so-called naphtha, having a sp. gr. from 0·780 to 0·850; they pass over between 86° and 284° F., and are the material of which the benzol and toluol are made. They have a very strong smell, owing to the alkaline substances contained in them. After this naphtha, which is collected separately, comes over the light oil, at from 300° to 400° F.; its sp. gr. is 0·830–0·890 and it contains chiefly the phenols, which are also extracted from it. If the distillation is continued, heavy oils pass over, especially rich in naphthalene, and depositing crystals on cooling. When the operation comes towards the end very heavy oils pass over of a dark red-brownish colour, which, when allowed to cool, congeal to a yellow semi-fluid substance, the so-called "green-crease." The residue in the stills is the hard pitch; it is fluid enough to be run off, but on cooling it congeals to a black, shining, brittle solid mass, which softens only at high temperatures, about 140° F., and can, therefore, even in summer be transported in open packages.

It is this pitch which is used in paving the streets in Liverpool.

The tar, being distilled in this manner, yields on the average per ton:—455 to 490 fluid ounces ammoniacal liquor; 1015 to 1050 fluid ounces very light oil (naphtha); 3150 to 3500 fluid ounces light oils, still containing a little benzol and fit for use as lamp-naphtha; 10,500 to 10,920 fluid ounces heavy oils, creasote oils, etc.

A discussion followed, in which the President, Messrs. T. F. Abraham, Conroy and Davies took part.

Mr. Kehlstadt replied to the points raised in the discussion, and a unanimous vote of thanks having been passed to the author, the meeting closed.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The annual dinner was held at the King's Head Hotel, Sheffield, on Thursday, the 5th inst. The chair was occupied of Mr. G. Ellinor, the President, and among the visitors were Messrs. A. H. Allen (borough and county analyst), W. T. Howie (Messrs. Barron, Harvey and Co) and J. Blair (Messrs. J. Brown and Co., armour-plate manufacturers), etc.

The usual loyal and patriotic toasts were proposed from the chair; also that of the Pharmaceutical Society, to which Mr. Howie replied. Mr. Allen proposed the Sheffield Society, which was acknowledged by Mr. E. R. Learoyd. In the course of his remarks Mr. Allen took the opportunity of saying that, judging from some observations that had been made, there was probably an impression that he was in the habit of initiating prosecutions under the Sale of Food and Drugs Act. Nothing could be further from the truth, the fact being that a public analyst really occupied more the position of a skilled witness consulted by the court, and had nothing to do with the initiation of proceedings. He made it a rule never to suggest the purchase of any particular kind of article unless he was requested to do so, or some kind of complaint reached him as to the quality of the things sold. The fact was that many of the inspectors entrusted with the enforcement of the Act had a notion that every case in which an article had not been found to be absolutely pure was a proper one for proceedings, and the analysts had continually to combat this idea. In one instance in which he (Mr. Allen) had been concerned he actually prompted the defence to ask him, in the witness box, whether, in his opinion, the case was a proper one for proceedings, and on his replying in the negative, the case was dismissed. In another instance, he added a remark to his certificate that the sample was not one to take proceedings about, and received, in consequence, a letter from head quarters informing him that the propriety of proceedings was for the bench to consider, and that the analyst's business was simply to state the results of his analysis. It had been stated that he was in the habit of condemning spirit of nitrous ether if it did not strictly respond to the B. P. tests. This was quite a mistake. Provided the sample was fairly rich in nitrous ether he took no exception to it; but it was well known that spirit of nitrous ether was extensively watered and that the dilution greatly hastened its decomposition. If he met with a sample which was destitute of nitrous ether, whether it had been watered or not, he unhesitatingly condemned it. This was often spoken of as a hardship, seeing that decomposition occurred spontaneously. The same plea might be held to justify the sale of stinking fish or rotten hams. It was the duty of those who dealt in perishable articles to see that they were in good condition. Public analysts were subject to much adverse and occasionally very unfair criticism, but the fact was that as a body they did their work remarkably well. A great deal was made of any case in which an analyst erred through indiscretion or other causes, while the many thousands of samples which passed through their hands annually were forgotten. People did not expect their lawyers, their judges, their government, their doctors or their generals to be infallible; but if an unfortunate analyst erred in any way, or even showed himself unacquainted with the forgotten pharmacopœias of the last century, the whole force of the trade influence was brought against him and he was considered a fair subject for public abuse. As an instance of this, might be mentioned the memorable milk of sulphur decision, where by means of legal quibbles a judgment was given which many leading pharmacists admitted was unjustifiable, and the better part of the trade generally regarded as a step in the wrong direction. The association which conducted that defence successfully did much to injure pharmacists in the eyes of thinking men, as did those who played fast and loose with the Pharmacopœia, and quoted it one day as the standard authority on drugs, while, if it suited their purpose, on the next day pooh-poohed it as of no value at all and as in no way to be regarded as authoritative. Such juggling did not escape notice, and was a discredit to these who practised it, while it tended to bring the whole trade into disrepute. In concluding, Mr. Allen said that from the reception his very outspoken remarks had met with, he felt sure that his meaning had not been misinterpreted, and that his pleasant intercourse with the pharmacists of Sheffield would suffer no diminution on that account.

Mr. Councillor Dobb in eulogistic terms then proposed "The President," and, in responding, Mr. Ellinor thanked the company for the very hearty manner in which they had drunk his health. He hoped it would be his care and study to conduct the business of the Society in a manner acceptable to its officers and members. Unity was strength, and it was desirable that all chemists and druggists in the district should be members, and he gave several reasons for supporting local institutions. The question was not what had the association done or what was it doing? but what had it averted? When the trade was threatened with legis lation which would affect the interests of the trade, meetings were called, petitions signed and forwarded to members of Parliament, organized united efforts put forth, and by the personal and combined action of this and other local societies, the evil was averted. To the meeting of the Pharmaceutical Society in London on January 9, 1879, representatives were sent by this Society and doubtless the tone and action of that meeting was the means of averting much evil. The "patent" question was one presenting many difficulties not easy of solution, and he thought the better plan would be not to introduce any new ones, no matter how good, and by every lawful means to supplant those in general use by their own preparations. He regarded the so-called homœopathic medicines sold by grocers as containing no medicine, the pilules being sugar of milk and the so-called tinctures, simply proof spirit, and said he thought that the grocers must have instructions from those who supplied them that they must not sell the No. 1 pilules or tinctures, as they would then be liable under the Pharmacy Act. He described an amusing incident of a customer interrogating a grocer's assistant as to the action of a medicine. He expressed a hope that the friendly intercourse of the officers and members which had so marked the past would also show itself during his year of office, and that he would when the time came relinquish his post unsullied to a worthy successor.

Mr. J. S. Burnell proposed "The Vice-President and Council," to which Mr. J. Preston replied.

Mr. Otley proposed "The Joint Honorary Secretaries," to which Mr. Newsholme responded.

The remaining toasts were "The Visitors," proposed by Mr. Hall, acknowledged by Mr. Blair, and "The Ladies," proposed by Mr. A. Wood.

The attendance was not quite equal to that of former years, but as every care had been taken to conduce to the comfort of those present, altogether a very pleasant and enjoyable evening was spent.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The fourth meeting of the session was held in Anderson's College, 204, George Street, on February 4, Mr. A. Kinninmont, F.C.S., President, in the chair.

The minutes of the previous meeting having been read and adopted, the President called upon Mr. Jos. A. Clarke to give a critique on an address of Dr. A. Buchanan on "Alcohol," delivered in Anderson's College to the Medical Students.

After Mr. Clarke's remarks there ensued a lively discussion, in which Messrs. Kinninmont, Paterson, Walker, Taylor and Hunter (Secretary) took part, after which a hearty vote of thanks was given to Mr. Clarke, for his critique.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The annual supper of the Association was held at the Flying Horse Hotel on Wednesday evening, January 28, when thirty members and friends sat down, under the presidency of Mr. R. Fitzhugh F.C.S., the vice-chair being occupied by Mr. J. Lewis.

After the usual loyal toasts had been given by the chairman and duly honoured, Mr. C. W. Warriner proposed "The Pharmaceutical Society," which was responded to by the local secretary, Mr. Fitzhugh. Mr. C. A. Bolton next gave "The Teacher of the Science Classes," which was acknowledged by Mr. R. Widdowson. Mr. F. H. Spencer then proposed the toast of the evening, "Success to the Nottingham and Notts Chemists' Association," and coupled with it the name of the President, who suitably replied. "The Officers of the Association" was next proposed by Mr. Humphreys and acknowledged by the Hon. Secretary, Mr. R. Jackson. Mr. Ault next gave "The Vice-President and Council," to which Mr. F. White replied. The remaining toasts were "The Visitors," proposed by Mr. Wilford and responded to by Mr. George; "The Chairman;" "The Vice-Chairman," and "The Ladies."

Some capital songs were well sung by Mr. Gascoyne, Mr. M. Ments and Mr. C. Fletcher, Mr. King presided at the pianoforte and a most enjoyable evening was spent.

EDINBURGH CHEMISTS' ASSISTANTS' ASSOCIATION.

The fifth meeting of the session was held on the evening of Wednesday, February 4, in the rooms of the Pharmaceutical Society, 119A, George Street; Mr. Robertson, Vice-President, in the chair.

The Secretary having read the minutes of the previous meeting, a paper on "Cinchona Barks" was read by Mr. Fraser.

Mr. Fraser traced the early history of the cinchona plant from the time when, as a medical agent, its efficacy was first ascertained by its having cured the wife of the Peruvian Viceroy, the Countess Chinchon, of a fever, until its introduction into Europe somewhat later, whither it was imported by Jesuits from Rome. Although it met with much opposition at first, he showed how on its admirable properties becoming known, it speedily attained to high repute. In France, during the reign of Louis XIV, its use was entirely prohibited, but having been employed with great success as a "secret remedy" by an English physician resident there, the Government finally persuaded its possessor to disclose his secret in exchange for a large sum of money and various other rewards. Since then it has been held in high estimation in all parts of Europe. During the year 1872, no less than 28,450 cwt. were imported into the United Kingdom alone. The original habitat of the plant was the valleys and eastern slopes of the Andes in South America; but attempts to acclimatize it in other countries had met with considerable success. The Dutch were the first to make the attempt, and though experiencing repeated failure, were at length successful in establishing a colony of healthy plants of the *Calisaya* species, in the forests of Java. The British Government had also established a plantation on the Neilgherry Hills in India, and on a similar plantation, established by the Indian Government in British Sikkim, the report for 1878–9 states that no fewer than four million trees are planted. Mr. Fraser then entered rather minutely into details concerning the official species, and showed the points of resemblance and of difference between them. Of all the various species employed in medicine, the *C. Calisaya* was undoubtedly the most valuable; but other species, the *C. Succirubra* notably, were fast rising into importance. On the Sikkim plantation, for instance, of the four million trees growing there, no fewer than three and a-half million belonged to this species. The alkaloids of the red bark, he remarked, had for some time been used in medicine under the name of "Cinchona Febrifuge;" but the popularity of this preparation was considerably impaired, by its containing a nauseating principle. The essayist next passed under review the various alkaloids obtained from the bark, and stated the principal tests for distinguishing one from the other. The best means of detecting adulterations were also pointed out.

Numerous specimens of the various kinds of barks were exhibited in illustration of the subject, as also living specimens of *Cinchona succirubra*, and *Cephaelis Ipecacuanha*, illustrative of the cinchona order.

Remarks were made upon the paper by several members, and afterwards a hearty vote of thanks was awarded to Mr. Fraser for his most interesting and highly instructive paper. A vote of thanks was also awarded to Mr. Sadler, Curator of the Royal Botanic Gardens, for his kindness in supplying the plants.

OLDHAM CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The annual meeting of the above Association, held at the Church Institute, terminated on Thursday evening the 29th ult., it having been adjourned from the previous Tuesday. The President, Mr. John Wood, occupied the chair.

After the usual preliminary business the Hon. Secretary, Mr. Joshua Naylor, read his annual report, in which he stated that whilst he could not congratulate the members on the rapid progress of the Association during that time, yet on the other hand he did not see anything to cause despair; in fact, financially the Association was stronger now than twelve months ago, notwithstanding that its number still remained small. It must not be forgotten that changes with assistants and apprentices were of frequent occurrence, and this fact made it difficult to keep an association composed so entirely of these classes in a satisfactory condition, for in many cases no sooner had an assistant begun to take an interest in the Association and avail himself of the facilities it offered than he had to leave the town. Considering the above, and seeing that there was no chemists' association in Oldham, it was to be regretted that the chemists of the town did not take a greater interest and more active part in the working of the Association, which must inevitably be to the advantage of the masters, inasmuch as it would be a means of uniting them more closely together in their business pursuits. At the same time it should be distinctly understood that most of the principal chemists of the town had hitherto given very valuable pecuniary aid to the Association. Another matter of great importance was the desirability of the masters using their influence in securing the aid of leading gentlemen in the business, by inducing them to come and give lectures occasionally. Lectures, essays and papers had been given on various subjects. In addition to these, examinations, classes and conversaziones had been conducted on botany, chemistry, materia medica and pharmacy. The Association was also again indebted to various persons for donations of books, journals, etc.

The Treasurer, Mr. Robert Taylor, then made his financial statement, showing that the expenditure for the past year was £7 18*s.* 1*d.*, and the income £10 10*s.* 10*d.*, leaving a balance in favour of the Association of £2 12*s.* 9*d.*

The officers for the ensuing year were then elected, with the following result:—President, Mr. John Wood, re-elected; Vice-President, Mr. John Boyd; Treasurer, Mr. Robert Taylor, re-elected; Hon. Secretary, Mr. Joshua Naylor, re-elected.

A hearty vote of thanks was given to the officers for their services during the past year.

The chairman then gave his annual address, dwelling chiefly on the business of the past year and expressing himself dissatisfied with the work done, hoping that the members would individually and collectively display more energy and thereby raise the Association to a higher standard during the coming year.

A cordial vote of thanks to the chairman terminated the meeting.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, Feb. 5, Mr. Warren De La Rue, President, in the chair. The following certificates were read for the first time:—M. Bechler, W. J. Dibdin, A. C. Fryer, C. C. Graham, C. P. Sheibner, J. R. Skelton. The following communications were read:—

Note on the Assumed Formation of Ozone by the Atmospheric Oxidation of Phosphorus. By C. T. Kingzett.—The author criticized a short paper recently read before the Society by Professor McLeod on the above subject. The quantitative experiments in Professor McLeod's paper consisted in aspirating air over phosphorus partly submerged in water and then heating the gas to a temperature at which peroxide of hydrogen is assumed to be decomposed into water and oxygen. Any water formed was absorbed in a weighed sulphuric acid tube. In one experiment 2760 c.c. of air thus treated increased the weight of the sulphuric acid tube 0·0006 grm., while the gas which passed through, liberated iodine in a potassic iodide mixture, equal to 1·8 c.c. of decinormal sodium thiosulphate. Professor McLeod then proceeds: "Now as 1 c.c. of the thiosulphate corresponds to 0·017 grm. of hydroxyl, which on decomposition by heat would form 0·009 grm. water, and as we may reasonably assume that at 200° at least the half of any hydroxyl that might be present would be decomposed, we should in the last experiment expect an increase of about ·016 grm. in the sulphuric acid tube instead of only 0·0006 grm." Professor McLeod therefore concludes that the active agent cannot be hydroxyl and is consequently ozone. The author of the present paper contends that the above argument falls to the ground because 1 c.c. of decinormal thiosulphate is not equivalent to 0·017 grm. of hydroxyl, but only to 0·0017 grm., so the gain in the sulphuric acid should be 0·0016 and not 0·016 grm. Passing exposure to 200° would probably not decompose a very small quantity of peroxide of hydrogen diffused through nearly three litres of air. The author therefore does not accept Professor McLeod's experiments as in an any sense conclusive, and hopes to present shortly a further communication on the subject.

The Secretary then read a paper entitled—

Contributions from the Laboratory of the University of Tôkiô, Japan. II. On Persulphocyanate of Silver. By R. W. Atkinson.—In a previous paper (*Chem. Soc. Journ.*, ii., 1877, 254) the author proved the above salt to have the formula $Ag_2C_2N_2S_3$; also, that when boiled with water, this yellow salt was converted into a black precipitate in which the ratio of silver to sulphur varied, the variation being at that time attributed to the presence of some silver sulphocyanate in the silver sulphide, which formed the main bulk of the substance. From further experiments the author concludes in the present paper that the body mixed with the sulphide is some undecomposed persulphocyanate. The reaction being—

$$2H_2C_2N_2S_3 + 4AgNO_3 = (Ag_2C_2N_2S_3 + Ag_2S) + C_2N_2S_2 + 4HNO_3$$

The actual proportion of the two insoluble silver salts formed depends on the influence of time, temperature, and the quantity of free acid present. The author has not been able to isolate the cyanogen disulphide, but is at present examining the orange-red sublimate formed when dry silver persulphocyanate is heated, in the hope that it may contain the missing body. The paper contains several tables giving the results of many experiments as to the influence of variations of time, temperature, and the quantity of the free acid present on the above decomposition.

On Methylated Dioxethylenamines. By H. F. Morley.—Wurtz showed that ethylene oxide unites directly with ammonia, forming mono- di- and tri-oxethylenamine; and that by treating glycollic chlorhydrin or ethylenic oxide with a solution of trimethylamine, neurine chloride is obtained, Baeyer having proved neurine to be trimethyoxethylenammonium hydrate—

$$C_2H_4\left\langle\begin{matrix}N(CH_3)_2CH_3HO\\OH\end{matrix}\right. .$$

Various similar compounds were subsequently prepared, but no one had investigated the action of mono-and dimethylamine on glycollic chlorhydrin. These reactions the author has studied in the present paper; he has prepared and analysed the platinum salts of mono-and dimethyldioxethylenamine. The first crystallizes in orange-red prisms, the second separates in small yellow crystals.

Note on Igasurine. By W. A. Shenstone.—The author has prepared some so-called igasurine of Desnoix. Four gallons of an aqueous decoction of nux vomica beans, from which the alkaloids had been precipitated by boiling with lime, were evaporated; on examination the residue contained notable quantities of strychnine and brucine. The quantity of strychnine present being sufficient to explain the superior activity of the so-called igasurine over that of brucine. The other property which was supposed to distinguish it from brucine, viz., its superior solubility, being of little importance, as the solubility of brucine varies with its purity. Igasurine is, therefore, a mixture of brucine and strychnine.

Mr. Howard and Dr. Wright commented on the utter uselessness of the solubility of an alkaloid as a test of its nature unless the alkaloid was perfectly pure.

Professor Tidy remarked that there was a marked difference between the physiological action of igasurine and strychnine.

On some Reactions of Tertiary Isobutylic Iodide. By L. Dobbin.—Primary isobutylic iodide, prepared in the usual way from the corresponding alcohol, was allowed to flow from a dropping funnel into a boiling alcoholic solution of potassic hydrate. Isobutylene was formed and collected in a gas holder. The isobutylene was then shaken vigorously with fuming solution of hydriodic acid, the mixture being iced. The product thus obtained was separated from the aqueous hydriodic acid solution, treated with dilute potassic hydrate, dried with calcic chloride and filtered. On prolonged shaking with a 12 per cent. solution of hydrocyanic acid, tertiary isobutylic iodide dissolves. After treatment with zincic oxide and distillation, some quantity of trimethylcarbinol was obtained in crystalline masses melting at 25·5, boiling at 82° C. A combustion was made, and numbers obtained closely agreeing with those calculated. It was afterwards found that the hydrocyanic acid takes no part in the reaction, which occurs equally well when water alone is used. This furnishes the first example of an alcohol radical being decomposed by water at ordinary temperatures. On mixing tertiary isobutylic iodide with the quantity of zinc oxide necessary to combine with the iodine present, the temperature being kept at about 15° C., isotributylene was formed and identified by its vapour density, analysis, etc.—

$$6\,\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!\underset{\displaystyle CH_3}{\overset{}{C}}\!\!-\!I + 3\,ZnO = 2\,C_{12}H_{24} + 3\,H_2O + 3\,ZnI_2$$

Lermontoff also prepared this substance (*Liebig's Ann.*, 196, 116) by the action of calcic oxide at 100° C. in sealed tubes, on tertiary isobutylic iodide, saturated with isobutylene; that chemist found it, however, to be mixed with isodibutylene, and gives no quantitative results. The author of the present paper obtained no sensible quantity of isodibutylene and the reaction was effected at the ordinary temperature. Wislicenus observed that when tertiary isobutylic iodide was acted on by sodium, a considerable quantity of gas was formed. The author has studied this reaction and analysed the gas which was obtained mixed with atmospheric air; 630·6 c.c. were obtained by the action of 1 grm. of sodium. The gas contained C_4H_8 16·5 per cent., C_4H_{10} 11·4 per cent., H_2 18·07 per cent. The formation of hydrogen is explained by the polymerization of some of the isobutylene. Thus by decomposing tertiary isobutylic iodide by sodium, the bodies formed are isobutylene, isotributylene and hydrogen, with small quantities of a hydrocarbon not absorbed by fuming sulphuric acid. No isodibutylene was found.

The Society then adjourned to February 19, when a ballot for the election of Fellows will be held.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, January 22, Mr. R. H. Parker, Vice-President, in the chair.

A note "On a Supposed Reaction of Aconitine," was read by Mr. A. J. Evans, in which the author drew attention to the fact that it is still stated in text-books on chemistry that aconitine gives with phosphoric acid a violet tint, although T. B. Groves in a paper* read before the British Pharmaceutical Conference, in 1873, stated thus:—"As for the phosphoric acid reaction producing a blue colour, I have never succeeded in obtaining it. It is probably due to some accidental impurity, and I believe Professor Flückiger has arrived at the same conclusion." Mr. Evans had examined a sample of aconitine which also did not give the reaction.

A vote of thanks was accorded to Mr. Evans.

Mr. A. F. Dimmock then delivered his report on "Analytical Chemistry."

* "Further Experiments on Nepaul Aconite and on the Characteristics of the Aconitines."

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Buffon.*

BY PROFESSOR ST. GEORGE MIVART, F.R.S., SEC.L.S., V.P.Z.S.

(*Concluded from page 618.*)

It seems to me that the spirit which would deny such realities is the same spirit which would deny our real knowledge of an external world at all, and represent any material object as "a state of consciousness," and at the very same time represent "a state of consciousness" as the accompaniment of a peculiar state of a material object—the body.† This mode of representation may be shortly, but not unjustly, described as a process of intellectual "thimble-rigging," by which the unwary spectator is apt to be cheated out of his most valuable mental possession—his rational certainty.

The same spirit asserts that our psychical powers never themselves enter into the circuit of physical causation, and yet few things would seem more certain to a plain man than that (supposing him to have received a message saying his house is on fire) it is his *knowledge* of what has been communicated which sets him in motion. To deny this is to deny the evident teaching of our consciousness. It is to deny what is necessarily the more certain in favour of what is less so. If I do not know this I know *nothing*, and discussion is useless. As a distinguished writer has said: "That we are conscious, and that our actions are determined by sensations, emotions and ideas, are facts which may or may not be explained by reference to material conditions, but which no material explanation can render more certain." The advocate of "Natural Selection" may also be asked, How did knowledge ever come to be, if it is in no way useful, if it is utterly without action, and is but a superfluous accompaniment of physical changes which would go on as well without it?

As we may be confident that thought not only is but also acts, as well as that there are things which are not psychical, but which are physical; so I would urge that the conception of living things, which I venture to put before you, is one which may be rationally entertained.

Assuming for the moment and for argument's sake that it may be accepted, what light does our knowledge of ourselves throw upon the intimate life-processes of lower organisms? We know that with us a multitude of actions, which are at first performed with conciousness, come to be performed unconsciously; we know that we experience sensations‡ without perceiving them; we

* Presidential Address to the Biological Section of the British Association, Sheffield, August, 1879.

† Those who deny that we have a real power of perceiving objects, refute themselves when they speak of "purely physical changes," or of anything "physical" of which feelings are but the "accompaniment" or "subjects." For according to them "matter" is but a term for certain "states of consciousness," while they represent each state of consciousness as a function of matter. According to this, let a represent a "state of consciousness, and b a physical state." Then a sensation and its physical accompaniment may be represented by the symbol $a+b$. But a physical state is itself but a state of consciousness with its objective correlate, and is, therefore, $a+b$. We thus get an equation infinitely more erroneous than $b=a+b$, because the b of the $a+b$ is itself ever again and again $a+b$.

‡ As when having gazed vacantly through a window we

know also that countless organic activities take place in us under the influence and control of the nervous system, which either never rise into consciousness at all, or only do so under abnormal conditions. Yet we cannot but think that those activities are of the same generic nature, whether we feel, perceive, or attend to them or not. The principle of individuation in ourselves, then, evidently acts with intelligence in some actions, with sentience in many actions, but constantly in an unperceived and unfelt manner. Yet we have seen it undeniably intervene in the chain of physical causation.

An animal is an organism all the actions of which are necessarily determined by the adjustments of its various organs and by its environment. But even its sensations cannot be regarded as mere accompaniments of its activities, but as guides and directing agencies intervening in the circle of its actions, and as facts, in the chain of physical causation. The sight of a stick may change the course of actions which a dog would otherwise have pursued—that is, the feeling of the moment, together with the faint recurrence of various past feelings and emotions therewith associated which the sight of the stick calls up, may cause such change. Besides its feelings, the general and the organic movements of the dog are, like our own, governed by a multitude of organic influences which are not felt, but which operate through the nervous system, and so must be taken as parallel with those which are felt, *i.e.*, as unfelt, nervous psychoses. The animal, then, like each of us, is a creature of activities partly physical, partly psychical, the latter —both the felt and the unfelt—being directive and controlling.

As we descend to the lowest animals, the evidence as to sentience fades. Yet from the resemblances of the lowest animals and plants, and from the similarity of the vegetative functions in all living creatures, we may, I think, analogically conclude that activities also take place in plants which are parallel with and analogous to the unfelt psychoses of animals. As Asa Gray has said with respect to their movements: "Although these are incited by physical agents (just as analogous kinds of movements are in animals), and cannot be the result of anything like volition, yet nearly all of them are inexplicable on mechanical principles. Some of them at least are spontaneous motions of the plant or organism itself, due to some inherent power which is merely put in action by light, attraction, or other external influences."

I have already adverted to insectivorous plants, such as *Dionæa*. In such plants we have susceptibilities strangely like those of animals. An impression is made, and appropriate resulting actions ensue. Moreover, these actions do not take place without the occurrence of electrical changes similar to those which occur in muscular contraction. Hardly less noteworthy are the curious methods by which the roots of some plants seek moisture as if by instinct, or those by which the tendrils of certain climbers seek and find appropriate support, and having found it, cling to it by a pseudo-voluntary clasping, or, finally, those by which the little "Mother-of-a-thousand" explores surfaces for appropriate hollows in which to deposit her progeny.

Nevertheless, nothing in the shape of vegetable nervous or muscular tissue has been detected, and as structure and function necessarily vary together, it is impossible to attribute sensations, sense-perceptions, instincts, or voluntary motions to plants, though the principle of individuation in each acts as in the unfelt psychoses of animals and harmonizes its various life processes.

The conception, then, which commended itself to the clear and certainly unbiassed Greek intellect of more than 2000 years ago, that there are three orders of internal organic forces, or principles of individuation, namely, the rational, the animal, and the vegetal,* appears to me to be justified by the light of the science of our own day.

I come now to the bearing of these remarks on the science of biology generally.

Animals and plants may, as I have before said, be regarded either *statically*, by anatomy, or *dynamically*, by physiology.

Physiology, as usually understood, regards the properties of the ultimate morphological components of organisms, the powers of the various aggregations of such components, *i.e.*, of the various "tissues" and the functions of the different special aggregations and arrangements of tissues which constitute "organs."

But as each living creature is a highly complex unity —both a unity of body and also a unity of force, or a synthesis of activities—it seems to me that we require a distinct kind of physiology to be devoted to the investigation of such syntheses of activities as exist in each kind of living creature. I mean to say that just as we have a physiology devoted to the several activities of the several organs, which activities are the functions of those organs, so we need a physiology specially directed to the physiology of the living body considered as one whole, that is, to the power which is the function, so to speak, of that whole, and of which the whole body in its totality is the organ.

In a word, we need a *physiology of the individual.* This science, however, needs a distinct appellation. I think an adequate one is not far to seek.

Such a line of inquiry may be followed up, whatever view be accepted as to the nature of those forces or activities which living creatures exhibit. But if we recognize, as I myself think our reason calls on us to recognize, the existence in each living being of such a "principle of individuation" as I have advocated the recognition of, then an inquiry into the total activity of any living being, considered as one whole, is tantamount to an inquiry into the nature of its principle of individuation. Such an inquiry becomes "*Psychology*" in the widest and in the original signification of that term —it is the Psychology of Aristotle.

Mr. Herbert Spencer has already made a great step

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revert to the pages of a manuscript we may be writing and see there the spectra of the window bars we had before unconsciously seen. Here the effect on the organism must have been similar to what it would have been had we attended to it—*i.e.* it was an unfelt sensation.

* Difficult as it confessedly is to draw the dividing line between animals and plants, such difficulty is not inconsistent with the existence of a really profound difference between the two groups. That there should be a radical distinction of nature between two organisms, which distinction our senses, nevertheless, more or less fail to distinguish, is a fact which on any view must be admitted, since animals of very different natures may be indistinguishable by us in the germ, and in the earlier stages of their development. The truth of this is practically supported by the late Mr. Lewes, who says (as to the difference between the protoplasms from which animals and plants respectively arise): "That critical differences must exist is proved by the divergence of the products. The vegetable cell is not the animal cell, and although both plants and animals have albumen, fibrine and caseine, the *derivatives* of these are unlike. Horny substance, connective tissue, nerve tissue, chitine, biliverdine . . . . and a variety of other products of evolution or of waste, never appear in plants; while the hydrocarbons abundant in plants are, with two or three exceptions, absent from animals. Such facts imply differences in elementary composition; and this result is further enforced by the fact that when the two seem to resemble, they are still different. The plant protoplasms form various cells, but never form a cartilage cell, or a nerve cell; fibres, but never a fibre of elastic tissue; tubes, but never a nerve tube; vessels, but never a vessel with muscular coatings; solid "skeletons," but always from an organic substance (*cellulose*), not from phosphates and carbonates. In no one character can we say that the plant and the animal are identical; we can only point throughout the two kingdoms to a great similarity accompanying a radical diversity." — ('The Physical Basis of Mind,' p. 129.)

towards reverting to this original use of the term, for he has made his "psychology" conterminous with the animal kingdom, having made it a history of the psychoses of animals. But the activities of plants must not be ignored. A science which should include the impressionability and reactions of a Rhizopod, and exclude the far more striking impressionability and reactions of Venus's Fly-trap, and of other insectivorous plants, the recognized number of which is greatly on the increase, must be a very partial and incomplete science. If pyschology is to be extended (as I think Mr. Spencer is most rational in extending it) to the whole animal kingdom, it must be made to include the vegetable kingdom also. Pyschology, thus understood, will be conterminous with the whole of biology, and will embrace one aspect of organic dynamics, while physiology will embrace the other.

Physiology will be devoted (as it is now) to the study of the activities of tissues, of organs and of functions, *per se*, such, *e.g.*, as the function of nutrition, as exhibited in all organisms from the lowest plants to man, the functions of respiration, reproduction, irritability, sensation, locomotion, etc., similarly considered, as manifested in the whole series of organic forms in which such powers may show themselves.

Psychology will be devoted (according to its original conception) to the study of the activities of each living creature considered as one whole—to the form, modes and conditions of nutrition and reproduction as they may coexist in any one plant; to these as they may coexist with sensibility and motility in any kind of animal, and finally to the coexistence of all these with rationality, as in man, and to the interactions and conditions of action, of all these as existing in him, and here the science which corresponds to the most narrow and restricted sense of the word, psychology, *i.e.*, the subjective psychology of introspection, will find its place.

Psychology in the widest sense of the term, in its oldest and in what I believe will be its ultimate meaning, must necessarily be, as to its details, a science of the future. For just as physiology requires as a necessary antecedent condition a knowlege of anatomy—since we must know that organs *exist* before we investigate what they *do*—so psychology requires as a necessary antecedent condition an already advanced physiology. It requires it because we must be acquainted with the various functions, before we can study their synthesis and interactions.

When, however, this study has advanced, one most important result of that advance will be a knowledge, more or less complete, of the innate powers of organisms, and therefore of their laws of variation. By the acquisition of such knowledge we shall be placed in a position whence we may advance, with some prospects of success, to investigate the problem of the "Origin of Species"—the biological problem of our century.

This reflection leads me back once more to my starting point, the merits of the great French naturalist of the last century, whose views as to variation, and as to animal psychosis, have enabled me to bring before you the questions on which I have presumed to enter. Buffon's claims on our esteem have, I think, been too much forgotten, and I rejoice in this opportunity of paying my debt of gratitude to him by recalling them to recollection. As to the questions which his words have suggested to me and upon which I have thus most imperfectly touched, the considerations I have ventured to offer may or may not commend themselves to your approval; but, at least, they are the result of not a few years of study and reflection, and I am persuaded they have consequences directly or indirectly affecting the whole field of biological inquiry, which belief has alone induced me to make so large a call upon your patience and your indulgent kindness.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association was held on February 11, Mr. F. W. Branson in the chair.

A paper was read by Mr. J. Woodland, entitled "Flowers and their Fertilization," in which the parts of a flower, with their uses and modifications, were described; the process of fertilization, together with agents which render their aid to this process, such as insects and wind, occupied the latter part of the paper, reference also being made to the views on fertilization of plants held by Darwin and Henslow.

After a discussion by a full meeting a vote of thanks to the author concluded the business of the evening.

Parliamentary and Law Proceedings.

Poisoning by Arsenic.

An inquest has been held at Nineveh Farm, Benenden, by Mr. G. Hinds, coroner, on the bodies of a farmer named Mark Boorman and his child.

Mrs. Jane Boorman, wife of deceased, stated that on the Wednesday morning, the deceased came home to breakfast and complained of feeling poorly, and told her that he thought he would take a dose of sulphur, and asked her to go and fetch the jar from the pantry, and as she brought what she thought contained sulphur, he mixed a dose in a jam pot, and took some. The child, Mark, seeing the jam pot, asked for some jam. Deceased said it would not hurt him, and gave him the spoon to lick. Shortly afterwards deceased complained of feeling very sick, and went out into the open air. He came in again after some little time, and said he had been sick, and then complained of being cold. He then went to bed, and his feet were very cold. He continued vomiting, and complained of being in pain towards Thursday morning. During Thursday she wanted to send for Dr. Joyce, but deceased thought the vomiting was caused through biliousness. About two o'clock, she sent for Dr. Joyce, and he came about half-past five. Deceased died about 8 p.m. on Thursday, and the child on Saturday night.

Dr. Joyce stated that he was called to see deceased on Thursday. He arrived home a little before five o'clock, and went at once to see deceased, whom he found vomiting and suffering a great deal of pain in the belly. On inquiring what he had been taking, Mrs. Boorman told him that he had taken a dose of sulphur on Wednesday morning. He looked at some that was left, and felt sure that deceased had taken poison. He remained with deceased until he died at 8 p.m. Took some of the mixture that was left in the jar, and after analysing it found that it contained a great quantity of arsenic. On Saturday, in company with Dr. Piggott, of Sandhurst, he made a *post-mortem* examination, and found that deceased had died from blood poisoning, caused by taking arsenic, which was in the mixture he had taken for sulphur.

The jury returned a verdict that both died through inadvertently taking poison.

The arsenical compound taken by the deceased is stated in a local newspaper to have been "Cooper's Sheep Dipping Composition."

Prosecution for the Sale of Vinegar alleged to be unfit for Food.

At the Droxford (Hants) Petty Sessions, on Thursday, January 22, Mr. Benjamin Boghurst was summoned for selling adulterated vinegar. A constable went to the defendant's shop and asked for a pint of vinegar. Mrs. Boghurst said she did not think she could draw so much, but managed to do so by tilting the cask.

Mr. Arthur Angell, the county analyst at Southampton, certified that the vinegar contained 3·9 per cent. of acetic acid, dead insects, organic matter and vinegar eels. It was turbid and filthy, and swarmed with microscopic organisms. In his opinion it was not fit for food.

In reply to Mr. Bullen, barrister, who defended, Mr. Angell said the liquid was of the substance of vinegar, but he could not swear that it was malt vinegar. There was no difference between the acetic acid of either malt vinegar or wood vinegar. He could not say that the vinegar eels were injurious to health.

In defence, Mr. Bullen said his client had purchased the vinegar from a well-known firm at Winchester, who had received it from Messrs. Grimble and Co., of London.

Both the defendant and Mr. Aylward, of Winchester, were called to give evidence, and both denied that the vinegar had been adulterated, and the head of the firm of Grimble and Co. said they occasionally obtained the assistance of Dr. Graham to analyse the vinegar.

Professor Voelcker gave evidence that the vinegar contained 4·22 per cent. of acetic acid. He did not find in it any microscopic organisms, only vinegar eels, and these could not be said to be present in swarms. It was of pleasant taste and odour and was not decomposed. The vinegar eels were not injurious, as they were generated and nourished in brown vinegar. Although the sample was not so bright as he should like to use, it was free from adulteration.

Professor Graham also gave evidence that the vinegar was fit for food, and the bench dismissed the case.

Prosecution under the 17th Section of the Pharmacy Act.

On Thursday, February 5, Thomas Hutchinson, carrying on business as a chemist in Sumner Lane, Birmingham, was summoned before the Birmingham magistrates, at the instance of the Chemists and Druggists' Association, for selling a certain poison—viz., oxalic acid—in a packet the cover of which did not set forth the name of the seller, as required by the Pharmacy Act. The name on the packet was Thomas Powers, and the defence was that he was the real owner and occupier of the business, and that the defendant merely acted as his agent. Mr. Thomas Powers was called in support of this plea, and stated he was a qualified chemist and druggist living at Stratford-on-Avon, and that the business in Birmingham was carried on by the defendant solely as his agent. In cross-examination he declared his inability to tell when the premises were taken, what they were rented and rated at, or who was the landlord. He had lent Hutchinson £200 for the purpose of the business, and received interest on that sum. The agreement between them was only a verbal one.

The magistrates convicted the defendant and fined him 20*s*. and costs.—*Times*.

Suffocated by a Piece of Liquorice.

On Friday, February 6, at Penzance, Mr. John Roscorla, borough coroner, held an inquest upon the body of Mr. Absalom Bennett. It appeared that Mr. Bennett was taken suddenly ill about one o'clock on Thursday morning when he complained of a choking sensation and took a piece of liquorice to give him relief. He almost immediately died without a struggle.

Mr. John Symons, surgeon, Penzance, said that when he arrived deceased was quite dead, and in making an after examination, he found a large piece of liquorice sticking in Mr. Bennett's windpipe, which in all probability was the cause of his death.

A verdict of "Suffocated by a large piece of liquorice accidentally sticking in the windpipe" was unanimously returned.—*Western Morning News*.

Obituary.

Notice has been received of the death of the following:—

On the 10th of January, 1880, at Shenstone, near Kidderminster, Mr. James Pocklington, Pharmaceutical Chemist, late of Sydenham. Aged 61 years. Mr. Pocklington had been a Member of the Pharmaceutical Society since 1842.

On the 19th of January, 1880, Mr. Seraphin Hooker, Chemist and Druggist, High Street, Cheltenham. Aged 42 years.

On the 21st of January, 1880, at Cheyne Walk, Hackney, Mr. John Buchan Wheeler, Chemist and Druggist. Aged 76 years.

On the 24th of January, 1880, at Nottingham, Mr. James Oscroft, Chemist and Druggist, Ilkester. Aged 31 years.

On the 26th of January, 1880, Mr. Richard Appleyard, Chemist and Druggist, Little Horton. Aged 48 years.

On the 5th of February, 1880, Mr. Joseph Mead, Chemist and Druggist, High Street, Ramsey, Hunts. Aged 76 years.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

Answers.

[385]. I had a prescription sent me a few days ago for a liniment containing "ol. sinapis sem.," and upon making inquiries was informed by the prescriber that "ol. sinapis, B.P.," was intended.

J. T. C.

[385]. A reference to any work on botany would have saved Mr. Talbot a very mortifying rebuff from the doctor and would have shown him that sem. sinapis, like the almond, contains both a volatile and a fixed oil, and that the latter was the only one that could be used in the proportion ordered. So it strikes

"An Unregistered Apprentice."

Queries.

[386]. What are the proper consistence and colour of zinci oleas? I find it can be obtained very brown and brittle, like a hard plaster, or of a much lighter colour and softer consistence, by simply altering the length of time that heat is applied or the degree.

Dubius.

[387]. In preparing infus. buchu should the remainder of the leaves, after decantation, be pressed to obtain the mucilage, or should the liquid be merely allowed to run from the leaves without pressure? One preparation differs very materially from the other.

Dubius.

[388].

℞ Acid. Nit.-Mur. Dil. . . . . . . ℥ij.
Tinct. Nucis. Vom. . . . . ʒj.
M. 25 minims in water twice daily.

On mixing, after various colour changes, it assumes a straw colour; but after a few hours action is set up, which keeps the contents of the phial in a continual ferment, and on attempting to pour out the dose brisk effervescence ensues. Why?

T. T. J.

[389].

℞ Quin. Disulph.,
Ferri Sulph. Exsic.,
Ext. Hyoscyam. . . . . . āā gr. xvj.
Aloes Soc. . . . . gr. iij.
M. divid. in pil. xvi.

I had the above handed to me the other day. Would any reader inform me what excipient to use?

XENOPHON.

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[390]. "Jacque" would feel much obliged if some gentleman could tell him how the following should be dispensed:—

℞ Liq. Quinæ Ammon. (gr. iv. ad ℥j) ℥v. (*sic.*)
Bromidi Ammonii . . . . . ℥iss.
Syr. Aurantii . . . . ℥ss.
Liq. Strychniæ . . . . ♏xxij.
Aquæ . . . . ad ℥iv.
M. ft. mist.

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[391].

Magnes. Sulph. . . . . ℥j.
Magnes. Carb. Pond. . . . . . . ℥ss.
Potass. Iodid. . . . . ℈ij.
Tr. Cardam. Co. . . . . ℥j.
Vin. Colchici . . . . ℥ij.
Aquæ Menth. Pip. . . . . . . ad ℥viij.

This mixture, in the course of some weeks, deposits a considerable firm crystalline mass, growing up from the bottom of the bottle. Can any of your readers explain the reaction and why considerable time is required for its development?

W. SYMONS.

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[392]. Will any reader kindly tell me through the Journal how he whould dispense the following prescription?—

℞ Glyceroli Plumbi Diacet. . . . . . ℥ij.
To be applied to the parts as directed every night and morning.
Sodæ Biboracis . . . . ℥ij.

W. R. N.

I dispensed it separately, and in the course of a few days I received a letter stating as follows:—"The powder and liquid you sent me the other day were in London made up as an ointment for application."

INQUIRER.

Notes and Queries.

[649]. TINCTURE OF CHERRY LAUREL LEAVES.—Can you favour me with any information concerning a tincture of the leaves of the common or cherry laurel (*Prunus laurocerasus*), said to have been used successfully in Vienna as a remedy for neuralgia?

It would be desirable to know, not only the proportion of leaves to spirit and the dose, but also whether young leaves should be used, or those of mature growth, on account of the percentage of hydrocyanic acid. If you can give me any information on the subject, I shall feel much obliged.

CHERRY LAUREL.

BOOKS, PAMPHLETS, ETC., RECEIVED.

THE SIZING OF COTTON GOODS AND THE CAUSES AND PREVENTION OF MILDEW. By W. THOMSON, F.R.S. Edin., etc. Second Edition. Manchester: J. Heywood. 1879. From the Publisher.

OBSERVATIONS ON FATTY HEART. By HENRY KENNEDY, A.B., M.B., etc. Dublin: Fannin and Co. London: Baillière, Tindall and Cox. 1880. From the London Publishers.

AIDS TO MATERIA MEDICA AND THERAPEUTICS. Part II The Vegetable and Animal Substances. By C. E ARMAND SEMPLE, B.A., M.B., etc. London: Baillière Tindall and Cox. 1880. From the Publishers.

AIDS TO PHYSIOLOGY. By B. THOMPSON LOWNE, F.R.S., etc. London: Baillière, Tindall and Cox. 1880. From the Publishers.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE USE OF THE WORD "PHARMACY."

Sir,—The 12th section of the Pharmacy Act, 1852, says, after prohibiting the use of the title "pharmaceutical chemist," "or to assume, use, or exhibit any name, title, or sign implying that he is registered under this Act," etc., etc. Now, if I were to exhibit on a door or window the name "surgery," would that imply I was a surgeon? Then if I were to exhibit the word "pharmacy," or "pharmaceutical laboratory," would that imply that I was a pharmaceutical chemist or pharmacist?

And yet this is the question our Council has referred to the solicitor. What is the good of an Act of Parliament, if it does not mean what it says? To my mind our Acts are very clear; but I am quite certain of this, solicitors are the very last persons to interpret them. Solicitors and barristers always take different sides, and common sense sits on the bench; at least, this is my humble experience and opinion. Chemists and druggists have nothing whatever to do with *pharmakon*, root or branch; the Act of 1852 absolutely protects it, in the same way as the Act of 1868 does the word "chemist."

Several of our members are clamouring for a new Act. If they will read their present ones and not treat them like Greek oracles and invoke the assistance of a soothsayer, they will find if they go further they will fare much worse. Let us keep what we have.

GEORGE MEE.

Sir,—With reference to the discussion at the last meeting of the Council relative to the use of the word "pharmacy," as applicable to the shop of a chemist and druggist, I beg to call attention to the fact that it is so used in the Society's own Calendar.

In the particulars of the Jacob Bell Memorial Scholarships, under the heading "Eligibility" we read—

"Candidates . . . . have passed not less, or been engaged not less, than three years in the *pharmacy* of a registered pharmaceutical chemist or *chemist and druggist.*" The italics are mine.

ALFRED PEEL.

Sir,—I was very pleased to see from your last week's issue that the attention of Council had been drawn to an encroachment upon the rights of "Majors" by a great many of the Minor men who are in business at the present time, and which is chiefly committed by younger men or by those who have lately opened new businesses; consequently, the sooner this evil is checked the better will it be both for the Society and those connected with it.

I think, sir, it must be very apparent to the Council of the Pharmaceutical Society that if they continue to allow those who have not taken the higher qualification to delude the public by advertising themselves as "qualified by pharmaceutical examinations," etc., they cannot be surprised if there should be a great decrease in the number of those who present themselves for the Major, because this will in a short time materially detract from the superior ability and dignity which have been heretofore attached to that qualification.

This grievance and injustice is more especially felt in the large provincial towns, where we may fairly say that nine-tenths of the public either do not or cannot distinguish a pharmaceutical chemist from a chemist by pharmaceutical examination, and the consequence is that the latter will soon take the place of the former if the Society do not bestir themselves and check the practice while yet in the bud; otherwise I fear that the "Majors" of the future will be unknown in the provinces, and the "few" who do aspire to it will remain near Bloomsbury Square and the immediate neighbourhood.

A VOICE FROM THE MIDLANDS.

Sir,—In looking over the proceedings of the Council as reported in last Saturday's Journal, I regret to find the death of our esteemed friend Mr. A. F. Haselden, who was one of my examiners for the Major and my certificate bears his signature.

Another matter which I think ought not to pass Majors unobserved is the "Pharmacy" question. At the passing of the 1868 Act, we had membership given to any who registered, examined or non-examined, that liked to pay for it. Membership prior to 1868 was always understood to be for passing the Major, and those who had passed the Major not wishing to become members (not being in business on their own account), became Major Associates. Somehow or other a new construction or interpretation was given and the Major Associateship was struck out of existence. The least that ought to have been done was to have created a Fellowship, and those who had passed the Major before the 1868 Act came into operation should have been made Fellows.

"Pharmaceutical chemist," and every form of it, is protected by the several Acts. The question is, "How can you have a pharmacy without a pharmacist?" On commonsense grounds, I think no one is legally entitled to call his place of business a pharmacy unless he is a pharmacist.

With all due respect to our Solicitor, though he may have given his opinion over and over again, as the Secretary says, yet I believe the list of Major Associates was published over and over and over again.

It appears quite plain that we shall have to interpret the law and the Council administer it. And we have had a good illustration that lawyers cannot or do not always properly interpret the law. That an impenetrable substance does sometimes intercept somewhere is the inference one might draw in the case of the Doncaster coroner (I believe a lawyer) and the difficulty our Solicitor had to make him understand the "true interpretation of the Pharmacy Act." I hope the Council will obtain the further true interpretation of that Act that "pharmacy" can only legally be used by a real pharmacist, and forthwith administer the same.

MAJOR.

PATENT MEDICINE LEGISLATION.

Sir,—In the last Council meeting attention was drawn to the continual decrease of the members of the Pharmaceutical Society. The report winds up by saying that the Council went into committee on the sale and use of narcotics. The connection between the two topics is not perhaps so obvious to some members of the Council as it is, especially just now, to most country chemists. There has been a good deal of writing and talking on the latter subject in connection with patent medicines. What is now wanted is prompt and decisive action on the part of the Council. This would most decidedly help to remove the prejudice and apathy which now tend to prevent chemists from joining the Society. There can be no doubt of the existence of this ill feeling, not only among outsiders but also among some who are now subscribers to the Society. Those who move among country chemists, and in fact many London ones, are obliged to hear strong language used as to the inaction of the Council with regard to the practical and trade interests of the great body of the trade, to whom the every-day experience of life brings home the lesson, that the dream of being raised to the status of a profession will only be realized in the millenium.

No doubt much of this prejudice is founded on misapprehension, but still it exists, and the object of my writing is to urge that the "set time" for action is now come. The abuse of narcotics has been discussed in all our leading newspapers, thus showing that public opinion is ripe for legislative action. It is surely fortunate that in the published correspondence the Pharmaceutical Society has come in for much unjust censure, that being a powerful argument for their claiming from the Legislature powers which they do not now possess, but which they have been publicly blamed for not using. For one I have done my best to defend the Pharmaceutical Society in a letter which appeared in the *Daily News*, in reply to one from a medical man.

If it be asked in what way action should be taken, I reply, just on the lines mentioned by me at the 1878 Annual Meeting, and suggested before that in a letter of mine which appeared in this Journal, viz., by making it compulsory that all patent medicines and proprietary articles which contain any article mentioned in the Poison Schedule should (subject to a heavy penalty on the maker for omission) have the nature and proportion of such articles plainly stated both on the outside of the package and also fixed on each bottle or box, and then extend the restrictions of the Sale of Poisons Bill to all such articles.

This would meet the public demand contained in much of the newspaper correspondence and would at the same time prevent the sale of such medicines by grocers and hawkers. It would also probably tend to make some popular cough medicines safer, by causing a reduction of the opiates now put in to produce decided effects.

If there were also an intimation given to the Chancellor of the Exchequer that the patent medicine licence may be judiciously increased from 5*s.* to 10*s.*, no respectable chemist would object. It would also be well if a list of all taking out such licences were hung up in the Inland Revenue offices.

These proposals are surely definite, practical and called for by outside public opinion, and most chemists, I think, would be satisfied if the Council would join with the Birmingham committee in introducing a Bill on such a basis. To aim at more with regard to patent medicines, would probably end in failure.

Barnstaple. W. SYMONS, F.C.S.

THE BOARDS OF EXAMINERS.

Sir,—All who take an interest in the examinations ought to rejoice at the action of the Council in endeavouring as far as possible to assimilate the standards at the London and Edinburgh Boards of Examiners. I think all will agree that the interchange of visits was a most important step in that direction; but another subject that appears to me of equal moment is the commonly prevailing opinion amongst students that there is a greater diversity in point of severity in the questions given by individual members on the London Board than there is between the two Boards collectively; and I believe that and the short time at the disposal of the examiners principally account for the success of some who have themselves but a faint hope of passing, when better men go to the wall.

I will mention as an example the chemistry portion of the examination, which in my time was generally conducted by the same four gentlemen. If a candidate who was in any way weak in that subject had been allowed to select the examiner he wished to go before, I believe that one would have had all or most of the work to himself.

Having only been up once for the same examination, I cannot speak authoritatively from personal experience, but young men who are on the eve of presenting themselves, let them be ever so ably trained by a teacher, naturally seek the experience of their friends who have already undergone the ordeal, and get the tale of the successful and the plucked ones.

As for myself, I can only speak in the highest terms of the examiners, as I found them most kind, encouraging and courteous; and a pure desire to remedy a grievance, if it really exists, prompts me to write on the subject.

St. Clears. R. WILLIAMS.

THE WEIGHTS AND MEASURES ACT.

Sir,—I was very pleased to see the letter in a recent issue, from F. H. McIntyre and Sons, concerning the weights and measures, and to find that others like myself are in a state of perplexity.

May I ask if the measures are any improvement on the old style? Besides the trouble of using two measures for one quantity, it necessarily entails the dispensing counter being encumbered with a larger amount, which is a very unwelcome change to dispensers.

I think the best measure is the one which combines simplicity with accuracy, and as such can see no fault in the old ones. They have answered their purpose for a long time without any evil results. Why, then, need the change? Are chemists a set of babies not capable of using them? Or is it a new-fangled idea adopted to please those who are never content with the same thing long?

I think we have enough bogies already, in the shape of co-operative stores, public analysts, the Poisons Act, and the sale of patents, without introducing another in the shape of fresh measures. In fact, our profession is fast getting a case of maximum trouble and minimum profits.

Great cry has been made of late about the sale of narcotics, all blame falling, as usual, on the poor chemist, of course. If a man means to kill himself, he will, and all the chemists in the world will not stop him. If, then, a man deliberately obtains poison in conformity with the Act and commits suicide, or through carelessness causes his own death, the chemist again has all the blame and censure. We are quite enough fettered as regards poisons, and the Act is sufficient to prevent mistakes taking place with sane people. When some weak-minded people take their own lives let not the slur be cast on us, or we had better become grocers, selling all drugs, etc., except poisons. ION.

Might not the Pharmaceutical Society of Great Britain have a Representative in the House of Commons?

Sir,—I do not know if the question of the Pharmaceutical Society having a representative in the House of Commons has even been thought of by any of the members of the Council, but it might not be out of place for the Council to consider the matter—seeing that at present there are six disfranchised seats in the House, which will shortly be allocated, and also having in mind that a scheme for the re-distribution of seats may be brought forward sooner or later.

Without entering into the arguments *pro* and *con.*, I would merely throw out the hint that the matter may not be altogether unworthy of consideration, and, if considered, the time may not be far distant when the pharmaceutists of Great Britain may be represented in Parliament in the same way as the graduates of our Universities are at present.

PHARMACEUTIST.

Oleum Aloes.

Sir,—I observe in your issue of January 31st ult., p. 613, Dr. M. Craig mentions that a specimen of "oleum aloes" was "presented to the Pharmaceutical Society, London, and unfortunately the bottle containing it was broken, and the oil was lost." This statement is incorrect.

The specimen in question was stated in a letter sent to me by Messrs. T. and H. Smith, to have been sent with other valuable specimens for exhibition at the Conference Meeting, which was held in London in 1874, at the rooms of this Society.

The hamper containing the specimens was directed to my care, and the most careful investigation of its contents failed to reveal the presence of the bottle of "oleum aloes." None of the specimens, so far as I remember, then exhibited by Messrs. T. and H. Smith were presented to this Society.

I should not have troubled you with this communication had not Dr. Craig's remarks implied carelessness on my part.

E. M. HOLMES, *Curator.*

Museum, 17, Bloomsbury Square.

Mitcham Oil of Lavender.

Sir,—What is to be done about Mitcham oil of lavender? In these days when the Council of our Society are called upon to do almost everything, it may not be out of place to inquire whether the present price (125*s.* per. lb.) of this essential oil, producing as it does such an exquisitely beautiful perfume, is to be allowed to continue, in which case there can be little doubt that it must ultimately not only bring into use very inferior oils, but destroy the popularity of the perfume altogether from this enormous cost.

Surely it is a time for some enterprising men to turn their attention in a direction which shall produce the original thing at a much less price, and yet allow a sufficient margin for paying all expenses of growth and labour.

YOUNG AND POSTANS.

S. J. Fisk.—We know nothing of any such society; but the initials quoted are already used to indicate fellowship of another society.

G. H. Lodge is recommended to apply to the Registrar under the Dental Act.

G. Farie.—Possibly the loan of the *clichés* might be obtained from the advertisers, whose property they would usually be.

H. E.—Probably a reference to the advertising columns would disclose what you require, but we cannot undertake to recommend books upon the subject of "diseases which chemists have very often to treat."

"*Theta.*"—We do not think the manufacture of iodine from sea-weed is carried on on the British coast except in Scotland, but among the conditions necessary to make such a manufacture successful would be a plentiful supply of the algæ rich in iodine and cheap labour. See vol. ix., pp. 302 and 486.

"*Bos.*"—Blaine's 'Outlines of the Veterinary Art.'

G. Spencer.—Your question is too general. The answer to it would depend upon what the colour was due to; it might be a physical property of the substance itself.

E. Lloyd.—We know of no other way than writing to the Solicitor of the Inland Revenue Department.

"*En Avant.*"—Proctor's 'Lectures on Pharmacy' is the nearest approach to what you require with which we are acquainted.

Minor.—We think not, but apply to the Secretary of the College of Surgeons.

R. J. L.—See before, pp. 486 and 644.

Fruit.—In the absence of any information as to the actual composition of the mixture we are unable to express an opinion.

"*Inquirer.*"—See a paper on the "Cultivation and Manufacture of Patna Opium," *Pharm. Journ.* [1], vol. xi., p. 205, and another by Mr. Maltass, on the "Production of Opium in Asia Minor," *Pharm. Journ.* [1], vol. xiv., p. 395.

"Οπο."— Probably "aniline green."

"*Ipecac.*"—The information will be found in the "Students' Number" of either of the medical journals, published usually in September.

J. Wearing.—We cannot give you the address required, but possibly the information might be obtained by applying to the editor of the *Grocer*.

J. J. J.—(1) Blaines' 'Outlines of the Veterinary Art.' (2) See the next answer.

Proprietary Preparations.—In reply to numerous inquiries referring to the compositions of proprietary preparations we are quite unable to give any information, but would suggest that wherever it is desirable to institute such inquiries they would be best answered by a chemical examination of the article in question.

A. P. S.—Information as to the sale of scheduled poisons by unregistered persons should be sent to the Registrar under the Pharmacy Act, 17, Bloomsbury Square.

L. W.—We do not know that sugar occurs at all as a natural constituent in the flours of cereals.

Inquirer.—Recipes for Composition Powder will be found in vol. viii., p. 498, and other places in the present series.

Tradesman.—*Pomade Hongroise.*—The following recipe is given by Piesse ('Art of Perfumery'):—

"White Wax	1 lb.
Oil Soap	½ ,,
Gum Arabic	½ ,,
Rose-water	1 pint
Otto of Bergamot	1 oz.
,, Thyme	½ drachm

"Melt the gum and the soap in the water by a gentle heat, then add the wax, constantly stirring the ingredients together; when of a uniform consistency, put in the perfume."

"*Dubius.*"—(a) The Weights and Measures Act applies to Ireland with certain modifications that are specified in sections 76 to 85 inclusive. (β and γ) See Dispensing Memoranda.

Communications, Letters, etc., have been received from Messrs. Barnard, Howard, Mackay, Mushens, Smout, Newham and Co., Andrews, Churchill, Welborn, R. J. L.

NOTES ON INDIAN DRUGS.

BY W. DYMOCK.

(*Continued from page* 582.)

CHAVAK. PIPERACEÆ.

Under this name the stem of the pepper plant is sold in the Bombay shops. It is jointed, about as thick as the little finger, and has the taste and odour of black pepper.

PIPER LONGUM, *Linn.:* PIPERACEÆ. *The fruit and root. Vernacular.*—PIPLI (Hind., Bomb., Beng.); TIPPILI-MULAM (Tam.).

History, Uses, etc.—Long pepper, in Sanskrit Pippali, is an old-established article of the Hindu materia medica; the root Pippali-mula is also extensively used, and is found in every druggist's shop throughout the country. Both drugs are considered stimulant, carminative, alterative and laxative, and are prescribed in chest affections, dyspepsia and palsy. Besides being administered by the mouth these drugs enter into the composition of medicinal snuffs and liniments. Dutt gives us the following peculiar method of administering long pepper as an alterative tonic:—An infusion of three long peppers is to be taken with honey on the first day, then for ten successive days the dose is to be increased by three peppers every day, so that on the tenth day the patient will take thirty at one dose. Then the dose is to be gradually reduced by three daily, and finally the medicine is to be omitted. Thus administered it is said to act as a valuable alterative tonic in paraplegia, chronic cough, enlargements of the spleen and other abdominal viscera (Chakradatta in Dutt's 'Hindu Mat. Med.,' p. 243). Mahometan writers, under the name of Dar-filfil, describe long pepper as a solvent of cold humours; they say it removes obstructions of the liver and spleen, and promotes digestion by its tonic properties; moreover it is aphrodisiacal, diuretic and emmenagogue. Both it and the root (Filfil-muiyeh) are much prescribed in palsy, gout, lumbago and other diseases of a similar nature. A collyrium of long pepper is recommended for night blindness; made into a liniment, it is applied to the bites of venomous reptiles. We learn from Roxburgh ('Flora Indica,' i., p. 155) that it is in Bengal only that *Piper longum* is cultivated for its pepper. When the ament is full grown it is gathered and daily exposed to the sun till perfectly dry, after which it is packed in bags for sale. The roots and thickest part of the creeping stems, when cut into small pieces and dried, form a considerable article of commerce all over India, under the name of Pippula-moola; for which purpose it is particularly cultivated in many of the valleys amongst the Circar mountains. This sort is more esteemed and bears a higher price than that of Bengal, where by far the largest portion is cultivated. It, as well as the pepper, is chiefly employed medicinally, and the consumption of both of these drugs is very great. *Piper longum* was formerly cultivated at Poway, near Bombay. It appears to grow well in gardens in Bombay, but requires plenty of manure.

Description.—The ament of *P. longum* is composed of a number of small berries crowded together round a common axis. The spikes vary in length, and taper slightly towards the apex. Each berry is about one-tenth of an inch from base to apex, and of an obovoid form; the structure is essentially the same as that of the fruit of *P. nigrum*. Long pepper when freshly picked has hardly any aroma; in the process of drying; it gradually develops an aromatic taste and odour.

Pipla-mul, or pepper root, when fresh is a fleshy, crooked and knotted root, about the size of a goose-quill, with many smaller rootlets branching from it. The cortical portion is very thick, and covered by a thin smooth brown epidermis. The central woody column is soft, and divided into from 4—6 wedge-shaped portions by from 4—6 very conspicuous medullary rays.

Microscopic Structure.—The epidermis of the root consists of several rows of tangentially extended brown cells. The parenchyme of the cortex is chiefly composed of large thin-walled cells loaded with starch, and containing drops of essential oil. Amongst them are scattered cells containing a refractive yellow substance (resin). The central woody column is also loaded with starch, and contains as many resin cells as the cortex. The medullary rays are abundantly provided with large scalariform vessels.

The anatomy of the fruit hardly differs from that of *Piper nigrum*; but the albumen does not contain any volatile oil.

Chemical Composition.—Generally considered to be similar to that of black pepper.

Commerce.—Three kinds of long pepper are met with in the Bombay market. 1st. Singapore, which is identical with the long pepper of European commerce and is produced by *P. officinarum*, D.C. 2nd. Bengali or léndi-pipli, the produce of *P. longum*, Linn., cultivated in Bengal. 3rd. Swaheli, imported from Zanzibar, a very inferior kind of pepper, the greater part of the catkins being immature and no thicker than a knitting needle.

Value, Singapore, Rs. 7-12 per maund of 41 pounds, Bengal, Rs. 9, Zanzibar, Rs. 5. Pipla-mul is also of three kinds.

Mirzapore, Rs. 10–40; Bengal, Rs. 7–7½; Malwa, Rs. 50 per maund of 41 pounds.

SALIX CAPREA, *Linn.:* AMENTACEÆ. *The flowers. Vernacular.*—BÉD-MUSHK (Pers. and Hind.). The distilled water, MA-UL-KHILAF.

History, Uses, etc.—This species of willow is frequently mentioned in Persian books as a well-known popular remedy. In Arabic it is called Khiláf-ul-Balkhi.

The Persian settlers in India have introduced the flowers and distilled water, but they are only used by the better classes of Mahometans and Parsees. Meer Muhammad Husain describes Khiláf-i-Balkhi as cephalic and cardiacal, deobstruent and tonic; it is one of the popular domestic remedies which are used in almost every kind of slight ailment. The Arabic word Khiláf is equivalent to the genus *Salix*. Two kinds are usually described in Persian books on materia medica, Bed-mushk and Bed-i-sádah or Bed-i-bari; the latter is called Safsáf in Arabic.

A description of *S. caprea* will be found in English botanical works; it is one of those willows which yield salicin.

The bark of *Salix tetrasperma*, Roxburgh, indigenous in this part of India, appears to be quite inert.

BETULA BHOJPATTRA, *Wall.:* AMENTACEÆ. BHURJA PATRA (Sans.), BHUJPATR (Hind., Beng., Bomb.).

This requires a brief notice as the bark is much used all over the country for writing medicinal charms on, and is to be found in every druggist's shop. This bark is well known as the material upon which the ancient Sanskrit manuscripts of northern India are writtten. Dr. Buhler in his account of a tour in Cashmere in search of Sanskrit manuscripts, says:—"The Bhûrja MSS. are written on specially prepared thin sheets of the inner bark of the Himalayan birch, and in variably in Sarada characters. The lines run always parallel to the narrow side of the leaf, and the MSS. present therefore the appearance of European books, not of Indian MSS. which owe their form to an imitation of the Tâlapattras. The Himalaya seems to contain an inexhaustible supply of birch-bark, which in Kásmir and other hill countries is used both instead of paper by the shopkeepers in the Bazaars, and for lining the roofs of houses in order to make them water-tight. It is also exported to India, where in many places it is likewise used for wrapping up parcels, and plays an important part in the manufacture of the flexible pipe-stems used by hukâ smokers. To give an idea of the quantities which are brought into Srînagar, I may mention that on one single day I counted fourteen large barges with birch-bark on the river, and that I have never moved about without seeing some boats laden with it. None of the boats carried I should say less than three or four tons weight.

"The use of birch-bark for literary purposes is attested by the earliest classical Sanskrit writers. Kalidâsa mentions it in his dramas and epics; Sásruta, Varahâmihira (*circa* 500—550 A.D.), know it likewise. Akbar introduced the manufacture of paper, and thus created an industry for which Kâsmîr is now famous in India. From that time the use of birch-bark for the purpose of writing was discontinued, and the method of preparing it has been lost. The preparation of the ink which was used for Bhûrja MSS. is known. It was made by converting almonds into charcoal and boiling the coal thus obtained with gomûtra (urina bovis); this ink is not affected by damp or water." (*Journal Bomb. Branch Royal Asiatic Society*, vol. xii., No. xxxiv., A.)

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KISHMISH-I-KÁWALIYAN or MUIZAK-I-ÂSLI: LORANTHACEÆ?

This is the name of a small, shrivelled, soft fruit imported from Persia; it is called Dibk and Kasús in Arabic and appears to be the berry of some species of *Viscum*. The author of the 'Makhzan-uladwiya' has the following account of it:—"A berry smaller than the seed of *Cicer arietinum*, green when fresh, but when dry shrivelled and of a brown colour; the contents are moist and viscid, the seeds about the size of poppy seeds.

"The plant is parasitic upon the pear and other trees and consists of several branches; the leaves are like those of the pomegranate and of a pale green.

"Properties resolvent and laxative, a solvent of corrupt humours, which it withdraws from the system. When steeped in hot water, strained, and beaten up with the kernels of the walnut or castor oil (which is the usual form of administration) it clears the system of bile and phlegm, removes obstructions, and is a remedy for lumbago, piles, etc. Applied externally it promotes the suppuration, or causes the dispersion of tumours and enlargements. Sportsmen use it as birdlime, and dyers as a mordant for crimson."

PINUS LONGIFOLIA, *Roxb.*: CONIFERÆ. *The wood and turpentine. Vernacular.*—SARAL, CHIR, (Hind.). *The turpentine.*—GANDAH-BIROZAH (Hind. and Bomb.).

History, Uses, etc.—The wood, in Sanskrit Sarala, and the turpentine, Sarala-drava, are mentioned as medicinal in Sanskrit works; plasters, ointments and pastiles for fumigations are directed to be made from the turpentine. The latter under the name of gandah-birozah is found in all the Indian bazars and appears to have all the properties of ordinary turpentine though differing from it in appearance. Oil of turpentine, does not appear to have been known to the ancient Hindus.

Description.—Gandah-birazah is a dirty-white opaque substance of a soft and sticky consistence having a strong turpentine odour. It is said to yield a good oil when distilled.

Commerce.—The turpentine can be purchased in Bombay at Rs. 8 per maund of 41 pounds.

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ZINGIBER CASSUMUNAR, *Roxb.*: AMOMACEÆ. *The rhizome. Vernacular.*—BAN-ADA (Hind. and Beng.), NEESAN. (Bomb), KARPUSHPOO (Teling.).

History, Uses, etc.—The rhizome of this species of *Zingiber*, though used medicinally by the country people, appears never to have been an article of commerce in India. In the Concans it has a reputation as a remedy in diarrhœa and colic. The fresh rhizome is rubbed down with water for administration. The Sanskrit name is Vanárdraka.

Description.—An excellent figure of the plant will be found in Roscoe's 'Monandrian Plants.' The fresh rhizomes are 1—2 inches in diameter, jointed, compressed, with numerous white fleshy radicles to some of which white tubers are attached. Each joint of the rhizome is furnished with a leaf-bud. The epidermis is scaly, light brown, the interior of a rich golden yellow. The odour is powerful and not very pleasant, like a mixture of ginger, camphor and turmeric; the taste hot and camphoraceous.

Microscopic Structure.—The epidermis is formed of many layers of compressed and obliterated cells. The parenchyma consists of large polyhedral cells; those in the cortical portion of the rhizome are nearly free from starch, but those in the central portion are filled with large ovoid starch granules. In all parts of the rhizome large cells full of a golden yellow essential oil abound. The vascular system resembles that of turmeric.

(*To be continued.*)

OSTRICH AND OTHER PEPSINES.*

BY I. R. JAMES.

During the last two or three years the French and English medical press have been discussing a new pepsine, called "ostrich pepsine," which has excited some amount of attention, and accounts of its probable benefits have found their way into the *Pharmaceutical Journal*, as well as a specimen into the museum of the Society. It is thus described in the *Medical Times and Gazette* by M. Ebelot:—"The stomach of the ostrich is celebrated for its incredible power of digestion. The abundance of pepsine to which it owes this faculty has created among the Indians a curious commercial fraud. They dry it, and sell it literally for its weight in

* Read at a meeting of the School of Pharmacy Students' Association.

gold. It is used for the purpose of restoring worn-out stomachs." A correspondent to the *Pharmaceutical Journal* says:—" In the Argentine Republic ostrich pepsine is prescribed by medical men, and known by the public as 'pepsina nostra.' A good wine is made by digesting the stomachs in wine. I consider this a useful article; but being a rough preparation our pepsine is preferable."

Beyond these and similar statements no definite statistics of experiments have been published, so far as I know. It is of the utmost moment that it should be given a fair and impartial trial by those who have the means at their disposal of testing it, as injustice might be done to a medicine which when properly prepared is proved by medical men to possess great therapeutic value; while, on the other hand, a worthless preparation would receive credit for performing a service which it is totally incapable of rendering. Before giving the results of my experience with ostrich pepsine, I think that the following brief history relating to this bird will not be altogether without interest.

The American ostriches contain two species—*Rhea Americana* and *Rhea Darwinii*, which, although closely allied to the African species, *Struthco camelus*, rarely attain to more than half the size. These birds inhabit various parts of South America to the southward of the Equator, but are principally found on the great plains in Buenos Ayres and the adjoining states. They are of a uniform grey colour, except in the back, which has a brown tint; they also differ from the true ostrich in having the head and neck covered with feathers and the feet furnished with three toes. The feathers of the wing and tail, though elongated, possess none of the beauty of the African ostrich, and are but little esteemed as articles of dress or ornament, being only employed in the manufacture of light brushes for driving away flies, or cleansing articles from dust. Their food consists mainly of grasses, roots, and other vegetable substances; but they will occasionally eat animal food, being known to come down to the mud-banks of the rivers for the purpose of eating the little fish that have been stranded on the shallows. Darwin, who had frequent opportunities of observing these birds, has given an excellent account of their habits. He says: "They take the water readily, and swim across broad and rapid rivers, and even from island to island in the bays. They swim slowly, with the greater part of the body immersed and the neck extended a little forward. On two occasions I saw some ostriches swimming across the Santa Cruz river, where it was 400 yards wide, and the stream rapid." It is polygamous; the male bird prepares the nest, collects the eggs (which are frequently laid by the females at random on the ground) and performs all the duties of incubation. Darwin says four or five females have been known to lay in the same nest, and the male when sitting lies so close that he himself nearly rode over one. All this time they are very fierce, and have been known to attack a man on horseback, trying to kick and leap upon him.

Whilst conducting my experiments upon ostrich pepsine my attention was drawn to another preparation, called "Ingluvin," thus described in the *Medical Times and Gazette* for May 10, 1879: "This is a new remedy, prepared by Warner and Co. from the *ventriculus callosus gallinaceus*. It is said to be superior to pepsine as a remedy for feeble, painful and imperfect digestion, and may be prescribed in the same manner, doses and combinations. . . . Ingluvin prepared from the gizzard of the chicken is the nearest approach to ostrich pepsine that can be obtained in Europe, we suppose." Naturally, I felt a little curious to test this preparation, and applied for some to the agents, who most readily supplied me. Below I have tabulated the results obtained.

Fresh eggs were kept in boiling water for one hour and then allowed to get quite cold; after depriving them of their shells the whites were cut into the thinnest possible slices—not minced, as it is easier to observe the progress of the digestion of albumen if it be sliced than if it be minced—and care was taken to reject any portion of yolk. Fifty grains of coagulated albumen thus prepared was placed in each wide-mouthed bottle and covered with 5 drachms of distilled water containing 1 per cent. of hydrochloric acid, sp. gr. 1·16. The quantity of pepsine was then weighed out and added to the mixture of albumen and dilute hydrochloric acid. The bottles and their contents were then placed in a water-bath and kept at a temperature of 98° to 102° F. for four hours, when digestion was regarded as complete.

Kind of pepsine employed.	Weight of pepsine employed.	Results.
Pig Pepsine . .	½ grain . .	Digested.
Ostrich Pepsine .	2½ grains . .	Not digested.
" " .	5 " . .	" "
" " .	10* " . .	" "
Ingluvin . . .	2½ " . .	" "
" . . .	5 " . .	" "
" . . .	10* " . .	" "

From the results detailed in the foregoing table, and contained in the bottles shown, it will be seen that the albumen is scarcely acted upon at all, and that both ostrich pepsine and ingluvin are practically destitute of the power of digestion.

We know how dominant ideas exercise a powerful effect on the bodily functions. Dr. Carpenter says, "A strong direction of the inward consciousness to any part, especially if attended with an expectation of something being about to happen, is quite sufficient to change the physical action of a part." If the South American Indians' imagination were similarly appealed to, it might be they would derive the extraordinary benefit attributed to ostrich pepsine after partaking of 7 or 8 pounds of beef, which, on the authority of Dr. Symes, they are in the habit of indulging in.

We have heard of late a great deal about elevating the position of pharmacists and chemists and druggists generally. As a step in this direction, and believing as I do that the examination of new remedies is a duty which we owe to medical men, I would suggest that we pay more attention to the testing of substances purporting to be remedial agents which from time to time find their way into our pharmacies and are prominently brought before the notice of practitioners; for it is a matter of considerable importance that the accuracy of facts be well sustained before they are given to the profession, many of whom have no facilities for verifying them. If any of you wish to work in this direction, lest you should think, after excluding the above-named winged animals, that pepsine can only be obtained from the stomachs of pigs, calves and sheep, I have much pleasure in placing before you other kinds. I am indebted to Mr. Lloyd

* Finding that twenty times as much ostrich pepsine and ingluvin had so little effect, I did not think it necessary to pursue the experiments further.

Bullock for the samples of pepsines shown, which I have found to possess considerable digestive activity, although inferior in this respect to the pepsine of the pig. One of the specimens is unique of its kind, viz., pepsine from a human stomach, which I need hardly say is not intended for medicinal use.

In the stomach of the river crayfish is found a plentiful supply of a yellowish-brown, feebly acid juice, which possesses an energetic fermenting power and rapidly dissolves fibrin, but the *addition* of a few drops of a dilute hydrochloric acid solution stops the action. Also, a somewhat similar ferment to pepsine, discovered by Fick and Murisier in the stomachs of frogs, pikes and trout, differs from it (pepsine) in being more active at a low temperature, as at 20° F., while it loses its digestive power at the temperature of the blood (96° to 98° F.)

NOTES ON ECONOMIC BOTANY OF THE WESTERN UNITED STATES.*

BY J. T. ROTHROCK, LATE A. A. SURGEON, U.S.A.

Berberis aquifolium, Pursh. "Oregon Grape."—According to Dr. Engelmann this is al o called in Colorado "mountain grape," and the juice when fermented makes, on the addition of sugar, a palatable and wholesome wine.

Caulanthus crassicaulis, Watson. "Wild Cabbage."—Sometimes used as food when a better substitute cannot be found.

Fremontia Californica, Torr. "California Slippery Elm."—Though totally unlike eastern slippery elm in its botanical characteristics, the inner bark develops large quantities of mucilage when wet; in this respect sharing the peculiar properties of some other members of the order. Used in California to make poultices, etc.

Larrea Mexicana, Moricand. "Creasote-bush."—Common from Western Texas to Kern County, California, and southward into Mexico. Dr. Loew's examination proves that "the reddish-brown exudate on the branches" will yield a red colouring matter, showing all the reactions of cochineal.

The alcoholic extract of the leaves on evaporation yields a greenish-brown residue of a specific and somewhat disagreeable odour, more strongly perceptible on boiling the extract with water. This residue is only to a small extent soluble in water, and the solution has an acid reaction. It yields a light-yellow precipitate with acetate of lead. The part of the alcoholic extract that is soluble in water is easily soluble in alkalies. It also dissolves in nitric acid at a moderate heat, whereby oxidation takes place. On addition of water a yellow brittle mass is precipitated. The Mexicans are said to use an infusion of the leaves for bathing in, in rheumatic affections.†

Rhus diversiloba, T. and G. "Poison Oak; Yeara."—Much like the poison oak of the Eastern States. Common on the Pacific coast. For remedy see *Grindelia robusta*.

Prosopis juliflora, DC. "Mesquit," "Algaroba" of the Mexicans.—Grows from South-eastern California east to Texas, where it attains the tree size, and forms dense thickets; extends south into South America. The gum exuding from this tree closely resembles gum-arabic in appearance and in its properties, and may some day become an important article in trade. The pods while yet in pulpy condition are a valuable forage, eagerly eaten by animals, and on which they actually thrive while making hard marches. The beans contain 30 per cent. of grape sugar. Dr. Loew asserts that the Comanche Indians prepare an alcoholic beverage from them. As a fuel it ranks with the hickory of the Eastern States, and the charcoal made from it is said by Dr. Loew to be of the best quality for metallurgical and smelting purposes. Besides this species there is another, hardly less useful, *i.e.*, *P. pubescens*, Benth., the screw-bean, the pods of which are ground into flour by the Indians. The wood of both species is of great value in some of the arts.

Oxytropis Lamberti,* Pursh, in Colorado; and *Astragalus Hornii*, Gray, and *Astragalus lentiginosus*, Dougl., var. *Fremontii*, Watson, in California, are known as loco-plants. The term *loco*, simply meaning "foolish," is applied because of the peculiar dementia induced in the animals that are in the habit of eating the plant. In Arizona I was told that *Hosackia Purshiana*, Benth., produces effects similar to the above plants, but I have no certain knowledge concerning it.

Whether the animals (horses chiefly) begin to eat the plant from necessity (which is not likely) or from choice I am unable to say. Certain it is, however, that once commenced they continue it, passing through temporary intoxication to a complete nervous and muscular wreck in the later stages, when it has developed into a fully marked disease, which terminates in death from starvation, or inability to digest a more nourishing food. The animal towards the last becomes stupid or wild, or even vicious, or again acting as though attacked with "blind staggers."

Dr. Horatio C. Wood has recently brought to light (*Phila. Med. Times*, vol. vii., p. 510) a new alkaloid in *Sophora speciosa*, Benth. This he names "sophoria." In its action it resembles calabar bean. This alkaloid is a spinal sedative, producing death through the respiration. One-twentieth of a grain of an impure specimen of this alkaloid produced a profound sleep, lasting many hours, in a half-grown cat. Mr. Bellinger, of Texas, states that the Indians near San Antonio use the bean as an intoxicant, half a bean producing "delirious exhilaration, followed by a sleep which lasts two or three days," and it is asserted that a whole bean would kill a man.

Mr. Lemmon has noted *Astragalus Mortoni*, Nutt., "as a deadly sheep poison" in California.†

This order (*Leguminosæ*) was, until lately, regarded as on the whole rather innocuous, but recent discoveries have brought to light quite a number of plants of bad repute.

Eucalyptus globulus, Labill. "Australian Blue Gum."—Now planted by thousands in Southern California. This tree is of a very rapid growth, and makes withal a solid, close-grained, enduring timber. Mr. Cooper, of Santa Barbara, estimates the gain in growing this to be greater than that derived from the cereals. As to its value from a medicinal standpoint, I am free to say it has in every instance disappointed me in its antiperiodic effects. I do not regard it (though I have used it heroically) as in any sense the peer of the preparations derived from cinchona. It is, however, not improbable that the enormous evaporation from the surfaces of the leaves and young shoots may be a means of improving the sanitary condition of a moist, boggy, ague-cursed area, when the trees are planted in masses, but the idea that any mere cordon of trees around a home would protect it appears improbable, not to say preposterous. However, I am bound to say we are yet without sufficient data on which to base an absolute conclusion. In such regions as the Sanoita Valley, Cienega or San Pedro, in Southern

* From the Report on the Botanical Collections made in Nevada, Utah, California, Colorado, New Mexico and Arizona, from 1871 to 1875, in connection with the U.S. Geographical Surveys, west of the one hundredth meridian, in charge of Lieut. Geo. M. Wheeler, Corps of Engineers, U.S. Army. From *Report upon U.S. Geographical Surveys*; vol. vi., Botany. 4to with 31 plates. Washington, 1878.

† See Wheeler's 'Reports,' vol. iii., pp. 608–9.

* The alcoholic extract of this plant failed, when hypodermically injected by Dr. H. C. Wood, to produce symptoms of poisoning in the lower animals. He hence concludes it is a mistake to regard it as one of the "loco" plants.

† See Brewer and Watson, 'Bot. of California,' vol. i., p. 165.

Arizona, it would doubtlessly flourish, and a few years hence be of immense value as a timber tree. The Southern Rio Grande Valley offers another suitable spot for its introduction. While these species will not endure cold weather, it is to be remembered that there are others of the genus that are hardier and almost as valuable as timber. These would probably be well worth a trial in Arizona and New Mexico.

Mentzelia albicaulis, Dougl.—The Indians in South-eastern California pound up the seeds of this, making thus one of their forms of pinoli (see later on, under *Salvia Columbariæ*). Sometimes also used by them in a kind of cake.

Cucurbita perennis, Gray. "Chili Cojote," and "Calabazilla," in Southern California.—Brewer and Watson assert, in 'Fl. Cal.,' p. 239, "that the pulp of the green fruit is used with soap to remove stains from clothing, and that the macerated root is used as a remedy for piles, and the seeds are eaten by the Indians."

Cymopterus Fendleri, Gray. "Chimaja," of New Mexico.—This plant emits, when in decoction, a peculiarly strong and pleasant odour, not unlike *C. anisatus*, which it closely resembles. The residents in and about Santa Fé are in the habit of using this as the chief ingredient, after whiskey, to form a warming stomachic "bitters," which is immensely popular, as anything is likely to be which improves in any way the whiskey of the region. A less objectionable use is made of it by using it as a stuffing in a leg of roast mutton, the whole mass of which it permeates with its pleasant flavour. It is not unlikely that ere long this plant will be made the basis of another quack constitutional invigorator. There is probably no doubt of its being a good carminative, and it may also prove to a certain extent tonic.

Osha.—This root, so well known in and around Santa Fé, is derived from an unknown plant, probably a *Peucedanum*. Better specimens are desirable, as it is altogether probable the plant is an old, well-known species. It may have remedial powers that will stand investigation.

Eupatorium Berlandieri, DC.—A specimen of this was handed me at the Chiricahua Agency in Southern Arizona, and the statement made that the Apache Indians there were in the habit of using it as a substitute for tobacco. At first I was disposed to accept the statement *cum grano salis*, but have since discovered that other species are elsewhere used in a like manner. On trial I find the smoke devoid of any marked flavour, but rather acrid when passed through the nostrils. It also appears to have some more marked property in a very slight degree, as indicated by a gentle nervous tremor induced in smoking. The dry leaves, when rubbed in the hand, emit a faint, rather resinous odour. There is no doubt but that it would be quite as pleasant and satisfactory as much of the drugged cheap tobacco now on the market.

Grindelia robusta, Nutt, or "Gum Plant" of California.—This plant has recently come into notice as a remedy in poisoning from *Rhus diversiloba* (Poison Oak of California). So far as I know it has not been tested on our Eastern oak,* which is another species, and for which the *Fluid Extract of Serpentaria*, as advised by Dr. Henry Hartshorne, acts almost as a specific when applied locally. The resinous exudation on the leaves of the *Grindelia* is applied in California, or it has been used in the form of a tincture. Concerning the wide range of usefulness anticipated in medicine for *Grindelia*, I am in the highest degree sceptical.

Bigelovia veneta, Gray. "Damiana" in Northern Mexico.—The plant is found just outside our borders, and may reach within our domains. I introduce it here because it is so closely related to *B. Menziesii*, which extends abundantly from San Diego to Arizona, and as far north as Utah, so as to be by some regarded as identical. Concerning Damiana, or, as it is oftener called, *Yerba anti-rheumatica*, we have of late heard much in

* It has been tried in the Eastern States with varying success.

medical journals as an aphrodisiac. There are a number of other claimants for the name Damiana. Of this one I am free to confess I consider it utterly worthless as a remedial agent. The resinous exudation on it somewhat resembles that found on *Grindelia robusta*, and was probably the means of attracting attention to it.

Pectis angustifolia, Torr., and *P. papposa*, Gray, appear to have been generally noticed because of their *peculiar odour of lemons*. Indeed, Dr. Loew suggests that in the former this might be turned to commercial account.

Artemisia.—Several Western species have been reputed as of use in ague and mountain fever by the prospectors of the West. They are used in decoction. I am not prepared to vouch for their efficacy, however. Some species are said to "owe decidedly stimulating properties to their aroma and bitterness."* The current ideas concerning some of our Eastern species would go for something in confirming the estimate placed on the Western ones.

Asclepias leucophylla, Engelm. var. *obtusa*, Gray. "Milkweed."—Has about Fort Tejon, California, the reputation of "locoing" the sheep. How well merited this is I am unable to say.

Eriodictyon.—In California, I believe, the name "Yerba Santa" is used for both *E. tomentosum* and *glutinosum* of Bentham. An infusion of the leaves in whiskey or other alcoholic liquor is reckoned almost a panacea by the native population. Precise clinical trial is yet needed to determine its true value.

Eritrichium fulvum, A. DC.—I have received from my friend, Mr. William L. Kennedy, of Fort Tejon, California, abundant specimens of this plant, collected in white paper, which it had stained completely with a *bright orange-red* colour. Mr. Kennedy accompanied the specimens with the remark that "the fresh root and leaves are used by the squaws to paint their faces, and that the colour is not inferior to the finest rouge." From the abundance of the juice, as manifested by the stained paper in which I received the plants, I infer that the plant might be turned to some commercial account. The colouring matter is not confined to this species.

Salvia Columbariæ, Benth., is the "Chia" of Southern and Central California. I abstract the following brief account I have given of it from the *Botanical Bulletin*:—

"During the summer of 1875 my attention was called, while in Southern California, to a mealy preparation in popular use among the Indians, Mexicans and prospectors. On inquiry I found it was called 'chia.' Further examination proved that it was furnished by the seeds of *Salvia Columbariæ*, Benth. The seeds are collected, roasted and ground, in the native way, between two stones. This puts it in the condition in which I first saw it. It is used as a food by mixing it with water and enough sugar to suit the taste. It soon develops into a copious mucilaginous mass, several times the original bulk. The taste is somewhat suggestive of linseed-meal. One soon acquires a fondness for it and eats it rather in the way of a luxury than with any reference to the fact that it is exceedingly nutritious besides. It is in great demand among the knowing ones who have a desert to cross, or who expect to encounter a scarcity of water, and what there is of bad quality. By preparing it so thin that it can be used as a drink, it seems to assuage thirst, to improve the taste of the water, and, in addition, to lessen the quantity of water taken, which in hot countries is often so excessive as to produce serious illness.

"As a remedy it is invaluable, from its demulcent properties, in cases of gastro-intestinal disorders. It also holds a place among domestic remedies for the same purpose that flaxseed occasionally does with us, *i.e.*, a grain of the seed is placed in the eye (where it gives no pain) to form a mucilage by means of which a foreign body may be removed from the organ. I have found it of great service as a poultice. As a matter of archæo-

* See 'Le Maout and Decaisne,' English edition, p. 505.

ogical interest, it may be noted that quantities of this seed were found buried in graves several hundred years old. This proves that the use of the seed reaches back into the remote past. Indeed, I find several allusions to the name 'chia' in the second volume of Bancroft's great work on the 'Native Races of the Pacific States,' pp. 232, 280, 347, 360. 'Chianpinoli' appears to have been made by the so-called Aztec races from corn which was roasted and ground as the chia was. Chia was among the Nahua races of Ancient Mexico as regularly cultivated as corn, and often used in connection with it. Indeed, it was one of the many kinds of meal in constant use, and which appear to have gone then, as now, under the generic name of pinoli."

Abronia fragrans, Nutt.—The delicious perfume of the flowers of this plant suggests the inquiry as to whether it could not be utilized as a toilet adjunct. Specimen number 127 of the New Mexican collection, when taken at Agua Azule, was fairly loading the air with its matchless fragrance.

Anemopsis Californica, Hook. "Yerba de Mansa."—This plant, if we may at all credit popular report, is well worthy of further investigation as a remedial agent. Unfortunately I have mislaid my notes, and can say nothing more definite now than that it is regarded as a diuretic, and is largely used in baths for rheumatic affections. It is rather unsafe to venture an opinion on its mere appearance; but if I were to do so, I should say it would probably drop into that somewhat vague class of remedies known to physicians as alteratives.

Yucca Baccata, Torr., along with other species of the same genus, is, like Agave, also known to the Mexicans as *Amole*, and the root is used by them in washing. Dr. Loew has recently furnished an analysis of the root (vol. iii., p. 609, Wheeler's 'Reports') and finds the froth produced on agitating the pounded root in water is due to saponin. Of course its marked detergent properties depend on this. The leaves of this also furnish a coarse fibre.

Euphorbia.—The various prostrate species of this genus have, in the south west, a popular reputation as a remedy in bite of rattlesnakes, tarantulas, etc.; and, to meet the demand for it, a tincture is kept on hand in the shops. In absence of this (on the authority of Dr. George Thurber), the fresh leaves bruised, or the dry ones steeped in wine, are applied to the wound. These plants are there known as *Yerba de la Golondrina*. While not wishing to cast discredit upon the remedy used in this way (and that, too, after the venom has usually been taken into the general circulation), I can only say it is hard to understand how it could be of service.

Populus tremuloides, Michx. "American Aspen."—Dr. Loew reports the bark of this tree to be used by the Indians in intermittent fever. It has long been more or less of a domestic remedy, and, indeed, of a certain class of practitioners, for this disease. It is not a little remarkable, however, that it should also be used by the Indians, and we can only account for the fact that it does possess some remedial power in this direction, which a "hit or miss" empiricism has led them to discover. Dr. Loew's analysis of the bark yields salicin and populin. The former was long ago in common use in intermittents. It is, therefore, probably slightly antiperiodic as well as tonic in its action.

Ephedra antisyphilitica, C. A. Meyer. "Canutillo; Tepopote; Whorehouse Tea."—The names, scientific and popular, might be regarded as sufficiently indicative of the alleged properties of the plant. The stems of the plant are largely used in decoction as a remedy in gonorrhœa. Precise clinical results are wanting to determine its real value. However, by common consent among the populace, and so far as I can learn from medical men of the region, it is of real service. Its close botanical relationship to the balsam-producing *Coniferæ* would appear to suggest that this, too, must contain a ike product. This, however, is not confirmed by the careful analysis of Dr. Loew (vol. iii., Wheeler's 'Reports,' pp. 611 and 612).

The above-ground portion is there shown to yield an aqueous extract of "acid reaction and an astringent taste, resembling that of tannin." No body resembling an organic base or alkaloid was found.

The filtrate of the aqueous solution proved the presence of tannic and tartaric acid. Pectin was also shown to be in filtrate by the "jelly-like precipitate produced by the addition of alcohol." The tannin belongs to the glucoside group, furnishing sugar on treatment with acid and various other compounds, and, upon dry distillation, pyrogallic and carbonic acids. This tannin splits up into sugar "*and a red amorphous powder*." The powder Dr. Loew considers quite a distinct body, which he names *ephedrin*, and to this he attributes (and probably correctly) its remedial properties. So concurrent is the testimony in favour of this plant that it is well worthy of a fair trial in hospital practice.

Agave Palmeri and *A. Parryi*, Engelm. "Mescal."—The subterranean trunk of most (or all) the Agaves contains, like that of the Yuccas and many other plants of these families, a great deal of mucilage, which, when mixed with water, has detergent properties to a considerable degree. These "roots" and the whole plants thus used are known to the Mexicans by the name of "Amole" (Englemann).* Mescal whiskey is prepared by distillation from the juice which has been collected in the cavity caused by removal of the just starting flower-stem and the inner leaves. The quantity yielded is almost fabulous. This whiskey contains a large percentage of alcohol, and it is said that it is impossible to adulterate it so that the adulteration cannot at once be detected in the taste. Hence it is hardly surprising that those who are "advised to take stimulants" take so kindly to "Mescal." Fresh from the still it is even hotter than corn whiskey equally new.

ANEMOPSIS CALIFORNICA (HOOKER).—YERBA MANSA.†

BY J. U. LLOYD.

This is a small perennial plant growing in damp situations in the southern part of California and Northern Mexico. The leaves are mostly radical, smooth, of a firm texture, and borne on sheathing petioles. The stem is about 6 inches high, bearing a clasping leaf near the middle, and terminating in a spike of flowers. The flowers are small, apetalous, cohering into a thick spadix, which is surrounded at the base by about six petaloid bracts, giving the entire inflorescence the appearance of a single terminal flower. A prominent character of the plant is its tendency to produce stolons.

In 1876 the writer received a specimen of the plant through the kindness of Dr. George, of California. It was known as "Yerba Mansa" in his neighbourhood, and used as a domestic remedy. This specimen was fresh, and upon cultivation grew vigorously, passing the hard winter of 1878–79 with impunity. The characteristics of the native grown plants were preserved, but while there was a rapid increase in the number of plants by means of runners, none have blossomed.

The plant, which belongs to the order *Saururaceæ*, was noticed in this journal, December, 1878, p. 589, by Dr. Edward Palmer in his interesting article upon "Plants used by the Indians of the United States,"‡ as follows:—

"The root of this plant is a great remedy among the Indians of Arizona and Sonora, in Mexico and Southern California. It has a strong peppery taste and odour. A tea made from the roots and a powder prepared from the

* In his paper on Agave in *Transact. of Acad. of St. Louis*, 3308, etc. See also *Botany* of Clarence King's 'Reports,' p. 497.

† From the *American Journal of Pharmacy*, January.

‡ See *Pharmaceutical Journal* [3], vol. ix., p. 774.

same and applied to venereal sores are a great remedy. The powder is advantageously used on cuts and sores, as it is very astringent. The leaves, after being wilted by heat, and applied to swellings, are a sure cure." In connection with this the following examination may be of interest.

All parts of the plant exhale, when broken, a pungent, disagreeable, penetrating odour. The taste is aromatic and peppery. Alcohol readily extracts all the sensible characteristics. Water simply becomes flavoured when boiled with the root, the filtrate being astringent and highly charged with glucose. It does not afford precipitates with the usual reagents for alkaloids. The odour and taste of the plant is derived from a volatile oil; this is obtained, according to our experiments, in the proportion of 6 fluid drachms to the avoirdupois pound by distilling the dried root with water.

Essential Oil, A.—This is heavier than water, yellowish, very refractive, and to the taste sharp, pungent and possessing in a high degree the characteristic odour and flavour of the plant. It dissolves in all proportions in alcohol, ether, chloroform and carbon disulphide. When mixed with an equal bulk of sulphuric acid heat is evolved, and a thick, dark red liquid results. This dissolves in alcohol and chloroform, with production of a beautiful red colour; is insoluble in ether, but becomes thinner when mixed with it and permitted to separate. This substance does not retain the odour of the oil.

When the essential oil is poured upon the surface of freshly prepared nitromuriatic acid in a test tube and gently agitated, it turns blue; then with evolution of nitric oxide and a sudden increase of temperature decomposes, the result being a brownish resinous substance; the natural odour of the oil disappears, and the underlying acid changes to a red colour.

When the essential oil is in like manner poured upon the surface of hydrochloric acid and gently agitated, a gradual change in colour to deep blue results; in the course of twenty hours passes into violet, then changes to purple, and lastly to brown. The natural odour of the oil remains.

After distillation with water the root has a slight odour of the oil, an astringent taste and a benumbing action upon the tongue.

Alcohol seems to extract all the sensible properties of the recently dried root. When percolated with this menstruum a dark reddish tincture results. Upon evaporating from it the alcohol at 150° F., the residuum separates into a reddish oil, B, and a stiff gummy substance, C.

Characteristics of the Oil, B.—It is heavier than water. The odour and taste are exactly like those imparted when the root is chewed. It dissolves in alcohol, ether, chloroform and disulphide of carbon, but from the latter solution a small amount of flocculent reddish matter separates. When the solution in disulphide of carbon is filtered, a light-coloured oil results, seemingly similar to the essential oil A, obtained by distillation, the colour being somewhat darker. The flocculent red precipitate is astringent and deliquescent, absorbing moisture and forming a red liquid. It is the material that gives the red colour to the oil B, and constitutes a considerable proportion of the bulk of the—

Gummy Substance, C.—This is purified from adhering oil by trituration with carbon disulphide, the residuum being granular, astringent and peppery, and of a brownish colour, soluble in dilute alcohol, and mostly soluble in glycerin. It dries by exposure to cool atmosphere, but melts to a varnish-like substance at the temperature of 125° F. to 150° F. When the dry powder is triturated with water a flocculent substance remains, astringent to the taste, soluble in glycerin, alcohol and dilute alcohol; insoluble in chloroform, ether and carbon disulphide; precipitates black from solution in glycerin and dilute alcohol, with ferrous sulphate, and is negative to action of the usual precipitants for alkaloids. The filtrate from the precipitate C, after rubbing with water, is almost colourless, astringent, precipitates black with ferrous sulphate, and when boiled with Fehling's solution yields a heavy red precipitate. It fails to respond to reagents for alkaloids. When the precipitate C is triturated with ether and chloroform, a portion dissolves, and an astringent substance remains, which deliquesces upon exposure, forming a red gummy substance, eventually liquefying. This seems to be the same as the substance that separated from the oil B by the action of carbon disulphide.

The residuum within the percolator, after extraction with alcohol, seemed thoroughly exhausted. Water and acidulated water are somewhat astringent after maceration with it, odourless, react with Fehling's solution, but not with tests for alkaloids. Ether and disulphide of carbon fail to extract a vegetable wax, resin or other constituent worthy of attention, and inert extractive matter and mineral salts of no importance, together with woody matter, thus far have been found.

TAYUYA.*

(*Trianosperma ficifolia*, Mart.)

BY DOMINGO PARODI.

The botanical collections of Lorentz and Hyeronimus, classified by Grisebach in his last work, 'Symbolæ Argentinæ,' comprehend eleven species belonging to the family of the Cucurbitaceæ, but no mention of the *Trianosperma ficifolia* and two undetermined species of *Cyclanthera* and *Prasopepon* that I have met with in the neighbourhood of Buenos Ayres. Of these the *Trianosperma ficifolia*, Mart. (*Bryonia ficifolia*, Lam., Dict. i., 498), is the celebrated tayuya, employed by the natives of these localities from remote times for the cure of a large number of infirmities, and still generally used in domestic medicine in the various provinces, in Paraguay and in Brazil. In Brazil it is called "Leroy vegetal," in reference, no doubt, to the supposed universality of its sanative virtues and its very decided emetico-cathartic effects upon the organism.

Dr. Ubicini has attempted to introduce the use of this medicine into Europe, and if the clinical experiments to which he refers can be accepted as positive results, the tayuya is not a simply purgative agent, but should be considered a powerful excitant of the lymphatic system and a very active depurative.

In my alphabetic catalogue and notes upon the ordinary plants of Paraguay, published in 1860 and 1877, I stated with respect to tayuya as follows:—"The part used is the root, which is white internally and covered with a reddish epidermis. Its taste is at first amylaceous, afterwards acrid, bitter and disagreeable. It contains much fecula. The active principle, tayuyina, is soluble in water and in alcohol, and is capable of producing violent emetico-cathartic effects when administered either in the form of an aqueous decoction (of the root) or an alcoholic tincture. It possesses energetic properties, operating upon the gastro-intestinal organs with great promptitude and violence. It is used in serious cases of dropsy, paralysis, obstinate cutaneous disorders, syphilis, etc. It is a medicine in which the common people place great faith, and from which, in fact, they obtain occasionally favourable results. Its therapeutic use is, notwithstanding, subject to the same inconveniences as the official *Bryonia alba* and other drastic analogues of the same family. It is employed in doses of 2 to 4 grams, in infusion or decoction, and lately the hydroalcoholic tincture in the proportion of one part of the root to four of the vehicle has been recommended in doses of 6 to 15 drops, progressively augmented, in the treatment of tertiary syphilis and as a deobstruent and depurative."

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* Abstract from a paper in the *Revista Farmacéutica* (Buenos Ayres), vol. xvii., p. 6.

I have intentionally reproduced this note, because, notwithstanding that Velloso, in his 'Flora,' cites and describes the *Bryonia Tayuya* in 1810, and Martius, in his treatise on the Brazilian materia médica, describes it and modifies the genus as *Trianosperma Tayuya* (1838), and in my catalogue I quote it under the name of "tayuya" (1860), in October, 1875, Mr. Stanislas Martin bestowed this name as a novelty, saying, singularly, that no author mentioned it and referring to Martius and Velloso. The old 'Formulario' of Chernovitz likewise mentions various species of tayuya, and it appears incredible that a chemist or botanist should make definite references to the products of those regions without consulting the works treating of them.

The tayuya belongs to the second series of the excellent taxonomic arrangement of cucurbitaceous plants by Bentham and Hooker. It is really a *Trianosperma* and not a *Bryonia*, as I have confirmed by an examination of the female flower, which has the ovules erect and not horizontal; the style with three stigmas expanded, the fruit with three seeds and the tendrils (*zarcillos*) frequently, but not constantly, trifid.

An analysis of tayuya made by M. Yvon gave the following results:—

Water	11·57	Water	11·57
Organic Matter	76·96	Glucose	0·84
		Crystallizable matter soluble in alcohol (Tayuyina).	0·24
		Resin	1·17
		Essential Oil	—
		Starch	17·32
		Organic acids, woody matter and loss	57·39
Inorganic Matter	11·47	Silica	1·02
		Lime	4·71
		Magnesia	3·12
		Iron and Alumina	1·23
		Potash and Soda	1·39
	100·00		100·00

Acids, Sulphuric and Hydrochloric.

With regard to the active components of tayuya the most extensive and complete work is that of Peckolt. Martius refers to an investigation of Herberger, with which I am not acquainted.

In the preparation of the trianospermina of Peckolt (the tayuyinum of Martius) the alcoholic extract of the root is treated with cold water, which leaves the resins undissolved. The solution is freed from precipitable matter by treatment with the neutral and basic acetates of lead successively; after filtration excess of lead is removed by sulphuretted hydrogen, the solution is again filtered, then evaporated to a syrupy consistence, and the salts of potash allowed to crystallize, and separated. Alcohol is added to the mother liquor to separate gum, and ether to the filtrate to separate sugar, and the liquid evaporated to dryness. The amorphous residue is redissolved in water and the solution precipitated with tannic acid. The precipitate is dried, triturated with calcined magnesia, dried, and exhausted with alcohol; the resulting tincture is evaporated to a syrupy consistence and shaken with ether. The ether takes up the trianospermitina, which crystallizes upon evaporation. The liquor separated from the ether contains trianospermina (tayuyinum) and a bitter substance; the one crystallizes upon the addition of alcohol and is separated, the other remains in the mother liquor.

Trianospermina occurs in colourless and odourless needles; it has a rather pungent taste and an alkaline reaction. When heated it volatilizes completely. It is soluble in water, such a solution being precipitated by basic acetate of lead and perchloride of platinum. It is also soluble in alcohol and in ether.

Buenos Ayres.

SATUREJA JULIANA.*

BY P. SPICA.

This plant, called "*erva de ibbisi*" in the Sicilian dialect, is used by the peasantry to prepare a decoction which is taken in cases of intermittent fever; it is a herbaceous plant of the labiate order, having an aromatic odour, and somewhat pungent taste. In order to ascertain to what the active properties of the plant were due, the residue left on evaporating the alcoholic extract of the plant was washed with cold alcohol to free it as much as possible from chlorophyll, then dissolved in boiling alcohol, precipitated with an alcoholic solution of lead acetate, and filtered boiling. After separating the excess of lead by adding ammonia carbonate to the clear liquid, it was concentrated and precipitated with water. The substance was further purified by treating its alcoholic solution with animal charcoal and again precipitated with water. The white gelatinous product was separated by means of ether into two compounds, one of which, moderately soluble in ether (m. p. 204—205°), gave numbers agreeing with the formula $C_{34}H_{58}O_4$, or, with less probability, $C_9H_{16}O$. The other substance, which is much less soluble in ether, especially in the cold, does not melt even at 250°, and above that temperature it is decomposed; the results of the analysis agree with the formula $C_{35}H_{56}O_4$. The more soluble substance acquires a greenish-yellow tinge when boiled with dilute sulphuric acid, but otherwise remains unchanged; a minute quantity dissolves, but the solution does not reduce Fehling's test, although when evaporated at 100° it blackens and emits an odour between that of wax and caramel. This is only a preliminary notice, the author intending to examine the plant more carefully as soon as he can obtain a sufficient quantity.

NEW PRESERVING FLUID.†

The Prussian Secretary of State for Education has caused the publication of the following compound, and method of its application, discovered by Wickersheimer, the preparator of the anatomical museum of the University at Berlin, who had at first patented the compound, but was induced to renounce his patent claims.

1. *Liquid.*—In 3000 parts of boiling water dissolve 100 of alum, 25 of sodium chloride, 12 of potassium nitrate, 60 of potassa, and 10 of arsenious acid. Let cool and filter. To every 10 litres of the filtrate, add 4 litres of glycerin, and 1 litre of methylic alcohol.

2. *Use.*—Its application differs with the special objects to be preserved. In general, the objects must be impregnated with it. If the objects are to be preserved dry, they are soaked in the liquid from six to twelve days, and afterwards dried in the air. Ligaments, muscles, and other animal objects remain perfectly soft and moveable. Hollow organs, as lungs, intestines, should be filled with the liquid, previous to immersion in it. After being taken out, and before drying, it is advisable to inflate them with air. Injecting the liquid into a corpse, will preserve the latter completely, and the muscular tissue will always retain the natural colour of fresh corpses. To preserve the external appearance of the latter, they should be well impregnated externally, and enclosed in air-tight cases. This is only necessary to preserve the exact original appearance; if it is not done, the body will keep equally well, if thoroughly injected, but the exterior will gradually become somewhat dry and dark coloured. Plants may likewise be preserved by this liquid.

* From the *Gazetta*, 9, 285—289. Reprinted from the *Journal of the Chemical Society*, February, 1880.

† From *Das Ausland*. Reprinted from *New Remedies*, January, 1880.

The Pharmaceutical Journal.

SATURDAY, FEBRUARY 21, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SALE OF POISONS AND CHEMISTS' CHARGES.

THE outcry against the abuse of narcotics, which, like a nine days' wonder, ran the round of the daily papers some weeks since, was certainly deserving of consideration in so far as it related to the baneful practice which we are assured has in various ways become habitual with a large number of persons. And if the consideration of this subject were prosecuted with a temperate regard to fact, it is possible that some good might be effected by striking at the root of the inducements to use such drugs without proper medical direction, and of the facilities by which persons disposed to such indulgences succeed in obtaining their supplies of narcotics.

Accepting the medical testimony given as to the vast extent of the evil and its mischievous consequences, there seems to be ample reason for recognizing the necessity for interference. We do not in the least degree question the propriety of accepting that testimony, and there are, moreover, other circumstances which justify inferences in support of it. Those who are best informed as to the facts of the case must therefore regret to see that many of the writers dealing with the subject have abandoned the rational course of seeking to expose the ways in which harm is done, and to suggest practicable means of counteracting it, and have devoted themselves to launching vague as well as unfounded charges againsts chemists and druggists.

The example first set in this direction by the coroner for Doncaster, who condemned the Council of the Pharmaceutical Society for not doing what it was not the business of that body to do, has more recently been followed by others who endeavour to throw upon chemists and druggists the entire responsibility for the misuse of narcotics and other dangerous drugs. In regard to the sale of these and other poisonous articles in the form of patent medicines, for instance, the actual state of the law is entirely disregarded, and notwithstanding the fact that the sixteenth section of the Pharmacy Act exempts patent medicines from the operation of the antecedent provisions as to the sale of poisons, chemists and druggists are blamed for selling patent medicines containing poison as though their doing so indicated a disregard for the public good and an actual breach of the law.

It should, however, be remembered that whatever mischief may be done by the sale of some patent medicines without precautionary labels, and the various other observances that are by law necessary in selling the poisons in their undisguised state, it is not the chemist and druggist that is in fault, but the present state of the law. In the first place the composition of patent medicines being secret, it is merely a matter of conjecture that any one of them contains poisons. Beyond this the sale of patent medicines is a branch of business that is not confined to chemists and druggists, but may be carried on by any one who pays five shillings a year to the Government for a licence.

But even under these circumstances it is probable that a remedy might be found for any mischief resulting from the sale of patent medicines containing poison, for although the sixteenth section of the Pharmacy Act exempts patent medicines from being subject to the preceding portion of the Act, the seventeenth section declares that it shall be unlawful to sell any poison either by wholesale or retail unless the box, bottle, vessel, wrapper or cover in which such poison is contained be distinctly labelled with the name of the article and the word "poison," and with the name and address of the seller of the poison.

Legal authorities are of opinion that this section of the Pharmacy Act is in itself amply sufficient both for preventing the sale of patent medicines containing poison without the observance of such precautions as are proper for warning purchasers against the danger of misusing them, and also for punishing any persons who sell them incautiously. It is considered that all that would be requisite for this purpose would be the proof that the article in question did, as a matter of fact, contain poison, and that the provisions of the seventeenth section had not been observed by the seller. So far this section applies to the sale of "any poison," and these words appear to have a wider scope than the poisons within the meaning of the Act, which are enumerated in schedule A. This is further indicated by the fact that after declaring it shall be unlawful to sell "any poison," except in accordance with the provisions above mentioned, the same section goes on to specify how the poisons within the meaning of the Act are to be sold, and it declares that it shall be unlawful to sell any one of those poisons which are in the first part of schedule A to any person unknown to the seller unless introduced by some person known to the seller and without making an entry in a book kept for the purpose, stating the date of the sale, the name and address of the purchaser, the name and quantity of the article sold, and the purpose for which it is required. This entry is to be signed by the purchaser, and any person selling poison otherwise than as provided in the section is liable upon summary conviction to a penalty of five pounds for the first offence and of ten pounds for the second or any subsequent offence.

If the opinion we have referred to be correct, that the provisions of the seventeenth section of the Pharmacy Act are applicable to the sale of patent medicines containing poison, a ready and effectual remedy for the indiscriminate sale of these articles is already in existence, and it is in the power of anyone to have recourse to it. If such be the case, there is no ground for the complaint lately made in the newspapers, that nothing is easier than to evade the whole letter and spirit of the Pharmacy Act. The patent medicine stamp would no longer act as a protection by which poisons could be distributed broadcast, "under artfully-designed names," with the result of producing serious mischief. The *Manchester Courier* had lately the following sensible remarks on this subject:—

"But is it quite true that the law as it stands is not strong enough to reach the cases? If deadly poisons are being sold as patent medicines surely the magistrates have power under the Sale of Poisons Act to deal with them, whatever be the names adopted to conceal the true nature of the transaction. An analytical chemist would have no difficulty in discovering the real character of these dangerous preparations, and if a representation were made to the magistrates, and it was found to be impossible to deal with them in consequence of the stamp, the Legislature would then have good reason to provide fresh precautions for the public safety."

Amongst members of the drug trade, an opinion has for some time past been gaining ground that in accordance with the general spirit of the Pharmacy Act, none but specially qualified persons should be permitted to engage in the sale of poisons or dangerous drugs under any conditions, either in their normal state or in the form of patent medicines, and there is now a decided disposition to apply to Parliament for a repeal of the exempting provision of the Pharmacy Act. At the present time the opportunity is favourable for such a step, in so far as there has been a strong expression of opinion on the subject of the mischief done by the secret and dangerous narcotic preparations in common use. But the view of the case suggested by our Manchester contemporary seems to promise a more speedy and certain result, and one that would be to a large extent effectual in securing the object desired.

Another of the modes of attacking chemists and druggists has been well illustrated by an anonymous writer in the *Times* of last Monday, who describes himself as "A Physician," and from that point of view expounds his views on "the outrageous character of chemists' charges." The signature adopted by this writer is one calculated to carry some weight with the public, and probably more than the publication of his real name would have entitled him to. His opinions are very strong and decided, but they are so little in accord with those entertained by physicians who from extended practice are brought into frequent communication with dispensing chemists, that we are disposed to infer he is "A Physician" of the order which delight in the display of a big brass plate announcing the multifarious nature of their practice in virtue of second-rate qualifications. If this inference is correct, we need not wonder that "A Physician" should express astonishment that a dispensing chemist, or shopkeeper as he terms him, did not profess to charge for medicine according to the cost of drugs. This quotation alone is sufficient to gauge the fitness of "A Physician" to constitute himself the censor of chemists' charges, and it is only the publication of his letter in the *Times* that lends some kind of adventitious importance to his opinions.

It may be assumed that it was on this account mainly that the President of the Pharmaceutical Society has replied to "A Physician" and exposed the fallacious nature of the statements in which he charges chemists with making extortionate charges for dispensing medicines. Mr. SANDFORD accounts for the opinions of "A Physician" by suggesting that he imagines compounding a mixture according to a prescription is just as simple an operation as retailing tea and sugar, and he disposes of the argument drawn from the alleged intrinsic value of the ingredients in a particular mixture referred to by showing that since the three-halfpence worth of material may have been arsenic, strychnine, prussic acid, or some other deadly poison, it was not the value of it that was to be considered in regard to the remuneration of the dispenser, but the skill, care, and responsibility involved in the performance of his duties so as not to endanger the patient's life. A person who was by mistake served with two pounds of butter for the price of one pound would certainly be less damaged than the butterman; but if some patient of "A Physician" furnished with medicine under similar conditions had a drachm of strychnine put into his mixture instead of a grain the disadvantage to him would be disproportionately greater than that to the dispensing chemist. But it is scarcely necessary to argue this matter, for as Mr. SANDFORD says, with good reason, chemists may rejoice in the confident assurance that the better class of physicians and surgeons heartily acknowledge the right of chemists to be fairly remunerated for skill and responsibility in the exercise of their calling.

PROSECUTION FOR THE SALE OF ALLEGED DEFECTIVE MERCURIAL OINTMENT.

JUST at the time of going to press we learn that in a prosecution of a chemist and druggist at Droxford, for the sale of a preparation that was labelled "mild mercurial ointment," on the ground that it was not of the British Pharmacopœia strength, the magistrates have dismissed the case and allowed costs.

CHEMISTS' ASSISTANTS' ASSOCIATION.

THE next meeting of the above Association will be held on February 25, at 32A, George Street, Hanover Square, when a paper on "New Remedies," will be read by Mr. I. R. JAMES.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A MEETING will be held on Thursday the 26th inst., at 8·30 p.m., when a paper will be read by Mr. E. A. REILLY on "Butter Analysis," and a report will be made on Organic Chemistry.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

Wednesday, January 7, 1880.

Present—Charles R. C. Tichborne, LL.D., Ph.D., President; Dr. A. Smith, Vice-President; Mr. Brunker, Dr. Collins, Mr. Doran (Bray), Mr. Goodwin, Mr. Hayes, Mr. Hodgson, Mr. Holmes, Mr. Simpson.

The minutes of the meeting held on December 3, 1879, were read and signed.

The President informed the meeting of the death, on January 6, of Mr William Allen, of Henry Street, Dublin, a member of the Council.

Proposed by Mr. Hodgson, seconded by Dr. Collins, and resolved:—

"That we have heard with much regret of the death of our respected colleague, William Allen, Esq., of Henry Street; and we desire to convey the expression of our sincere sympathy to Mrs. Allen, and the members of her family, under their sad bereavement."

Read a letter, dated November, 29, 1879, from Dr. A. H. Jacob, respecting a death from poison at Coagh, Co. Tyrone.

The Registrar was directed to acknowledge the receipt of the letter, and ask for particulars of the case, with a view to action by the Council.

Read a letter, dated December 2, 1879, from Dr. Grimshaw, the Registrar-General of Births and Deaths for Ireland, informing the Council that he had issued a circular to all the registrars of deaths in Ireland, requiring them to send information to the Registrar of this Society of the death of every pharmaceutical chemist which takes place in Ireland.

The receipt of Dr. Grimshaw's letter to be acknowledged, with thanks.

Read a letter, dated December 22, 1879, from Dr. Mason, Secretary to the Ledwich School of Medicine, Dublin, asking the Council to recognize the lectures of that school.

The Registrar was instructed to acknowledge the letter from the Ledwich School of Medicine, and to state in reply that we do not require lectures, and consequently cannot grant the request.

Proposed by Mr. Brunker, seconded by Mr. Hayes, and resolved:—

"That in respect to the memory of the late Mr. Allen, the meeting do now adjourn to Wednesday, 14th inst., at the usual hour."

ADJOURNED MEETING OF THE COUNCIL.

Wednesday, January 14, 1880.

Present—Charles R. C. Tichborne, LL.D., Ph.D., President; Dr. A. Smith, Vice-President; Sir George Owens, M.D., Messrs. Brunker, Doran (Bray), Goodwin, Hayes, Holmes, Oldham, Simpson.

Proposed by Mr. Holmes, seconded by Dr. Aquilla Smith, and resolved:—

"That William Whitla, M.D., L.A.H., of Monaghan, be elected a member of Council in the place of Mr. Allen, deceased."

Proposed by Dr. A. Smith, seconded by Mr. Holmes, and resolved:—

"That Mr. Stanley Oldham be appointed auditor, in the place of the late Mr. Allen."

The reports of the Preliminary examination held on Monday, January 5, and of the examination for the licence as pharmaceutical chemist held on Wednesday, January 7, were laid on the table.

Seven candidates presented themselves at the Preliminary examination, of whom six passed, and one was rejected.

At the Pharmaceutical examination, five candidates presented themselves, of whom one failed, and the following four passed, and were registered as pharmaceutical chemists:—

John Patrick Harold, Ormond Quay, Dublin.
John Murphy, Queenstown, Co. Cork.
Robert O'Halloran, George Street, Limerick.
Michael Joseph O'Reilly, Bolton Street, Dublin.

Proposed by Mr. Hayes, seconded by Mr. Brunker, and resolved:—

"That the clauses as to fees in pages 64 and 66 of the Calendar be amended to read thus:—

Page 64 (*Preliminary Examination*).

"In case of rejection, the fee of £2 2*s*. shall be retained; but the candidate may present himself, after the lapse of six months, for a second examination without additional payment."

"In any further examination the candidate will be required to pay the amount of the examiner's fee."

Page 66 (*Pharmaceutical Examination*).

"In case of rejection, the fee of £5 5*s*. shall be retained, but the candidate may present himself, after the lapse of six months for a second examination, without additional payment."

"A rejected candidate may present himself again for re-examination after a lapse of six months; but he will be required to pay the amount of the examiners' fees."

Proposed by Dr. A. Smith, seconded by Mr. Holmes, and resolved:—

"That one thousand copies of the 'Sale of Poisons (Ireland) Act, 1870,' and also of the 'Pharmacy (Ireland) Act, 1875,' be printed, and be kept in stock."

Messrs. Browne and Nolan's bill for stationery for the past year was ordered for payment, and the Council then rose.

The next meeting of Council will be held on Wednesday, March 3, and not on March 5 as stated by mistake in last week's Journal.

OBITUARY.

The Registrar has received official information of the deaths of the following Pharmaceutical Chemists:—

On the 4th of April, 1878, at Cartron Lodge, Sligo, Mr. John Denning, of Sligo. Aged 29 years.

On the 12th of August, 1879, at No. 3, Emerald Terrace, Dublin, Mr. John Marischal Diack, late of Fairview, Co. Dublin. Aged 41 years. Mr. Diack had been a Member of the Pharmaceutical Society of Ireland since November, 1876.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The ninth general meeting was held at the Royal Institution on Thursday evening, February 12, the President, Dr. Charles Symes, in the chair.

The minutes of the previous meeting having been read and confirmed, the following donations were announced:—The current number of the *Pharmaceutical Journal* and the Calendar of the Pharmaceutical Society of Great Britain for 1880, from the Society; the Twenty-seventh Annual Report of the Liverpool Free Public Library; and the Report of the Liverpool Engineering Society for 1879.

Mr. William J. Rogers was elected an associate.

Mr. Edward Davies, F.C.S., called attention to a new method of preparing hydriodic and hydrobromic acids. The process for hydriodic acid consists in heating a mixture composed of 20 grams of iodine and 60 grams of copaiba oil in a retort connected with an upright condenser and purifying the gas by passing it through a drying tube. As the evolution of gas slackens fresh iodine is added and the process continued until 150 grams of iodine have been used.

In preparing hydrobromic acid by this method, the bromine must be slowly dropped into the retort containing the oil and the gas purified by passing through three drying towers.

After a few other communications of a miscellaneous character, the President read the paper for the evening, entitled—

The Relation of the Pharmacist to the Pharmacopœia.

BY C. SYMES, PH.D.

The existing and growing importance of the Pharmacopœia is, I feel assured, a sufficient apology (if, indeed, apology be needed) for bringing the subject before the members of this Association this evening. Indeed, this very importance makes me hesitate to deal with the relationship, seeing that I have neither time nor opportunity for dealing with it as thoroughly as I could wish, or it deserves.

We are, or ought to be, on the eve of preparation for a new edition of the British Pharmacopœia. Some copies of this work are probably still on hand, but I trust no sordid considerations have been the cause of delaying what is admitted on all hands to be a necessity demanding early attention.

Let us first consider the nature of the work itself and then the duties, qualifications and responsibilities of those who have to do with it.

The word pharmacopœia has been applied to various books more or less related to pharmacy and therapeutics, but *the* Pharmacopœia at once suggests a work possessing authority, the dictates of which are enforced by law.

I need not trouble you with the early continental pharmacopœias, dating from Nuremberg, 1542; in fact, a full description of them, were I in a position to give it, would in no way help our subject. The first work of the kind in this country was published in 1618 by the Royal College of Physicians, and was known as the London Pharmacopœia. Successive editions appeared in 1627, 1635, 1650, 1697, 1721, 1746, 1787, 1809, 1824, 1836 and 1851. The pharmacopœia by the Edinburgh College of Physicians was first published in 1699, for use in Scotland, and that of Dublin, for Ireland, not until 1807. These works were intended to indicate the particular kind of drugs and chemicals which were regarded as the most important of medicinal agents, to provide formulæ whereby they should be prepared and rendered suitable for administration, and to form the official medium of communication on those subjects between the physicians and the apothecaries; for apothecaries were then, and, indeed, have been until quite recent times, the legally recognized dispensers of medicines in the three countries. As might be supposed, the earlier London editions did not long satisfy the requirements of those who had to use them, hence they appeared in somewhat rapid succession. The materia medica was largely composed of animal substances of a nature somewhat disgusting to our modern cultivated tastes. The elixirs, confections, unguents, etc., were composed of ingredients whose name was legion, which were compounded according to formulæ based on empiricism, a single remedy often appearing in varied forms, such as crabs' eyes, oyster shells, stag's horn, etc. No scientific exposition could be given of the action of the remedies and no logical explanation of the simple, yet tedious, processes which they were put through to render them fit for the mysterious ignorance which encircled the healing art. The works were written in the Latin language, and the processes, imperfectly described, were gone through with the most religious observance of detail, often without in any way affecting the substance operated on, so that clearly no pharmaceutical skill was required. By the date of the first Dublin work, 1807, pharmacy had made some real progress, and pharmacopœias had discarded many useless remedies and introduced others of a more rational kind; the various processes had been revised and slowly brought more or less in accord with the dictates of science. But it was only slowly—very slowly—that physicians gave up prescribing barbarous remedies; indeed, within the present week we have prepared what may be regarded as a relic of the past, in the form of tinctura fuliginis, for which we, in common with other houses, have an occasional demand.

Three different pharmacopœias, published by three different colleges, in the United Kingdom, could not fail to possess differences which might, and doubtless did, occasionally lead to serious consequences, and in the early part of the present century suggestions were made for the production of a British Pharmacopœia. But so great were the prejudices to be overcome, and so slowly were concessions made, that it was not until 1864 that the work was accomplished. There were reasons for the delay, one of which corresponds with the suggestion that I have given at the commencement of this paper as possibly acting prejudicially against the immediate issue of a new edition of the existing work.

In the *Pharmaceutical Journal*, January 1, 1846, it is stated that the first official attempt to obtain a united pharmacopœia had been made and had failed, it further adds, "The distance between the three capitals was the assigned cause of the failure of the attempt; but there is reason to believe that other obstacles existed. We have been told that the Dublin College having, at the time the proposition was first made, recently printed a large edition of their pharmacopœia was unwilling either to indemnify the publisher, or to inflict on him the injury which he would have sustained by the sacrifice of his stock on hand, in the event of the work being superseded."

The Medical Act of 1858 conferred on the General Medical Council the right of "publishing under their direction a book containing a list of medicines and compounds, and the manner of preparing them, together with the true weights and measures by which they are to be prepared and mixed; and containing such of the matter relating thereto as the General Council shall think fit, to be called the British Pharmacopœia, which, shall, for all purposes, be deemed to be substituted throughout Great Britain and Ireland for the several above mentioned pharmacopœias." The first result, which appeared in 1864, was, as you all know, an acknowledged failure, and it was soon found desirable to supersede it by a new edition, which appeared in 1867, to which has since been added an appendix. This is by far the best work of the kind that has been produced in this country. That pharmacopœias have not always been regarded as models of perfection is evident from the following remarks by Professor Redwood in his second edition of Gray's 'Supplement.' "But the value of these formulæ is not, in all cases, confined to the aid afforded to the pharmaceutist in dispensing prescriptions; many of them are for processes the products of which are identical with those ordered in our own pharmacopœias, yet the instructions being different and sometimes better, they may be advantageously referred to by the manufacturer, the scientific inquirer, and those engaged in framing new pharmacopœias." Here then, imperfection in working details at that date (1848) are clearly recognized, and however perfect the present book might have been when published in 1867 there must now be much that requires revision and much that ought to be added; if in the seventeenth century a pharmacopœia became obsolete in a few years, what must a work of the kind be after thirteen years' existence amid the rapid strides of chemistry and pharmacy in the latter part of the nineteenth century?

Let us now turn to consider the pharmacist and see what his position has been and his relation is to the Pharmacopœia.

One of the earliest and by no means the least distinguished of pharmacists in this country was Ambrose

Godfrey Hankwitz, who flourished early in the eighteenth century and whose interesting history has been epitomized by Mr. Ince (*Pharm. Journ.*, vol. xviii., pp. 126, 157 and 215, 1st series). We cannot, however, follow the progress from his time to the present from the information at my disposal, but passing over nearly a century we find ignorance largely prevailing, the practice of pharmacy largely in the hands of apothecaries, who, prescribing for and treating diseases, failed to give attention to chemistry and the science of pharmacy (probably found it more profitable), and so the remedies they used and dispensed were carelessly prepared. Gradually, however, men who were essentially chemists and druggists developed, and leaving the practice of medicine to the physician and apothecary, devoted themselves specially to the preparation and dispensing of medicines, and the superior knowledge of those subjects which they thus gained soon attracted the notice and jealousy of the latter; but truth and right must sooner or later prevail, and notwithstanding various attempts on the part of the apothecaries to put down their opponents, they grew and prospered. Indeed, this very persecution, together with measures of medical reform, which included vexatious clauses bearing on chemists and druggists, had the effect of bringing them together for defensive purposes and the maintenance of their rights, and ultimately founding the Pharmaceutical Society. This Society laid down for itself a grand programme, not merely for the defence of trade interests, but for the better education of pharmacists and for elevating the practice of pharmacy, the necessity for which will be evident from some remarks in an editorial by one of its most worthy founders, Jacob Bell, in 1844 (*Pharm. Journ.*, vol. iv., p. 1, 1st series), "In almost every civilized country, the education of pharmaceutists and the practice of pharmacy are regulated by stringent laws, and, as well as other matters relating to public health, under the control of the Government. In Great Britain this has never been the case, and while the Legislature has not overlooked the safety of the public in reference to medical practitioners, the compounders and vendors of medicine have been passed over and allowed to take their own course. As a natural consequence of this oversight a great number of uneducated persons have encroached upon the province of the chemist and druggist, who have therefore been stigmatized as a body of men possessing no legal qualification and comprising many individuals unworthy of confidence."

Although there were men of undoubted ability within the ranks in those days, yet it is quite certain that the charge of ignorance did not apply solely to the interlopers here referred to. Mr. Phillips's 'Illustrations of the Present State of Pharmacy in England,' given about that date, is really an unfavourable criticism on the pharmacist. Time and effort wrought considerable advancement, and fifteen years later Mr. Bell writes, "When it was proposed to constitute pharmacy, on the ground of qualification, as a branch of the profession, the general opinion might be condensed into these words, 'It may be desirable, but you will never succeed.' While the existing defects in this department of medicine were continually felt, and occasionally brought under public notice by some serious or fatal event resulting from the incautious use of dangerous materials by ignorant persons, the notion of converting the trade of a chemist and druggist into a profession was not popular, and would probably never have been attempted if circumstances had not combined, at a favourable moment, to excite some *esprit de corps* among the previously disunited members of the pharmaceutical body. . . . The Pharmaceutical Society is no longer a theory, all that was projected at the outset has been carried into practice, and only requires to be perservered in and allowed to proceed, in order to realize all that the most sanguine hopes could have imagined."

This prophecy has been amply fulfilled, and at the present moment there are distributed throughout the country men of ability, both in the science and practice of pharmacy, sufficiently numerous to demonstrate both to the medical profession and the public that the labours of the Pharmaceutical Society have not been in vain. We have already seen that pharmacy was originally in the hands of the apothecary, and that as his knowledge increased in the practice of medicine, so it diminished in the science and art of preparing the remedies, and as the medical practitioner of to-day is considerably in advance of the apothecary of fifty years ago in the practice of medicine, so is the pharmacist of to-day equally in advance of him in the practice of pharmacy. As these two distinct, yet closely allied, professions have developed and have approached their natural position, so has each left to the other the study of its particular subjects, and as a necessary result the physician and the surgeon of the present day know very little of practical pharmacy. It is true the curriculum of medical education requires attendance at a course of lectures in chemistry, botany, and materia medica and three months' practical chemistry, but the majority of students go through these as a matter of form, as a burden they would willingly be rid of. They regard anatomy, physiology, pathology and the practice of medicine as their sheet anchor, and as constituting the essentials of their profession; and this view is not only one pertaining to the students, but is endorsed by men of position.

The book we were just now considering, viz., the Pharmacopœia, is one in the compilation or revision of which thorough knowledge of botany, materia medica, chemistry and practical pharmacy are essential, and were I to tell you that in China or Japan the production of such a work was entrusted to a highly respectable class of men, but who had not made these subjects their special study, while there existed amongst them a body of men who had made these branches of science their almost exclusive study, and yet these latter had no real share or recognized position in the editorship, you would regard it as one of the many absurdities with which we accredit benighted people. But when we find that it is in enlightened England where such an anomaly exists there is good reason for expressing astonishment. A certain relationship does exist between the pharmacist and the Pharmacopœia, but certainly not that of authorship; it is a law to him; a law in the framing of which he has no share, and which often deals harshly and unjustly with them. It prescribes the official drugs and chemicals which he shall employ, tests for determining their purity, processes for preparation and descriptions more or less of what such preparations should be, and as from what I have said it is not probable that all this is correctly rendered, it is obviously unfair that the responsibility of any imperfections should rest on the pharmacist, which in practice it does.

In the hands of certain ignorant and overbearing public analysts this work has been an instrument by which a considerable amount of injustice has been perpetrated, instances of which have became quite familiar to us; happily not in our own town, from the fact that we have a gentleman in that capacity not only possessing considerable ability, but also good common sense.

New processes and new remedies are constantly arising, but these are of no avail to the physician until they have passed through the hands of the pharmacist. Is it not reasonable, then, to assume that in the revision of so important a work as the British Pharmacopœia he should have a legal position on an editorial committee?

Taking the United States Pharmacopœia as the one which best compares with our own, the national convention for its revision is composed of physicians and pharmacists; the latter not being brought in by some side wind to furnish gratuitous and unacknowledged advice, but with an acknowledged position in which they confer on terms of equality with those who represent the higher professional position. It would certainly be well were the number of the latter somewhat increased; but even as the body is now constituted, a very excellent work is produced, in which the substantial results of progressive knowledge are utilized, and such as is unreal or unproved is discarded. A quotation from the preface of the last edition will show the tendency and scope of the work. "In accordance with the resolution of the convocation, the scope of the work has been extended rather than abridged; and it has been the desire of the committee to adapt it to the wants of our extended country without losing sight of the conservative character necessarily pertaining to a national pharmacopœia. Such a work must necessarily follow in the wake of advancing knowledge, it is no part of its mission to lead to the paths of discovery. It should gather up and hoard what has been determined to be positive improvement, without pandering to fashion, or to doubtful novelties in pharmaceutical science. By such apprehension of the duties imposed upon it has the committee been guided." There is certainly nothing too advanced in this; indeed, the present number of *New Remedies*, which has come to hand just as I am closing this paper, contains an editorial article so thoroughly *apropos* that I will trespass on your time to make a quotation from it. It is a criticism on a recent paper by Dr. Edes, of Boston, Professor of Materia Medica and Therapeutics in the Harvard University, entitled "The Relation of Drug Manufacturers to the Progress of Therapeutics." The doctor appears to object to the large number of medicines in use, and says, "If one has in his pocket a vial of morphia and another of sulphate of atropia he has all that is essential in thirty-two preparations." The critic says—"The object of the Pharmacopœia is to offer definite and carefully considered standards and processes for all drugs and galenical preparations which are likely to be employed in the practice of physicians; and just so far as it fails to meet this demand, does it encourage manufacturing pharmacists to make and sell preparations peculiar to themselves. The fact of the matter is, that most physicians, like Dr. Edes, ignore the fact that pharmacopœial revision can only be effective when they co-operate with pharmacists in agreeing upon such standards, and, therefore, pharmacopœial revision has been left to a few who have become more noted for an obstinate adherence to bygone customs than for an appreciation of present needs."

Now if these remarks apply at all in America, how much more do they in this country, where the right of pharmacists to dictate in any way in pharmacopœial revision is utterly ignored. Indeed so hopeless does the position appear at present that a motion in the Pharmaceutical Council by Mr. Hampson, supported by Mr. Schacht, Mr. Greenish and myself, proposing to make an attempt to obtain such legal position, although it received some sympathy from other members, was thought either unwise or premature at present and was lost by a large majority, and doubtless the gentlemen who opposed had good reasons for entertaining the opinion they did (*Pharm. Journ.*, Dec. 6, p. 452). Until, however, the Pharmacopœia Committee is properly constituted we shall have little real progress; little real sympathy between men who should be working hand in hand for the benefit of the two professions.

In conclusion let me offer a few remarks on one or two preparations as illustrative of the benefit that would arise from the proposed interchange of views between prescribers and dispensers of medicines. It has been ascertained that continued boiling injures the medicinal efficacy of senega, consequently the decoction which was officinal in the P.L. is absent in the B.P., its place being filled by the infusion, and yet most medical men prescribe the decoction; omitting it from the Pharmacopœia clearly does not prevent its being prescribed or impart information to the prescriber. Fluid extract of bark is usually assumed to be four times the strength of the bark itself, and is prescribed in doses accordingly; whereas, it is known to pharmacists that such is not the case and if this becomes known to the practitioner he falls back on the preparation of some special maker, just as he does with regard to phosphorus pills when he finds those of the B.P. useless unless combined in some form. Liq. atropiæ, B.P. is sometimes prescribed as "drops for the eye," but is not the preparation intended, as the spirit present causes considerable pain when applied. This preparation might with advantage be omitted from the Pharmacopœia, inasmuch as the neutral solution of the sulphate answers equally all purposes. These and many other things might be known, but the average practitioner does not hold the average pharmacist in sufficiently high esteem to learn from him.

If, however, a Pharmacopœia Committee, such as I have indicated, were constituted, and its members met from time to time to consider and discuss the matter in hand, and were to issue reports of progress, such reports would be read with interest by all concerned and would shed light where now much obscurity prevails. The work when finished would approach perfection much more closely than it now does; our position as pharmacists would be advanced and brought into accord with that of our continental and transatlantic brethren; indeed the benefit would be mutual and all would soon feel the advantage of a properly existing relationship between the physician, the pharmacist and the Pharmacopœia.

The paper gave rise to the following discussion:—

Mr. A. H. Mason, in proposing a vote of thanks, said that the right of pharmacists to have a voice in pharmacopœial revision was indisputable, and agreed with Dr. Symes that a committee consisting of medical men and pharmacists would be a more competent body than a committee consisting of medical men only. The fact, however, must not be overlooked that the Medical Council availed themselves of the service of able pharmacists in the work of revision, and that they had also the privilege of taking note of the opinions and experiences of pharmacists from the various journals in which such were published, and he considered that by this latter means the practical knowledge of pharmacists could, in a very satisfactory manner, be brought to bear upon the work of revision.

Mr. R. Sumner had great pleasure in seconding the vote of thanks. He thoroughly concurred in what had been said by Dr. Symes respecting the importance of having men upon the Pharmacopœia Committee who were thoroughly conversant with pharmaceutical operations, and he considered that the Pharmaceutical Council would be acting in conformity with the wishes of pharmacists by using their influence to obtain this privilege.

Mr. Conroy, though agreeing with Dr. Symes as to the desirability of having competent pharmacists on the Pharmacopœia Revision Committee, thought that it would be undignified for a body like the Pharmaceutical Society to in any way attempt to thrust their services on the Medical Council, and more especially so when the manner in which their former advances in this matter had been met by that body was considered.

Mr. B. Dickens concurred in the desire that pharmacists should be permitted to bring their practical knowledge to the aid of the theoretical members of the Pharmacopœia Committee. He said that it would greatly assist dispensers if prescribers would adhere more than they sometimes do to the language of the Pharmacopœia, where its terms would express their intentions. A carefully drawn table of doses was also a desideratum, and he would like to see adopted the practice which had been so much advocated that prescribers ordering a dose exceeding the maximum in such a table should so emphasize their writing as to make the intention manifest; the chemist would then feel no hesitation in supplying it.

Dr. Symes, in reply, said that it was quite true the Pharmacopœia Committee could take note of any new preparations and new processes which appeared in the various journals; indeed a sum of money had been granted for the purpose of keeping a record of such things for use in future editions; but this only partially met the requirements; it was in the unpublished, minor, practical details that a pharmacopœia usually erred. Such details could, of course, be furnished privately by practical pharmacists; but such would not be representative. The preface of the Pharmacopœia acknowledged that Professor Redwood and Mr. Warington had really done the work of revision on the last occasion under a committee of physicians; but that was not pharmaceutical representation either. They had no legal standing, no voice, no vote, as to what should be inserted or omitted, or how this or that should be prepared, and the Committee could alter their work as they pleased. He was pleased to have the support of an old member of the Association like Mr. Sumner in the views he had put forward. He (Dr. Symes) had not considered the question of doses in this paper. As regards the Pharmacopœia, it was a medical one; but Mr. Dickens's remarks were very *apropos* on the present occasion. It would be remembered that about two years ago a chemist refused to dispense half an ounce of tincture of digitalis for a dose; the patient, suffering from delirium tremens, died, and there was considerable discussion of the subject both in medical and pharmaceutical journals. It was suggested on all hands that some special indication of the intent should be given when large doses such as these were prescribed. This matter was quite as serious, perhaps more so, to the pharmaceutical than to the medical profession, and yet nothing satisfactory had been arrived at. This particular case had been forgotten, and the question of large doses now remained exactly where it did before. If such a committee as he had suggested were in existence they would doubtless deal with such a question, and arrive at satisfactory results and recommendations, which, possessing authority, would be regarded.

A unanimous and hearty vote of thanks having been passed to Dr. Symes, the meeting closed.

MEETING OF THE CHEMISTS AND DRUGGISTS OF BRISTOL AND CLIFTON.

A meeting of the chemists and druggists of Bristol and Clifton was held this day at the Athenæum.

A large majority of those practising pharmacy in the neighbourhood were present, and several letters explaining unavoidable absence were forwarded.

Mr. G. F. Schacht was requested to preside.

The Chairman briefly stated the cause of their assembling together—namely, the recent public announcement on the part of an important "wholesale and retail" firm of pharmacists trading in Bristol of their adoption of "co-operative" prices in the retail portion of their trade, accompanied by the issue of a cheap price-list, a copy of which they had forwarded to every family in the neighbourhood, and he invited a free discussion of the position thus thrust upon them.

After ample consideration of the whole subject, the following statement of opinion was unanimously adopted:

"It is the opinion of the meeting that the application of so-called "co-operative" prices to retail pharmacy would, if generally adopted, render its practice as a separate and distinct industry absolutely impossible, and that therefore the trade of chemists and druggist would soon cease to exist.

"It is also the opinion of this meeting, that chemists and druggists as a body fulfil a distinct public want, and that their destruction would be not only a hardship to those now in business, but would be attended with great inconvenience to the public generally."

BUXTON.

A meeting was held at the Coffee Tavern, Spring Gardens, Buxton, on Friday, the 13th inst., the intent being to form a Chemists' Assistants and Apprentices' Association during the ensuing winter; Mr. G. Jackson in the chair. After a few preliminary remarks, the Chairman put to the vote the advisability of forming an association or not. The question was carried unanimously in the affirmative. The following were then elected officers:—Mr. H. Wilson, President; Mr. Chell, Treasurer; Mr. J. R. Lynn, Secretary.

It was then proposed to call a second meeting to discuss the plans and projects for the coming session.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION OF GREAT BRITAIN.

A meeting of the Law and Parliamentary Committee of this Association was held at the office of the Association, 23, Burlington Chambers, New Street, Birmingham, on February 13, 1880, at 1 p.m.; Mr. Thomas Barclay (Birmingham), President, in the chair.

Present—Messrs. Andrews (London), Churchill (Birmingham), Cross (Shrewsbury), Hampson (London), Holdsworth (Birmingham), Symes (Liverpool), and the Solicitor of the Association.

The Secretary said Mr. Jones was too ill to be present.

Mr. Barclay said Mr. Southall was unwell and absent from home.

The minutes of the previous meeting of the committee were read and confirmed.

The Secretary reported that on October 10, 1879, Mr. E. Davis, of Newport, was defended by the Solicitor of the Association, acting under the instructions of the Committee, in an action brought against him under the Sale of Food and Drugs Act for the sale of soda water alleged to contain no soda, but a trace of lead,—Professor Attfield and Mr. Stoddart gave evidence in support of the defence; and that on January 9, 1880, Mr. William Blissett, of Romsey, was defended by the Association in an action under the same Act of Parliament for having sold cream of tartar containing 6 per cent. of tartrate of lime. Both these summonses were dismissed by the magistrates, but without costs. That was the second occasion upon which the Association had defended Mr. Blissett for prosecutions brought against him under that Act. The adjourned hearing of a third case, in which the Association was defending one of its members, would be heard on the 19th.

The Secretary said that in compliance with the instructions of the Committee he had, by means of printed and written communications addressed to various influential members of the trade residing in different parts of the country, obtained a number of suggestions as to the best means of restricting the sale of scheduled poisons under cover of the patent medicine stamp to registered chemists and druggists. That he had also held private conferences in Hull, Bristol and Sheffield, all of which were well attended and at which a very strong opinion was expressed that the Pharmacy Act, 1868, should be amended in so far as it dealt with patent medicines. Some practical suggestions relating to this subject were also obtained from the gentlemen attending these conferences. The papers bearing on these matters were laid upon the table and carefully perused by the Committee. After a considerable amount of discussion, the Secretary was instructed to prepare a report for presentation to the next meeting of the Executive on the action that had been taken by the Committee, embodying the information and suggestions that he had obtained, and recommending that the Executive should approach the Council of the Pharmaceutical Society with a view to induce that body to take steps to so amend the Pharmacy Act, 1868, as to restrict the sale of scheduled poisons under cover of the patent medicine stamp to registered chemists and druggists.

The Secretary reported that on February 6 last, he had given evidence for Messrs. Flux, Slade and Co., in the Birmingham County Court, in support of an action instituted by the Council of the Pharmaceutical Society against J. G. Earp, Cheapside, Birmingham, for an infringement of the 15th section of the Pharmacy Act, and that this was the first case in which that Society had used his evidence in a court of law.

The Secretary further reported that since the Committee had last met he had taken proceedings under the 17th section of the Pharmacy Act, in the police courts, against seven illegal traders, and that the particulars of these cases were as follows:—

William and Thomas Cussons and others, trading as the Hull and East Riding Supply Association, at Lansdowne Terrace, Beverley Road, Hull. Poison purchased, chloral hydrate and morphia pills. Fined 40*s.* and costs.

John Hayhurst, Bamber Bridge, Preston. Poison purchased, vermin killer. Fined 10*s.* and costs.

Daniel Tudor Williams, 4, Merchant Street, Aberdare. Poison purchased, sheep dipping composition. Fined 2*s.* 6*d.* and costs.

W. W. Brewis, 1, New Street, Newcastle. Poison purchased, vermin killer. Fined 40*s.* and costs.

Hubert Murray, 110, Kirkgate, Leeds. Poison purchased, oxalic acid. Fined 50*s.* and costs.

Theodore Morris, 119, Lodge Road, Birmingham. Poison purchased, laudanum. Fined 21*s.* and costs.

Thomas Theophilus Hutchinson, Summer Lane, Birmingham. Poison purchased, oxalic acid. Fined 20*s.* and costs.

Communications were read from a member of the Association stating that he had been threatened with proceedings for the recovery of damages, his assistant having sold quicksilver and nitric acid alleged to have been improperly mixed. After some considerable discussion, it was moved by Mr. Holdsworth, and seconded by Mr. Andrews:—"That the Solicitor be instructed to defend a member of the Association threatened with an action for damages, consequent upon the sale of nitric acid and mercury alleged to have been improperly mixed, should the Secretary find on personal inquiry that the statements submitted to the committee are substantiated."

On being put to the meeting, Messrs. Andrews, Barclay, Churchill and Holdsworth voted for, and Messrs. Cross and Hampson against the motion, Mr. Symes not voting. The motion was consequently carried.

The Secretary was instructed to obtain prints of the medical bills, to carefully peruse them, and if they appeared to contain any clauses affecting the interests of the trade, to then place them in the hands of the Solicitor for his opinion.

A number of communications were read from members of the Association and instructions given to the Secretary as to the manner in which he should deal with the same.

Proceedings of Scientific Societies.

ROYAL INSTITUTION OF GREAT BRITAIN.

Spectroscopic Investigation.*

BY JAMES DEWAR, M.A., F.R.S.,

Fullerian Professor of Chemistry, Royal Institution, etc.

In Kirchhoff's celebrated paper "On the Relation between the Radiating and Absorbing Powers of Different Bodies for Light and Heat," the remarkable experiments of reversing the bright lines of lithium and sodium by causing sunlight to pass through the vapours of those metals, volatilized in the flame of a Bunsen burner, are described. Bunsen and Kirchhoff reversed the stronger lines of potassium, calcium, strontium, and barium by deflagrating their chlorates with milk-sugar, before the slit of the solar spectroscope. Recent researches on the artificial formation of Fraunhofer lines have been made by Cornu, Lockyer and Roberts.

Cornu improved upon a method previously used by Foucault. It depends upon so arranging the electric arc that the continuous spectrum of the intensely heated poles is examined through an atmosphere of the metallic vapours volatilized around them. By this means Cornu succeeded in reversing several lines in the spectra of the following metals, in addition to those above mentioned, viz., thallium, lead, silver, aluminium, magnesium, cadmium, zinc and copper. He observed that, in general, the reversal began with the least refrangible of a group of lines, and gradually extended to the more refrangible lines of the group, and drew the conclusion that a very thin layer of vapour was sufficient for the reversal. In almost every case the lines reversed are the more highly refrangible of the lines characteristic of each metal.

Lockyer's plan was to view the electric arc through the vapours of the metals volatilized in a horizontal iron tube. The iron tube had its ends covered with glass plates, and was heated in a furnace, a current of hydrogen passing during the experiment. He did not succeed in observing any new reversal of bright lines, with the exception of an unknown absorption line which sometimes appeared when zinc was experimented upon. He confirmed, however, the channelled-space absorption spectra observed by Roscoe and Schuster in the cases of potassium and sodium, and recorded channelled-space spectra in the case of antimony, phosphorus (?), sulphur and arsenic (probably). "As the temperature employed for the volatilization of the metals did not exceed bright redness, or that at which cast iron readily melts, the range of metals examined was necessarily limited, and in order to extend these observations to the less fusible metals, as well as to ascertain whether the spectra of those volatilized at the lower temperature would be modified by the application of a greater degree of heat," a new series of experiments were undertaken by Lockyer and Roberts, in which the combined action of a charcoal furnace and the oxyhydrogen blowpipe was employed. A lime crucible after the form of Stas was used to replace the iron tube. By this means they obtained still no new reversal of a metallic line, but they observed channelled-space spectra in the cases of silver, manganese, chromium and bismuth. They observed, however, that the metal thallium gave the characteristic *bright* green line, the light of the arc not being reversed.

In the above-mentioned experiments, the coolness of the ends of the tube, which acted as condensers of the metallic vapours, and the continual change of density and temperature necessarily produced by the maintenance of a current of hydrogen through the tube, appear to account for the failure in observing reversals.

The following facts have been acquired during the course of a long series of conjoint experiments with my distinguished colleague, Professor Liveing, of Cambridge*:—

In order to examine the reversal of the spectra of metallic vapours, it is more satisfactory to observe the absorptive effect produced on the continuous spectrum emitted by the sides and end of the tube in which the volatilization takes place. For this purpose it is convenient to use iron tubes about half an inch in internal diameter, and about 27 inches long, closed at one end, thoroughly cleansed inside, and coated on the outside with borax, or with a mixture of plumbago and fireclay. These tubes are inserted in a nearly vertical position in a furnace fed with Welsh coal, which will heat about 10 inches of the tube to about a welding heat, and observations are made through the upper open end of the tube, either with or without a cover of glass or mica. To exclude oxygen, and avoid as much as possible variations of temperature, hydrogen is introduced in a gentle

* Lecture delivered at the Weekly Evening Meeting of the Royal Institution of Great Britain, Friday, June 6, 1879.

* "On the Reversal of the Lines of Metallic Vapours," Nos. I., II., III., IV., V., VI., 'Proc. Roy. Soc.,' 1878-1879.

stream by a narrow tube into the upper part only of the iron tube, so that the hydrogen floats on the surface of the metallic vapour without producing convection currents in it. By varying the length of the small tube conveying the hydrogen, the height in the tube to which the metallic vapour reaches may be regulated. Thus different depths of metallic vapour may be maintained at a comparatively constant temperature for considerable periods of time.

By this means the characteristic lines of the volatile metals thallium and indium may be easily reversed.

Metallic lithium, alone or mixed with sodium, gave no results. Similarly, chloride of lithium and metallic sodium, introduced together, gave no better results. To a tube containing mixed potassium and sodium vapour, lithium chloride was added. Now the bright red lithium line was sharply reversed, and remained well defined for a long time. The lithium line was only reversed in a mixture of the vapours of potassium and sodium, and it seems highly probable that a very slightly volatile vapour may be diffused in an atmosphere of a more volatile metal, so as to secure a sufficient depth of vapour to produce a sensible absorption. This would be analogous to well-known actions which take place in the attempt to separate organic bodies of very different boiling points by distillation, where a substance of high boiling point is always carried over, in considerable quantity, with the vapour of a body boiling at a much lower temperature.

Sodium and potassium, when observed in such tubes, give none of the appearances noted by Lockyer, "On a New Class of Absorption Phenomena," in the 'Proceedings of the Royal Society,' vol. xxii., but the channelled-space spectrum of sodium described by Roscoe and Schuster in the same volume of the 'Proceedings' was often seen. Potassium gives no channelled-space absorption, but continuous absorption in the red, and one narrow absorption band, with a wave length of about 5730, not corresponding with any bright line of that metal.

The absorption spectrum of sodium vapour is by no means so simple as has been generally represented. The fact that the vapour of sodium in a flame shows only the reversal of the D lines, while the vapour, volatilized in tubes, shows a channelled-space absorption corresponding to no known emission spectrum, appears to be a part of a gradational variation of the absorption spectrum, which may be induced with perfect regularity. Experiments with sodium exhibit the following succession of appearances, as the amount of vapour is gradually diminished, commencing from the appearance when the tube is full of the vapour of sodium, part of it condensing in the cooler portion of the tube, and some being carried out by the slow current of hydrogen. During this stage, although the lower part of the tube is at a white heat, as long as the cool current of hydrogen displaced metallic vapour, on looking down the tube it appeared perfectly dark. The first appearance of luminosity is of a purple tint, and, with the spectroscope, appears as a faint blue band, commencing with a wave length of about 4500, and fading away into the violet. Next appears a narrow band in the green, with a maximum of light, with a wave length of about 5420, diminishing in brightness so rapidly on either side as to appear like a bright line. This green band gradually widens, and is then seen to be divided by a dark band with a wave length of about 5510. Red light next appears, and between the red and green light is an enormous extension of the D absorption line, while a still broader dark space intervenes between the green and the blue light. The dark line in the green (wave length about 5510) now becomes more sharply defined. This line appears to have been observed by Roscoe and Schuster, and regarded by them as coinciding with the double sodium line next in strength to the D lines, but it is considerably more refrangible than that double line. In the next stage, the channelled-space spectrum comes out in the dark space between the green and blue, and finally in the red. Gradually the light extends, the channels disappear, the D line absorption narrows, but still the dark line in the green is plainly discernible. Lastly, there is only D line absorption.

The method of observation described may be used to observe emission as well as absorption spectra; for if the closed end of the tube be placed against the bars of the furnace so as to be relatively cooler than the middle of the tube, the light emitted by the vapours in the hottest part is more intense than that emitted by the bottom of the tube. This succeeds admirably with sodium.

The volatility of rubidium and cæsium rendered it advisable to try the effects first in glass tubes. For this purpose a piece of combustion tubing had one end drawn out and the end turned up sharply, and sealed off (like an ill-made combustion tube of the usual form), so as to produce an approximately plane face at the end of the tube; a small bulb was then blown at about an inch from the end, and the tube drawn out at about an inch from the bulb on the other side, so as to form a long narrower tube. Some dry rubidium or cæsium chloride was introduced into the bulb, and a fragment of fresh cut sodium, and the narrow part of the tube turned up, so as to allow the tube and bulb to be seen through in the direction of the axis of the tube. The open end was then attached to a Sprengel pump, and the air exhausted; the sodium was then melted, and afterwards either dry hydrogen or dry nitrogen admitted, and the end of the tube sealed off at nearly the atmospheric pressure. It is necessary to have this pressure of gas inside the tube, otherwise the metal distilled so fast on heating that the ends were speedily obscured by condensed drops of metal. Through these tubes placed lengthways in front of a spectroscope, a lime light was viewed. On warming the bulb of a tube in which rubidium chloride had been sealed up with sodium, the D lines were of course very soon seen; and very soon there appeared two dark lines near the extremity of the violet light, which, on measurement, were found to be identical in position with the well-known violet lines of rubidium. Next appeared faintly the channelled spectrum of sodium in the green, and then a dark line in the blue, very sharp and decided, in the place of the more refrangible of the characteristic lines of cæsium in the flame spectrum. As the temperature rose, these dark lines, especially those in the violet, became sensibly broader; and then another fine dark line appeared in the blue, in the place of the less refrangible of the cæsium blue lines. During this time no dark line could be observed in the red; but as the temperature rose, a broad absorption band appeared in the red, with its centre about midway between B and C, ill defined at the edges, and though plainly visible not very dark. The lines in the violet had now became so broad as to touch each other and form one dark band. On cooling, the absorption band in the red became gradually lighter without becoming defined, and was finally overpowered by the channelled spectrum of sodium in that region. The double dark line in the violet became sharply defined again as the temperature fell. There are two blue lines in the spectrum of rubidium taken with an induction-coil very near the two blue lines of cæsium; but they are comparatively feeble, and the two dark lines in the blue observed in the places of the characteristic blue lines of cæsium must have been due to a small quantity of cæsium chloride in the sample of rubidium chloride. These blue lines were not, however, visible when some of the rubidium chloride was held in the flame of a Bunsen's burner, nor when a spark was taken from a solution of the chloride; but the more refrangible of them (Cs*a*) was visible in the spark of an induction-coil, without a Leyden jar, taken between beads of the rubidium chloride fused on platinum wires.

(To be continued.)

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday the 12th inst. Mr. H. Allen, Vice-President, in the chair. A paper was read by Mr. J. R. James, on "Ostrich and other Pepsines," which is printed on p. 662. Specimens of the pepsines from the stomachs of the ostrich and also from other animals were exhibited and the digestive power possessed by each shown. After a discussion, the thanks of the meeting were awarded to Mr. James for his interesting paper. Mr. F. W. Branson then delivered his report on botany, the subject being "The Origin and Development of the Embryo Sac in Phanerogamia." The researches of Strasburger and Marshall Ward on this subject were described and illustrated by diagrams, showing the development of the embryo sac. The meeting then adjourned.

Parliamentary and Law Proceedings.

The Pharmaceutical Society of Great Britain *v.* Earp.

At the Birmingham County Court, on Friday, the 6th inst., before J. Motteram, Esq., Q.C., the Judge, the Pharmaceutical Society of Great Britain sued Joseph G. Earp, of 22, Cheapside, Birmingham, in respect of a penalty of £5, incurred under the 15th section of the Pharmacy Act, by a sale of "oxalic acid" and "white precipitate," the defendant not being a chemist and druggist within the meaning of the Act.

Counsel appeared on both sides, and the defence relied upon technical objections raised by the defendant's counsel, which were successively considered and disposed of by the learned judge, and judgment was given for the penalty of £5 with costs.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

Answers.

[385]. Considering the quantity ordered, I should be disposed to think that the fixed oil of mustard was intended, unless it was desired to produce an action quite or nearly approaching vesication, which is just possible. I cannot understand why Mr. Talbot failed to obtain the information from the doctor; I have always found them courteous and willing to explain. Anyhow the failure is unfortunate.

South Norwood, S.E. J. H. Baldock.

[386]. Oleate of lime should be soft and white; if hard, brittle, or dark in colour, it is an indication that the heat has either been too great or too long applied (*vide* Gmelin's 'Chemistry,' vol. xvii., p. 72).

South Norwood, S.E. J. H. Baldock.

[389]. The ferri sulph. exsic. has a tendency to reacquire its water of crystallization; but if the excipient used, either syrup, or perhaps better, soft honey (mel depuratum), be added so as to make the mass somewhat soft, and it be quickly rolled, the pills will soon harden, and retain their shape.

South Norwood, S.E. J. H. Baldock.

[392]. It is not clear why "Inquirer" sent the two ingredients separately, or what he imagined was to be done with the borax. The glycerole of subacetate of lead (described by Dr. B. Squire, in the *Pharmaceutical Journal* [3], vol. vi., p. 881, May 6, 1876), mixed with the borax in the proportions indicated, makes a nice ointment, and in that way I should have dispensed it.

South Norwood, S.E. J. H. Baldock.

Query.

[393]. In the following prescription what should be used for the dec. senegæ,—the P.L. preparation of that name or the inf. senegæ, B.P.?

℞ Æther. Chlor. . . . . ʒj.
Muc. Acac.
Syr. Ros. āā . . . . ℥j.
Tinct. Lupul.
Syr. Rhœad. āā. . . . . ʒiiss.
Decoct. Seneg. . . . . ad ℥viij
M. Sum. cochl. mag. tertiis horis.

S. S.

Correspondence.

**** No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Death Rate of Chemists and Druggists.

Sir,—As a supplement to your statistical record of week before last, will you permit me to add some particulars which I think will prove interesting.

The first table shows the number of deaths recorded from March, 1875, to July, 1879, and the average age at death:—

Date.	Total Deaths. Age Recorded.	Deaths. Age not Stated.	Total Deaths	Average Age at Death.
1. March to June 30, 1875 . .	30	2	32	53·2
2. July 1, 1875, to July 1, 1876 .	121	14	135	51·02
3. ,, 1876, ,, 1877 .	119	16	135	51·21
4. ,, 1877, ,, 1878 .	119	3	122	50·68
5. ,, 1878, ,, 1879 .	131	4	135	52 16
Total	520	39	559	51·4

The second table shows the number of deaths at various ages, and the percentage:—

Age at Death.	1*.	2*.	3*.	4*.	5*.	Total.	Per cent.
20 to 30	5	10	10	8	13	46	8·84
30 to 40	5	27	28	29	25	114	21·92
40 to 50	3	21	21	25	19	89	17·11
50 to 60	3	25	23	23	29	103	19·8
60 to 70	7	25	24	21	27	104	20·
70 to 80	7	11	6	11	16	51	9·8
80 and upwards . .	0	2	7	2	2	13	2·5

The records from which the above tables are calculated are not sufficiently extensive, either in point of time or of detail, to justify any conclusions being drawn from them at present; but they are interesting as far as they go, and may serve as a basis for future calculations; in the meantime to reassure those who lately in your correspondence columns took such a gloomy view of the healthiness of our occupation, I subjoin another table (extracted and condensed from one of the returns following the census), which has been kindly furnished me by a gentleman who takes great interest in the subject of vital statistics.

* These numbers refer to the dates in previous table.

The first column shows the occupation, the second the proportion of deaths to each thousand then living. The nearest round numbers are used to avoid fractions:—

Clergymen	14–
Barristers	11–
Solicitors	20+
Physicians	30–
Surgeons	20–
Law Clerks	20–
Chemists and Druggists	15+

34, *Leinster Terrace.* FREDERICK ANDREWS.

CHEMISTS' PRICES.

Saturday, Feb. 7, 1880.

"SHOPS *v.* STORES.

"*To the Editor of the Times.*

"Sir,—On Friday or Saturday in last week a prescription, containing 16 grains of chloral in 4 ounces of water flavoured with a little ginger, was made up for me by a chemist in Bond Street. His charge for this was 3*s*. Yesterday the same prescription was made up at the "Stores" where I usually deal. The charge was 8*d*.

"How thoroughly the public should sympathize with the indignation felt by tradesmen against co-operative stores!

"I am, sir,
"Yours faithfully,
"FRANCIS R. HULLAH.

"*Grosvenor Mansions, Victoria St., S.W., Feb.* 6."

Monday, Feb. 9, 1880.

"SHOPS *v.* STORES.

"*To the Editor of the Times.*

"Sir,—For the lower price of the stores your correspondent who complains of the chemist's price can only obtain medicine, however pressing the emergency, during forty-four hours of the week, while at the chemist's he can be served any hour, day and night. Surely the difference of cost is but proportional to the difference of security arising from medicines being obtainable at the chemist's at any time —a consideration most material when health, perhaps life, are at stake.

"ÆQUITAS."

Sir,—With respect to the above correspondence, I was not at all satisfied with the reply given by "Æquitas," who does not attempt to show that the medicine was obtained at an unseasonable hour of the night, and so we may infer that it was had in business hours. But "Æquitas" informs us that medicine can be obtained at the chemist's at such times as the stores are closed by those who are willing to pay nearly five times the price charged at the stores during forty-four hours of the week.

Now, of course, a person would not go to Bond Street to get a thing cheap, and I readily admit that a chemist has a right to charge what he pleases for his work, whether he charges it at high or at low prices; just as one artist will be content to receive as many shillings for a painting as another artist would charge guineas; but with respect to high charges, the chemist should remember that they sometimes become prohibitory, and I have known a mother refuse to call in a medical man in a serious case, because his high charge would prevent her purchasing food for her large family.

JOSEPH LEAY.

Downside Villa, Chilcompton, Bath.

THE USE OF THE WORDS "PHARMACY" AND "QUALIFIED BY PHARMACEUTICAL EXAMINATIONS" AS APPLIED TO CHEMISTS AND DRUGGISTS.

Sir,—I have read some of the letters on this subject, and should like to express an idea or two of my own. I have every sympathy with pharmaceutical chemists in defending their position, and feel sure they will not object to just claims of chemists and druggists.

The Major examination does not include pharmacy as a subject, so that we may fairly suppose that when a person has passed the "Minor" he has a perfect right to call his shop a "pharmacy," or else what is the use of him being passed in that particular subject?

Persons cannot become chemists and druggists without passing the Preliminary and Minor examinations, which are the Society's own. Therefore, "A Voice from the Midlands," whoever he may be, may consider them so far "qualified by pharmaceutical examinations." The same gentleman should remember that Minor associates in business support the Pharmaceutical Society equally the same as Major members.

Bradford. H. WRIGHT.

THE USE OF THE WORD "PHARMACY."

Sir,—Now that the use of the word "pharmacy" is being discussed, I should like to write a few words in reference to its meaning. Mr. George Mee states that chemists and druggists have nothing whatever to do with pharmakon root or branch. If my memory serves me, φάρμακον, pharmacon; a medicament, or as Pereira has it, a drug, is the word from which pharmacy is derived, and that pharmacy is the art of compounding and preparing medicines. If this be correct, a man who is legally qualified to perform that office is literally and virtually a pharmacist.

"A Voice from the Midlands" seems very much distressed on account of the Minor men being allowed to delude the public by advertising themselves as qualified by "pharmaceutical examinations," etc., from which I infer that both the Minor examination and those who have passed it have nothing whatever in common with pharmacy. This seems to me rather contradictory, since the above examination is conducted in the house of the Pharmaceutical Society, by pharmaceutical chemists, one of the subjects (which by no means receives the least attention) is called pharmacy, and to the best of my knowledge is not even repeated in the Major examination.

In France chemists enjoy a higher prestige than we do here; there are two grades as in England, first and second class, the former are *bacheliers-ès-sciences*, but both are pharmacists, and their establishments are called pharmacies.

A member of the Council remarked at the last meeting that many Minor men were in the habit of calling their establishments pharmacies instead of chemists' shop. I would therefore suggest the following model for the facias of future chemists and druggists, "Jones, chemist's shop." Much has been said about raising the status of the drug trade, but if those engaged in pharmacy are to be lowered in their own estimation, I consider the proposed step a retrograde movement in that direction.

OLIVER ROGERS.

Paris.

Sir,—I read with very great pleasure the letters on "Pharmacy" in your issue of February 14, and I think with the writers of those letters that it is high time a stop was put to the practice of chemists and druggists using the words "pharmacy" and "pharmaceutical laboratory" to designate their places of business.

I maintain, sir, that they are the exclusive property of pharmaceutical chemists; if men who only hold the Minor qualification are allowed to do this thing, where is the use of a man passing the Major examination? As the matter stands now, the public are at a loss to knew what difference there is between the two. I think the time has arrived for the Council to take the matter up in earnest.

There is another matter I would like to draw attention to, that is, the title "chemist." From the Pharmacy Act, 1868, I read, "It shall be unlawful for any person to assume or to use the title chemist and druggist or chemist or druggist, etc., etc., unless such person shall be a pharmaceutical chemist or chemist and druggist within the meaning of the Act, and be registered under this Act." From this I gather that the title "chemist" belongs only to a pharmaceutical chemist or chemist and druggist. Then how is it that analysts and others throughout the kingdom are allowed to use it with impunity?

PH. C.

Sir,—I think it will be wise for the Council to consider well its course before entering upon the persecution, for persecution it will be, of any registered chemist and druggist who has ventured to call his shop a "pharmacy." I have called mine the "—— Road Pharmacy" now for ten years, and can conscientiously state in so doing I had not the remotest idea of trenching upon the rights of the Major men. I found when I commenced business that the grocer named his stores the "East-end grocery establishment," and so on, and the draper, "the well-known drapery," etc. The pharmaceutical chemist himself does not disdain the use of such terms as "apothecaries' hall," "medical hall," and I being on the Register, with a legal right to make up and retail any of the preparations of the Pharmacopœia, adopted the word "pharmacy" as a proper and reasonable title.

For nine years I have paid annually my guinea to the funds of the Society. Is this now to be used against me as one of the supposed infringers? I consider the letters in last week's Journal most ungenerous.

Not ten doors from my pharmacy, patent medicines are being sold at a branch post-office. Scarcely one hundred yards distant the public can procure at a grocer's all drugs and chemicals not actually poisons within the meaning of the 1868 Act.

I submit then, is this the time to quibble within the borders? Surely there is enough outside to complain of and demanding serious and prompt attention, without raising in our very midst rival persecution associations.

ANOTHER VOICE FROM THE MIDLANDS.

Sir,—Having read letters in your last week's issue of the *Pharmaceutical Journal*, on the above subject, allow me in a few lines to express my surprise at the step a few Major members wish the Council to adopt. In the first place, what is a pharmacy? In my idea it is an establishment set apart for the sale and manipulation of "pharmaceutical preparations;" therefore, if a chemist is not qualified sufficiently to call his establishment a "pharmacy" he is not fit to be a chemist and the Minor examination is no good to him and a complete farce. I quite hold with the higher examination; but as all men cannot spare the money and time involved in obtaining that qualification, I do not see why the bulk of us are to be deprived of our rights by a clique, and I feel very sorry that at the last Council meeting one of the members did not speak on behalf of the bulk of qualified chemists, namely, "Minor men." I, no doubt in common with others, subscribe towards the "Society," but I certainly shall not any more if those funds instead of protecting our privileges are used detrimentally to our interests. I have had relatives in the business for fifty years past, and when I compare their access into business with its privileges and our access into the business now with its reduced profits, etc., the comparison is not very encouraging.

I am in business in a midland manufacturing town, and all round me the business is being trespassed upon by unqualified persons. I think if the money spent in squabbling over the use of the word "pharmacy" was devoted for the purpose of altering this state of affairs, it would be of much more benefit to all the Major members, and, indeed, the trade at large.

A YOUNG BEGINNER.

APOTHECARIES' WEIGHTS AND MEASURES.

Sir,—In your leading article in the last issue of the *Pharmaceutical Journal*, you wished to know from the local secretaries or others, "Whether any, and what action had taken place with the local authorities respecting the new Weights and Measures Act, 1878, for the verification and inspection of apothecaries' weights and measures?"

Now, sir, I think chemists are already beset with troubles and difficulties enough in carrying on their business, and Acts of Parliament have hitherto done them little or no good, and this last Act, if heedlessly and injudiciously enforced, would place the trade under considerable inconvenience and annoyance. As, therefere, there appears to be much doubt and uncertainty in the meaning of this Act, and inspectors who may be appointed by the local authorities might be interpreting it in different ways, I considered it the wisest course under all the circumstances and in the interests of the chemists in Bath, to move the following resolution at the committee of the town council which takes cognizance of these matters:—

"That in the opinion of this committee it is not necessary at present to provide local standards of apothecaries' weights and measures." (*Carried.*)

WILLIAM BRIGHT, *Alderman.*

Bath.

N.B.—I have acted on the assumption that this Act is permissive in its character.

OIL OF LAVENDER.

Sir,—In your last week's number I noticed an article by Messrs. Young and Postans, on the present high price of oil of lavender and the effect it would most likely have on the sale of lavender water; also a suggestion to induce some enterprising men to turn their attention to the cultivation of the plant.

As an old grower of lavender, the cultivation of which has been carried on by members of my family for about sixty years, I may be able to show that, however enterprising growers may be, they cannot produce oil of lavender, even at a moderate price, if the seasons, etc., are against them.

In the first place, there is a large amount of disease in the plant to contend with, destroying some thousands each year, and many just coming into bearing, one or two years old; secondly, the late frosts in May destroying the young spikes; and lastly, the most important of all, the want of bright sunny weather during the months of May, June and July, the yield of essential oil entirely depending on this. It will therefore be seen, however highly the land be manured, the plants well trimmed and kept clean, expenses kept low, it will after all depend in great measure upon the season, as it does with most crops. For instance, I have noticed for some years past that a good lavender season is a good wheat season, but in these cases the weather has been warm and bright, and *vice versâ* when an absenee of sun and the weather wet. I have only to refer to last year as regards both crops, each yield being unusually low. I quite agree with Messrs. Young and Postans that the present price of oil of lavender is likely to bring into use inferior oils and in many cases destroy the popularity of this beautiful perfume; but I would recommend all who have a name for lavender water to use only English oil, if they get but a smaller profit.

If any member of the Pharmaceutical Society could find out the cause of the disease now existing in the lavender plant, and a remedy, it would confer a great boon upon the growers and enable them in some measure to reduce their prices.

Hitchin. SAMUEL PERKS.

J. R. P.—In the latter part of the 17th section of the Pharmacy Act it is provided that those provisions in the former part of the section which relate solely to poisons in the first part of the schedule shall not apply to sales by "wholesale to retail dealers in the ordinary course of wholesale dealing."

T. F. E. and S. M. R.—A communication asking for an explanation, forwarded to the writer at the address given by him, has been returned through the dead letter office.

"*Hibernicus.*"—Only those persons who are registered under the provisions of the Pharmacy Act, 1868, can legally carry on business as a pharmaceutical chemist or chemist and druggist in Great Britain.

E. F. F.—We are not acquainted with any experiments that have been made in the direction to which you refer.

G. Spencer.—If, as you say, the colour is due to two of the ingredients, we do not know how it can be removed without affecting the perfume.

E.—The subject has been so recently discussed that the time has hardly arrived for reopening the subject.

Simplex will find what he wants if he refers to the advertising pages.

W. H. S. will oblige by repeating his question.

C. L. S.—The second ingredient is no doubt "mucilago acaciæ." With respect to the last see the Dispensing Memoranda.

"*Ceratum.*"—For Unguentum Galeni, see vol. viii., pp. 506 and 518.

T. W. Ogilvie.—(1) *Parmelia saxatilis.* (2) *Parmelia physodes.*

W. P. D.—Your communication has been forwarded to the Advertisement Agents, Messrs. J. and A. Churchill, 11, New Burlington Street, to whom all letters relating to advertisements for this Journal should be sent.

Tayuya.—See a paper on the botanical origin of this drug, before, p. 667.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Chandler (Chicago), Bagnall, Renninger (Minnesota), Cotton, Baldock, Agathos, Major, Nil Desperandum, E. S.

The Pharmaceutical Journal.

SATURDAY, FEBRUARY 28, 1880.

THE INTENTION AND SCOPE OF THE PHARMACY ACT.

After many delays, the appeal of the London and Provincial Supply Association against the decision of Lord Chief Justice Cockburn and Mr. Justice Mellor has at length come before the higher Court of Appeal, the presiding judge on this occasion being Lord Justice Bramwell, who it will be remembered was, several years ago, counsel for the Pharmaceutical Society when an attempt was made to dispute the powers of the Council under the Pharmacy Act, 1852.

Our readers will remember that one of the grounds upon which the Lord Chief Justice and Mr. Justice Mellor decided the previous appeal against the London and Provincial Supply Association was the view that the Pharmacy Act being really a means of protection to the public, it was essential that no association of persons should be free from liability to penalty for doing that which in their individual capacity would unquestionably be an offence. For this reason they held that all persons, "natural or artificial," should come within the scope of the prohibitory sections of the Act.

The point raised by Mr. Wills at the hearing of the further appeal was briefly whether the prohibition against selling poisons without being a registered chemist and druggist extends to limited companies. That, at least, may be taken to be the drift of his argument, although, as will be seen from our report of the case, Mr. Wills seemed to confound a member of the Pharmaceutical Society with a chemist and druggist registered under the Pharmacy Act, 1868.

Mr. Wills contended that inasmuch as part of the qualification for being registered consists of an examination, a limited company was incapable of qualifying itself, but he did not adopt the decision of the county court judge, that so far as the interests of the public are concerned it was sufficient if the persons employed by the company to deal out poisons, to compound prescriptions, and actually to effect the sale of poisons, were qualified within the meaning of the Act.

In support of the contention that companies were not included within the scope of the Act, Mr. Wills argued that though the term "person" is capable in law of including corporation, still in the language of modern Acts of Parliament that was not so, but that where "person" was intended to include corporation there was an interpretation clause saying so. Various Acts of Parliament were cited as illustrating this view of the matter.

Rather by implication than otherwise, Mr. Wills, in his argument, treated the Pharmacy Act as one of a nature to ensure protection of the class of persons exercising the business of chemists and druggists, as by reference to the Act of Parliament passed in the reign of Queen Elizabeth, providing that it should not be lawful to exercise any craft or business without having been regularly apprenticed. In doing this he omitted any reference to the fact that the Pharmacy Acts were both passed, for the reason that it was deemed expedient for the safety of the public that persons keeping open shop for the retailing, dispensing and compounding of poisons should possess competent and practical knowledge of their business, and have been examined with that object and registered before commencing business.

In reciting the history of the Act of 1868, he suggested that it took its origin from the Pharmaceutical Society seeing the opportunity presented by what he termed the "great scare" then prevailing, as to the alarming facility with which persons were able to get possession of poison, and applying to Parliament under that influence to obtain an Act of Parliament, which he represented as having done a good deal for the Society, though he did not say anything of the benefit it conferred upon the public by preventing incompetent persons from carrying on a business which frequently involves possibilities of life or death.

But this reticence was not the only point in which Mr. Wills's representation of the case admits of being questioned. He went still further and did not hesitate to declare that what the Pharmaceutical Society really wanted to do, and what he had no doubt was the real object of the movement, was to shut up the co-operative stores, because co-operative trading was really the thing which hit the trade so hard.

In the present state of popular feeling in regard to co-operative trading this connection of the action of the Pharmaceutical Society with designs against the existence of co-operative stores is calculated to prejudice the question at issue unduly. As that question now stands it may be regarded that its decision involves a contest between common sense views and legal logic and that in this contest the former would be severely handicapped if the popular prejudice in favour of co-operative trading in any way came to exercise an influence.

The situation is a critical one for the drug trade, no less than for the safety of the public, and we commend to our readers a careful perusal of the report of the arguments put forward by the counsel for the appellants, as well as the remarks made by the judges themselves, as showing the disfavour with which the idea of protection of class interests is regarded. Even when the Attorney-General at the commencement of his address referred to the point that after all the question must be what did the Legislature intend when the Pharmacy Act was passed, and when he pointed out the importance of considering in whose interest it was passed, not that of chemists and druggists, but for the protection of the public, insisting that from that point of view if a man devotes himself to a particular profession or business, spending time and money in securing the requisite knowledge in carrying it on, it was reasonable that the Legislature should think it well he should be protected in its exercise, the comment of Lord Justice BRAMWELL was that "the presumption is against protection now-a-days."

The view insisted upon by the Attorney-General was that the meaning of the provision that it should be unlawful to sell or keep open shop for selling had reference to the proprietors and not to those who actually sold on their behalf, that the object of the Legislature was to prevent shops being kept for the sale of poisons except by qualified and responsible persons. Lord Justice BAGGALLAY and Lord Justice THESIGER entertained some doubt on this point, and suggested that in this case the public might have less protection than if the seller were understood to mean the person actually effecting the sale, since a qualified proprietor might leave his shop entirely in the hands of a person like the famous boy referred to in "Pickwick." The liability of the proprietor for the consequences of such a proceeding might, however, be taken, as the Attorney-General showed, as a guarantee against such neglect.

The extent of the report prevents our doing more than sketch in this general way some of the prominent features of the addresses on both sides.

THE EVENING MEETING.

AT the next evening meeting of the Society, to be held on Wednesday, the 3rd of March, a paper will be read by Professor REDWOOD, "On the Diffusive Properties of some Preparations of Iron;" another by Mr. H. G. GREENISH, "On Cantharides," giving an account of results obtained in the examination of three samples for the estimation of cantharidin; and a third by Mr. THRESH, "On the Volumetric Determination of Alkaloids."

SCHOOL OF PHARMACY.

THE courses of lectures on "Chemistry and Pharmacy" and "Botany and Materia Medica," in connection with the Pharmaceutical Society's School of Pharmacy, 17, Bloomsbury Square, will commence on Monday, March 1, at 9 o'clock in the morning, when Professor REDWOOD will give his first lecture on "Chemistry." Professor BENTLEY will commence his course on "Botany," on Friday morning, March 5. Students who have but a limited time at their disposal will find the ensuing five months to be a favourable period for studying at the School of Pharmacy, for between the 1st of March and the end of July, they will not only have the opportunity of attending in the laboratory and the usual courses on chemistry and pharmacy, and materia medica and botany, but also the lectures and demonstrations on "Systematic and Practical Botany," which are delivered at the Royal Botanic Society's Gardens, in the Regent's Park, where every opportunity will be afforded them of obtaining a practical acquaintance with medicinal plants.

WE learn from the *Birmingham Daily Mail* of last Wednesday that Mr. W. F. HAYDON has been appointed Secretary of the Birmingham Exchange and Chamber of Commerce. We understand that there were two hundred and seventy-five candidates for the office, and that the election of Mr. HAYDON by the Joint Committee was unanimous.

Parliamentary and Law Proceedings.

THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN *v.* THE LONDON AND PROVINCIAL SUPPLY ASSOCIATION, LIMITED.

This appeal, which has been a long time in the paper, came on for hearing on Monday last, February 23, in the Appeal Court, Westminster, before Lord Justice Bramwell, Lord Justice Baggallay and Lord Justice Thesiger.

Mr. Wills: My lord, this is an appeal from a judgment in the Queen's Bench Division reversing the judgment of the County Court in an action in which the Pharmaceutical Council sued a limited company for penalties under the Pharmacy Amendment Act, 1868. The point submitted to your lordships is whether the penalties and prohibitions contained in that Act, against any person carrying on the business of a pharmaceutical chemist in selling certain specified articles, apply to a limited company.

Lord Justice Bramwell: Is it pharmaceutical or pharmakeutical?

Mr. Wills: I do not know, my lord.

Lord Justice Bramwell: I remember asking the late Lord Chief Baron, who was an authority on everything, and he said the rule was that the sound of "c" was not affected by a silent vowel that followed it, and therefore it would be pharmakeutical.

Mr. Wills: If we adopt the Greek pronunciation it is no doubt a "k," but it has become so English that one is tempted to Anglicize it.

Lord Justice Bramwell: Do not suppose I am attempting to teach you; I am only telling you what the late Lord Chief Baron said.

Mr. Wills: I am always glad to hear anything coming from his lips; it is always well worth listening to; and I shall endeavour to benefit by the information your lordship has been kind enough to convey.

Lord Justice Bramwell: It is a curious case, because we say "pharmacy," no doubt.

Mr. Wills: Now, my lord, the short point is whether the prohibition in that Act against selling poisons without being a registered member of the Pharmaceutical Society extends to limited companies, and the way it arises is this. I need not read the case, because the point is very short and the case is perfectly clear. A person of the name of Mackness carried on business as a wholesale and retail grocer, and so on, in Tottenham Court Road. It struck him that he would like to become a limited company, and he associated with himself the necessary number of people and turned himself into a limited company, under the name of the London and Provincial Supply Association, Limited, and then they added to the other business the business of a dispensing chemist. Mr. Mackness was not a qualified chemist himself, but he employed—and the case finds that he employed—a person named Longmore, who was a qualified person under the Act, and two assistants under him, and that Longmore attended to the department and nothing else, and that he and the two persons who served under him, and who dealt out these articles, were properly qualified persons. The persons, therefore, who actually compounded the prescriptions and who actually physically effected the sale were qualified within the Act. But, of course, inasmuch as part of the qualification consists of an examination, and so on, a limited body was incapable of qualifying itself, and the question for your lordships will be, whether the Act was intended to apply to limited companies and corporations as well as to individuals. Very shortly, my lords, my argument will be divided into two parts, and I may shortly put the two points which I propose to make to your lordships thus: in the first place, I shall show to your lordships that although, of course, undoubtedly "person" or "*persona*" is capable in law of including corporation, that in the language of modern Acts of Parliament, especially those that impose penalties, it is not so, and that in the language of modern Acts of Parliament it is universal that where "person" is intended to include corporation there is an interpretation clause saying so. That is portion No. 1. The second portion of my argument will be to show from the Act itself that, as it seems to me, it cannot possibly have been intended, looking to all the provisions of the Act, that "person," which is used over and over again in the Act of Parliament, can have been intended to include a corporation, because in some places it makes nonsense of it. Those are shortly the two points of my argument. In the first place I propose to show to your lordships that "person" does not necessarily mean, in an Act of Parliament, and does not in fact mean in modern legislation, corporation. My learned friend the Attorney-General, who argued this case with conspicuous ability, of course, in the court below, quoted a passage from Lord Coke to show that in the Act of Elizabeth, which relates to holding lands in mortmain, "*persona*" or "person" meant and included corporations. Of course I do not quarrel with that general doctrine that "*persona*" in law is capable of including corporate bodies, artificial, non-natural persons as well as natural persons; but I think I shall show your lordships that in modern legislation that certainly is not the case. Now, my lords, this Act was passed in 1868. For a considerable time before 1868 to the present time it has been, I believe, the universal practice of draftsmen to put in an interpretation clause with respect to the word "person" when it is intended to extend it. There was, as your lordships know, a general Act of Parliament passed, the 13 and 14 Vic., cap. 21, which is commonly known as Lord Brougham's Act, for shortening the language of Acts of Parliaments, which provided that words used in the singular should comprehend the plural and words of masculine gender should comprehend the feminine, unless there was something repugnant to it in the context. But it did not go on to say that "person" should include a corporation, although it was already at that time the commonest thing in interpretation clauses to find the three things following one upon the other, that singular should include the plural, that masculine should include the feminine, that person should include a corporation or corporate body. Therefore, at that time the Legislature, when proposing to shorten the language of Acts of Parliament, drew the distinction, I think for very obvious reasons, because in the great majority of Acts of Parliament there is no question arises and "person" is only intended to comprehend natural "persons," and the inconvenience of having a general clause of that sort with a specific exception would, I think, very much outweigh the inconvenience of reading "person" in its ordinary sense, and extending it when necessary. Now, my lords, to show that that was so, I refer to one general Act of Parliament which bears on this subject, which was a few years earlier. In the 7th and 8th Geo. IV., cap. 28, sec. 14, there is that which is marked in the margin as a rule for the interpretation of all criminal statutes, but it does not go quite so far as that, because it is enacted that wherever this or any other statute referring to any offence, whether punishable by indictment or summary conviction, in describing or referring to the offence, has used or shall use words importing the singular number or masculine gender, the statute shall be understood to include several matters as well as one matter, several persons as well as one person, feminine as well as masculine, and bodies corporate as well as individuals. Well, my lord, I use that, and I think legitimately, to show that it was felt that there might be a difficulty in so extending the expression "person" to non-natural "persons" if it had not been for specific enactment. That specific enactment does not cover this case, because this is not a case of conviction before a magistrate; this is a case of an action for a penalty brought in the county court, and therefore that Act does not cover this specific case, and so the court below held. It only throws light upon it. Of course, the use which the Attorney-General made of it was to suggest that that was really the expression of the common law, and that it illustrated the rule of interpretation.

Lord Justice Bramwell: A sort of declaratory Act.

Mr. Wills: Yes, my lord, as far as it went. I submit, on the contrary, that is hardly so, and I think the constant presence of an interpretation clause would have been necessary if that had been so, and that really the fairer inference from that is that without some such enactment you would not read "person" as including corporate bodies. There have been several decisions, I need not go through them, in criminal cases in which "person" has been held, under the specific language of Acts of Parliament, not to include corporate bodies. I will just refer your lordships to the last case that I know of on that subject, which is one in the Common Pleas Division, quite a late one, the Guardians of St. Leonard's, Shoreditch, *v.* Franklin, in the Third Common Pleas Division, page 377. There, by a local Act, a penalty was imposed on coal dealers knowingly selling one sort of coal for another, and the penalty is recoverable by the person who shall inform and sue for the same. "Held, that a Board of Guardians, being a corporation, did not come within the term 'person' and could not sue for the penalty." Lord Coleridge said, "So far as I know this is a case *primæ impressionis*, but not without clear authority bearing on the question, although not directly deciding it. The plaintiff corporation having had coals supplied by the defendant, not only sue him for damages for breach of contract in failing to supply good coals, but proceed further to sue him for a large sum for the breach of duty of which he has been guilty in violating 1 and 2 Will. IV., cap. 76. The corporation say that the breach of contract was so bad that they are entitled not only to damages but to the penalties imposed by sec. 45, which exceed the sum of £25 and are recoverable under sec. 85, 'by the person or persons who shall inform and sue for the same.' It is suggested that the corporation are within the terms of sec. 85 and can sue. Undoubtedly the corporation may be in one sense included within the terms 'person' or 'persons.' But the Act must be construed *secundum subjectam materiem*, and I must ascertain whether it would be reasonable that a corporation should be within the words. If the case had arisen under one of the old penal statutes it would have been too clear for argument, as some of the conditions precedent to maintaining the action would have been such as a corporation could not from its very nature perform; and therefore to have held a corporation included in the words 'person' or 'persons' would have made nonsense of the Act." His lordship is there following out very much the same line of argument I propose to address to your lordships by-and-by on the second head of my argument. "I agree that such a construction would not make nonsense of this Act; but the general current of authorities seems to show that a corporation cannot be common informers. The argument that in numerous statutes, corporations are empowered to sue has an important bearing against the plaintiffs, for the fact that it has been thought not only well but prudent to include corporations in special terms rather tends to show that they otherwise would not have been included. No doubt the provisions in many statutes enabling the recovery of penalties have been extended to corporations, not, however, by making corporations do things beyond their nature, but by saying that things done by others on behalf of corporations should give them the same advantage as if done by them. The statutes as to inspection and exhibiting interrogatories in legal procedure, etc., which prescribe that certain acts shall be done for corporations by certain officers, all tend to show that corporations are by the very necessity of their nature excluded from doing such acts. I think it undesirable that corporations should be common informers. The general dictum of the text books is against it. Under all the earlier statutes corporations could not have been informers, and I think they cannot be so in this case." Of course I cannot quote that as deciding this case, but only to illustrate that "person" need not necessarily include a corporation and that you must look at the *subjectam matériem*. Now, my lords, I have looked, of course, to see what was the common practice in Acts of Parliament about the time, and in the older days before them, by taking up the very volume in which this Act of Parliament is contained, and, looking through the statutes for 1868, I find no less than four statutes in that volume, which when it is necessary that penalties should be inflicted upon corporations as well as upon private individuals, or rights given to them, contain an interpretation clause. The first of them is cap. 45, sec. 5, which is an Act relating to Sea Fisheries, where numerous penalties of course are imposed for the preservation of fisheries, and it is enacted there that the word "person" wherever used shall include corporate bodies. The next, my lord, is cap. 60, and that is the Act relating to the Curragh of Kildare, which was proposed to be used for the purpose of an encampment. The Act recited that there were numerous persons entitled to various rights over the common which would be interfered with, and it was desirous to make provision for their protection. I do not think, as far as I remember—I looked at it cursorily—that there are penalties imposed there; but there is an interpretation clause, and "person" is said to include in that Act corporate as well as non-corporate bodies. Then, my lords, comes cap. 119, which is as to the regulation of railways, and there by sec. 2, also, the interpretation clause is made to cover corporate existences as well as natural persons by the word "person." The last is cap. 131, which is the Artizans and Labourers' Dwellings Act. There also, there being rights of compensation given and also penalties imposed, "person" is made to include corporations. Now, my lords, I believe that I might go through every volume of the statutes in or near about that time and find exactly the same state of things. In the first Public Health Act, which is 10 and 11 Vic., cap. 63, the interpretation clause contains three things: masculine shall include feminine (of course, the 13 and 14 Vic. had not been passed), singular shall include plural, and person shall include corporation; and in that volume—the 10 and 11 Vic.—having chanced to open that, because I happened to recollect it, and thought I recollected that interpretation clause, there are no less than six more Acts of Parliament all containing exactly the same thing. Those are the Acts relating to the consolidation of the clauses usually applicable to markets and fairs, to gas works, to commissioners, to cemeteries, waterworks and towns' improvement. That is going back a few years. Now, I will just go forward. I cannot pretend to have gone through the whole of the Acts of Parliament since to see, but I have looked into the last two or three volumes of the statutes, and I find precisely the same state of things provided. In 1876 there are two Acts of Parliament, cap. 69, which relate to the Sheriff's Court of Scotland, and in sec. 63 "person" is extended to corporate bodies. In the Pollution of Rivers Act, cap. 75, sec. 21, it comes in the middle of the Act, but there also there is a similar clause. So in 1877 there is one Act of Parliament, the Fisheries Act, cap. 42, in which sec. 13 contains the interpretation clause, and there is the same interpretation given. In the year 1878—I have not looked further down than that—there are several. There is the Irish Public Health Act, which is cap. 52, sec. 2 is the interpretation clause. There is the Roads and Bridges for Scotland Act, which is cap. 51, and sec. 3 is the interpretation clause. There is the General Act of Parliament, that very important Act of 1878, as to weights and measures, which of course is to have a general application, and of course imposes a number of penalties, that is cap. 49; sec. 7 contains the interpretation clause and there the same language is used. Also, there is the other Act, of very wide application, which beyond all doubt would be applicable to a number of corporate existences, limited companies, as well as private individuals, the Factory and Workshops Act, cap. 16, and in sec. 96, which is the interpretation clause, there is the same thing. I think I have shown your lordships sufficient to show that both before and since that time this was the current language of Acts of Parliament. I will give your lordships one further illustration, which is in the rules of the Judicature Act, which by the Act of Parliament are to have the force of Acts of Parliaments, and which of course were drawn by persons very familiar with the ordinary language of Acts of Parliament. There the word "person" is applied to a corporate body. I cannot help thinking that the truth is, whatever may have been the state of things in the time of Elizabeth, to which Lord Coke's dictum—I should hardly call it a dictum, but Lord Coke's statement—applies, whatever may have been the practice at that time, that the modern practice I cannot help thinking is all one way. I have looked cursorily through the Acts and found those I have stated to your lordships. Of course, I do not ask your lordships to take any negative statement of mine for more than it is worth. All I say is, the impression left on my mind is that there are no Acts of Parliament where I should expect them to have the application beyond the ordinary use of language, in which that is not provided for. I will not say it is not so, but none caught my eye, or else I should have looked at them with more care in order to see. But it seems to me I am well founded in saying that that has become the habit, and had become the habit long before this Act of Parliament was passed.

Lord Justice Thesiger: Will you give me the reference to that in Lord Coke?

Mr. Wills: 2 Coke's Institutes, page 722. It is a comment, my lord, on the 39th Elizabeth, cap. 5, which, as I said before, is the Mortmain Act. It is about the erection of hospitals and houses of correction. The language of the Act is that "all and every person or persons seised of an estate in fee simple, their heirs, executors, and assigns shall have full power, strength and lawful authority for the next twenty years, by deed enrolled in a court of chancery, to erect hospitals," and so on. Then his comment on that is that "all and every person or persons"—"these words reasonably do extend to every body politic and corporate, but not to such as are restrained by any Act of Parliament, etc., but doth extend to such bodies politic and corporate as mayors, commonalties, burgesses and the like, and to all other "persons" whatsoever."

Lord Justice Bramwell: There is no case decided; it is only that passage.

Mr. Wills: No, my lord, only that passage.

Lord Justice Bramwell: Really I cannot help thinking that that might have been very different if that were a decision of his lordship on a case that had come before him, and that was arranged on both sides. I should have ventured, if I had been on the other side, to have asked why the word "successors" was not put in.

Mr. Wills: It struck me, my lord, when I was reading the Act of Parliament, but of course I am not concerned to say very much about it, because it expresses the general rule of law, which is that "person" in law does mean corporate bodies, if there is nothing whatever to qualify it.

Lord Justice Bramwell: And the reason of the thing is so, that is the way the Lord Chief Justice suggests, and there is no difficulty in applying it.

Mr. Wills: I challenged my friends in the court below in the course of the argument, which was very ably conducted, and you see who represents my learned friend the Attorney-General now, and my friend made a very vigorous reply upon me, and a successful one, and, therefore, I am disposed to think it was a good one, but I challenged my learned friend to cite any case in which there had been an indictment or proceeding against a corporation for a breach of a statute which contained the word "person," without the interpretation clause, and none such exists. I believe none such exists, at any rate none such was quoted. Of course that does not decide the matter either way; it might either be that the case had never arisen, or if it had arisen, people thought it too clear the other way, and that in that way there is no decision, but at all events no case was produced, and I do not cite any further cases to your lordships on this point. Now I think I have said all that is necessary to say on that first point at the present moment. I have condensed it as much I can, and one cannot make it clearer by going over the ground twice. There it lies. I believe that is the habitual course in modern Acts of Parliament, and if my friend can shake what I have said there, what he points out will be better worthy of attention than my belief at present. But I believe that will prove to be so, whatever may the case formerly. Verbiage was certainly rather the predominant rule in Acts of Parliament, and I believe that the tendency has been, and that it has become perfectly settled in the use of modern draftsmen that they do not use the word "person" as including "corporation" without saying so. Now having said thus much, I pass to the more specific consideration of the Act of Parliament with which we have more particularly to deal. My lords, there was one other point which was taken in the court below, and was taken before the learned county court judge, which I have forgotten to mention. I think it is only due to him I should mention it, because it is the point, if I remember rightly, on which he decided it, and he was a very learned gentleman, the late Mr. George Lake Russell, whom probably your lordships knew. I knew him very well, and respected him very much, and was certainly attached to him. The view he took was that the statute to which I am about to call your lordships' attention, which prohibits the selling or keeping open shop by a person unqualified, had not been broken where the actual sale was effected by a person who was qualified, although the owner of the shop was a limited company who could not be qualified. Now, my lords, I confess I felt myself, and still feel, much difficulty in seeing my way to that conclusion. I only hope that your lordships will think Mr. Russell's view was better founded than it occurs to my mind it was, but the language of the Act of Parliament being "person who shall sell or keep open shop for the sale," I confess I felt a great deal of difficulty, and do feel a great deal of difficulty, in saying that the person who kept open shop for the sale is anybody but the owner of the shop.

Lord Justice Bramwell: I am not going to indicate any opinion, but it did occur to me immediately you mentioned the case, that if it should be said against you, why this mischief is not provided for in the case of a corporation, you possibly might say, then if it is not, the individual doing it would be liable.

Mr. Wills: The individual would certainly be hit. I will show your lordships presently the individual who did it certainly would come within the terms of the Act, because he sells, and there is no doubt about that.

Lord Justice Bramwell: What I mean is this: suppose a man kept a shop who is not qualified, and suppose he kept an unqualified shopman.

Mr. Wills: He being qualified?

Lord Justice Bramwell: No, neither master nor servant being qualified. I am not going even to indicate an opinion, for I have not got one, but possibly it might be said it was a wrongful act on the part of the man who sold, which he could not justify because he was the servant of the master. Do you see what I mean?

Mr. Wills: I think that is so, my lord. I will come to it presently. I think there is very good ground for saying that in this Act of Parliament "sell" means the person who physically effects the sale — the hand that does it—because there is another section which is intended to mean the master of the shop, and does say so, and therefore here when it does not it would seem to refer to the actual seller. The words I felt pressed with on this point, and do feel great difficulty in supporting Mr. Russell's view, are "keep open shop for the sale."

Lord Justice Bramwell: What is the conviction, what is the charge here? That he had sold?

Mr. Wills: Both, my lord; both sold and kept open shop. But I feel bound to say that at the time I argued the case down below I was not aware of a case which I stumbled upon perfectly accidentally—since I take no credit for having found it, but I happened to come across it at Leeds the other day—which certainly is an authority, as far as it goes, and one which goes a considerable way in favour of the view taken by Mr. Russell. It is a good sporting case, Reynard *v* Chase, and it is found where Reynard very often is found, at the opening of a burrow. It is the first case in the first volume of Burrow's Reports. There, my lords, it was an action for a penalty under the 5th Elizabeth, chap. 4, for exercising the trade of brewer without having served an apprenticeship. The facts were, that there were two partners, one of whom was under the Act, for he had served his apprenticeship, but the other was not, for he never had. It was found that the one who was not qualified never had interfered in the business and simply was a partner taking his share in the profits and bearing his share of the losses, and Lord Mansfield held that he did not come within the Act. Lord Mansfield says, "When we have no doubt, we ought not to put the parties to the delay and expense of a further argument, nor leave other persons who may be interested in the determination of a point so general unnecessarily to anxiety and suspense." They were very clear therefore in the particular case before them. "The defendant has a share of the profits with Cox in moieties, and is liable to the debts of the partnership, but it is positively found that during all the time charged he never acted in or exercised the trade. He was not by the terms of his agreement to act in the trade, the other partner was to do the whole and had a particular salary on that account. It is not found that either Cox or any servant under him was set to work by Chase, or that Chase did any act whatever in exercising the trade. He was only concerned in the profit. Now, although this may be for some purposes exercising a trade in respect of third persons who deal with a partnership as creditors and within the meaning of the statute concerning bankrupts, yet the present question is, would it be exercising the trade contrary to this Act? I think Mr. Fisher has laid his foundation right against extending the penal prohibitions beyond the express letter of the statute. First, it is penal law; secondly, it is in restraint of natural right; thirdly, it is contrary to the general right given by the common law of this kingdom, and I will add, fourthly, the policy on which the Act was made has, from further experience, become doubtful. Bad and unskilful workmen are rarely prosecuted." Then, my lords, he says, "Let us consider whether the present case be within the letter. The letter of the Act is 'after the 1st of May it shall not be lawful for any person, other than such as do now lawfully use any right, to set up, occupy, use or exercise any craft, mystery or occupation, now used or occupied within the realm of England, excepting he has been brought up therein seven years at least as an apprentice, nor to set any person on work on any mystery not being a workman at this day, except he be an apprentice or has served an apprenticeship, upon the pain that every person wilfully offending shall forfeit and lose for every fault 40*s*. for every month.'" Now, my Lord Mansfield says, "The Act was made early in the reign of Queen Elizabeth, and afterwards, when a great number of manufacturers took refuge in England from the Duke of Alva's persecution, they brought trade and commerce with them, and enlarged our notions. The restraint of trade by this Act was thought so unfavourable that in 33 Elizabeth in the Exchequer it was construed away, or it was held by judges in that case, which construction, however I take not to be law now that if one who had been an apprentice of seven years, but in one trade, he may exercise any trade named in it, although he has not been an apprentice to it. All these observations only show that this Act, as to what enforces the penalty, ought to be taken strictly and according to the construction as made by former judges being favourable to the qualification of the persons attacked for exercising a trade, even where they had not actually served an apprenticeship, they have by a liberal interpretation extended the qualification for exercising a trade much beyond the letter of the Act, and have confined the penalty and prohibition to a case precisely within the express letter. Let us consider whether in the present case it comes within the letter or meaning of this Act. The whole policy of the Act was to have trades carried on by persons who had skill in them. Here the personal skill of the defendant makes no real difference in the case." That is very much what I should say here, "for the person who is skilful acts everything, and receives no directions from this man." In this case the assistant who did the work and served out the poisons; "he acts everything and receives no directions from this man, and neither did nor was to interfere." Mr. Justice Benson was of the same opinion. I do not think there is anything else in the decision. It goes some distance further on, but there is nothing else that makes anything for or against me. If there is anything else my learned friend will have an opportunity of seeing it. Now, my lord, I will show your lordship what the exact words and the exact nature of the Act of Parliament with which we have to deal are. I take leave to observe first, my lord, that this was an amending Act, and that it was an amendment of a former Act which constituted the Pharmaceutical Society an incorporated society, and something, I think, will turn on that. I reserve my remarks on the former Act until I have brought the provisions of this conspicuously before your lordship. It is an amending Act. Until about the 15 and 16 Vic., I think chemists and druggists, or persons exercising skill in the compounding of medicines, selling of drugs, and so on, were under no discipline, or subject to no necessity for qualifying at all. The Act of 15 and 16 Vic. gave a corporate existence to the Pharmaceutical Society, and gave them power for admitting persons as members of their Society by examination, and so on. It provided, if I remember rightly, I am not quite sure about that, that you were not to call yourself a pharmaceutical chemist unless you belonged to the Society; but it imposed no restriction on carrying on the trade.

Lord Justice Bramwell: I can tell you that is so, for I had the honour to be their counsel when they were attacked. I remember contending for them that their claims were very small. They proceeded most politically and most wisely. They began with a very small request to Parliament, and they got it. They said all their rights were that nobody shall assume the name which indicates he is a member of their Society. I think the case is reported. I remember the Chief Baron was on the other side.

Mr. Wills: I do not know the case, my lord.

Lord Justice Bramwell: He declared that society would be shaken to its foundation if we succeeded. However, we did.

Mr. Wills: There was no prohibition against anybody dealing in these drugs. Then there came, as the Attorney-General pointed out, somewhere about 1866, 1867 or 1868, some cases of poisoning which were reported, in which it was shown that people were able to get possession of poisons with alarming facility and there was a great scare about it, and this led to legislation. The Pharmaceutical Society saw their opportunity, and they went to the Government and obtained an Act of Parliament which did a good deal for them. And now, my lords, what they want to do is really what I have no doubt is the real object of this movement, to shut up the co-operative stores, because that is really the thing which hits them so hard. They would not care about a little affair of this kind, but if they succeed in this they will shut up the dealing in drugs by the Army and Navy and the Civil Service associations, and all those associations who make them up a great deal cheaper than you can get them at Apothecaries' Hall, or elsewhere. They procured their Act of Parliament, and my view of it, which I am going to submit to your lordships, my view certainly on anxiously looking at the Act, is that the person who drew the Act at this time did not think about limited companies. They were already in existence—the earliest of them really, I am told, came into existence two or three years before this Act passed—but they had not attained the importance they have now, and had not interfered with tradesmen as much as they have, and I do not think that the draftsman of this Act thought about dealing in poisons or dealings in any way affected by this Act by any but natural persons. But the Act of Parliament undoubtedly does a great deal for those persons who are recognized, who have passed the examination of the Pharmaceutical Society. It does not in terms prevent other people making up medicines; but inasmuch as in the list of poisons which are prohibited to be sold by any except properly qualified persons is comprehended something which is found in pretty nearly every prescription of any importance, nobody can carry on business unless he comes within the Act; I mean if the Act prohibited him. Therefore incidentally it does affect most importantly the power of carrying on a dispensing chemist's business. Now, my lords, I will say at once I think this is an imperfect Act. I think the provisions for the protection of the public are imperfect in many respects. It does not seem to me to be quite happily conceived; because it would certainly follow from one reading which was argued for strenuously by the Attorney-General, that a properly qualified person might carry on business with any number of unqualified assistants and never interfere in it himself. That should not be. It also follows from my reading of it, and I cannot escape from that—I know the inconvenience and I am not going to blink that for a moment—it would follow that a limited company might carry on the business without any protection to the public at all. I will not say without any protection, but with much scantier protection, because if I am right the protection would be insufficient in such a case. Inasmuch as if a limited company chose to have an unqualified assistant the only way in which the Act would apply would be by hitting the unqualified assistant who actually effected the sale; and I quite agree with the learned Attorney-General who says that is an unsatisfactory protection, because he would be a person who might be here to-day and gone to-morrow, and to be able to sue him for a £5 note in the county court is not very satisfactory. I think, my lords, in saying that I really have pointed out the extent of the inconvenience which my construction involves; at all events, no other inconvenience was pointed out in the argument in the court below.

Lord Justice Bramwell: That puts me in mind of an argument which I have always thought a most stupid one—that you ought to be at liberty to maintain an action against a corporation for malicious prosecution when they could not be guilty of malice, because if you are to go against the subordinate officials who were malicious, and who did prosecute, they might not be worth powder and shot. A most mischievous and stupid argument in my opinion. I do not say it is in this particular case.

Mr. Wills: That is very much the line of argument as far as the argument arises, the argument *ad inconvenientem*. What was said was this. I think I can put before your lordships what was put before the court below, and give an outline of the argument on both sides, almost in a couple of sentences. What they said was: this is an Act which imposes a general prohibition against any except persons qualified under the Act dealing in these things. Now, if by reason of your being a limited company it is physically impossible for you to qualify yourselves under the Act, *tant pis pour vous*, and it does not in the least affect the general prohibition, if you are within it, because you cannot submit yourselves to examination. So much the worse for you. That is their argument. My argument on the other side is this : the chief feature of the provisions which the Act of Parliament made shows that this case was not contemplated, because if an Act of Parliament had been asked at that time of day, in 1868, to impose a prohibition on all limited companies from carrying on a business, of this kind by qualified assistants, Parliament would not have given it, and therefore they did not intend to do by a side wind that which they would not have done directly. And, therefore, I say that, although I grant it may perfectly well be that large words and prohibition may be universal, and that the way of getting out of that prohibition may be such that a limited company cannot, from its very nature, get out of the difficulty, and it may therefore follow as you say that the limited company are indirectly prohibited and prevented from carrying on the business, yet I say it is fair to look at the the other side of the case and see whether there is any reason why in the nature of things a limited company should have been intended to be prohibited. Is it not much more probable that if Parliament had been thinking of including corporate bodies under this prohibition they would have put in a clause, and said that if a company carries it on the head manager or some responsible person shall be a duly qualified person, which would have effected all the protection which the public desire? It would not have suited the Pharmaceutical Society quite so well, and they would rather stand on their Act as they have got it now, with the interpretation which they have succeeded in getting in the court below, but I cannot believe myself that Parliament either then or now, would for a moment think of shutting up all these bodies. I do not believe there would be a chance of getting such an Act of Parliament, and I do not believe there was in 1868, and if that be so, it is a very fair argument for showing that it is not likely Parliament intended to do that indirectly which it would not have done directly. That is a short outline of the argument on both sides. Now, my lords, I will just go through the Act as shortly as I can, but it is absolutely necessary that I should go through the sections to some extent one by one,—it will not take very long,—in order to show your lordships that there is passage after passage where, as it seems to me, corporate bodies cannot be intended to be meant by the word "person," and if not in one place, then I say "person" must receive the same meaning throughout the Act. I pointed out in the argument in the court below, and I will point it out again, and I just make the observation now because your lordships will see the force of it, or the want of force of it as the case may be, as we go through the sections. I pointed out that if this restriction prevails at the present moment the Apothecaries' Hall itself is within it.

Lord Justice Bramwell: I was just going to ask that question.

Mr. Wills : They are liable to prohibition.

Lord Justice Bramwell: I was waiting to see if there was an exception in favour of Apothecaries' Hall.

Mr. Wills : No, my lord ; there is not.

Lord Justice Bramwell : That is a company.

Mr. Wills : The Apothecaries' Hall could bring itself within the Act in this way, that all persons who had carried on the business of chemists and druggists at that time, who at that time were already started and established in business as chemists and druggists, were entitled, on proving that to be the case, to send in a claim in writing signed by them, and with some householder to certify that they were persons who had been in business a certain time, and register themselves ; and Apothecaries' Hall might in that way have brought itself under it ; but it has never registered itself, and never dreamt of it, and it is at this present moment just as liable to the Act as any one else.

Lord Justice Bramwell : How can a corporation send in a thing in writing ?

Mr. Wills : There is this, also, my lord, and it does seem to me to be a very strong argument. A corporation never dies. It may dissolve itself, but it cannot undergo a natural death, and as long as it is worth carrying on it may be carried on. Now, the result may be that if any unhappy little company had been in existence before 1868, and had then registered itself under this Act of Parliament, it might go on for all time enjoying the privilege of compounding medicines and selling them over the counter, and keeping open shop, and yet there would be no clause in the Act of Parliament anywhere which could make it in the smallest degree an offence if it carried on its business by a parcel of boys or children, or persons who did not know the difference between Epsom salts and oxalic acid. That very nice boy, the assistant of the chemist in "Pickwick," whose presence in the shop was not considered by the court as a reason why his master should be excused from serving as a juryman, might be employed by this company until he had acquired his experience. Now, my lords, I pressed that illustration of the Apothecaries' Hall rather prominently in the court below, and I seemed at one time to make some impression on the court, but the Lord Chief Justice gave an answer to it which I will point your lordships' attention to when I come to deal with the judgment, but which I venture to think is wholly—I speak with great respect—untenable. His lordship suggested that every individual member of the corporation was a properly qualified person ; but that cannot make any difference. You cannot confuse the individual corporators with the corporate body.

Lord Justice Baggallay: Would every future member of the Apothecaries' Society be necessarily qualified?

Mr. Wills : In point of fact, instead of all the members of Apothecaries' Hall being duly qualified, I believe none of them are, because, by the provisions of this Act of Parliament, as soon as a man carries on the business of a medical man and compounds his own drugs, he is to cease to be a pharmaceutical chemist, and I believe that is the status of the individual corporators of Apothecaries' Hall. But I confess I was a little surprised at the difficulty which I experienced in the court below in maintaining my proposition, that you cannot for a moment think of importing the qualification of individual corporators into the question of the qualification of the corporate body. The corporate body has an existence of its own; it is an essence in law and it does not matter one straw what the individual corporators are with respect to that. The Act in question is the 31st and 32nd Vic., cap. 121. It is called an Act for Regulating the Sale of Poisons and to Alter and Amend the Pharmacy Act of 1852. It begins with a general recital which formed the groundwork of the argument below, and formed the groundwork of the judgment of the court against my view that it is perfectly general:—"Whereas it is expedient, for the safety of the public that persons keeping open shop for the retailing, dispensing or compounding of poisons, and persons known as chemists and druggists, should possess a competent practical knowledge, of their business, and to that end, that from and after the day herein named all persons not already engaged in such business should, before commencing such business, be duly examined as to their practical knowledge, and that a register should be kept as herein provided, and also that the Act passed in the fifteenth and sixteenth years of the reign of her present Majesty, intituled an Act for Regulating the Qualification of Pharmaceutical Chemists, hereinafter described as the Pharmacy Act, should be amended." Of course that is perfectly general. At the same time it is open to the observation which I made upon it below, and which I venture to repeat, that in that very section the mention of examination shows that the examination being just as general, the area of the examination being as general as the area of the whole recital, it shows that the person who drew that was not thinking of the particular case of corporate bodies. Now, my lords, the first section is, from and after a given day, "it shall be unlawful for any person to sell or keep open shop for retailing, dispensing or compounding poisons, or to assume or use the title chemist and druggist, or chemist or druggist, or pharmacist, or dispensing chemist or druggist, in any part of Great Britain, unless such person shall be a pharmaceutical chemist or chemist and druggist within the meaning of this Act, and be registered under this Act, and conform to such regulations as to the keeping, dispensing and selling of such poisons as may from time to time be prescribed by the Pharmaceutical Society with the consent of the Privy Council." Then by section 2, certain scheduled articles are declared to be poisons within the meaning of this Act, and they are a very large and wide category. Arsenic and its preparations, prussic acid, cyanide of potassium and all metallic cyanides, strychnine and all poisonous vegetable alkaloids and their salts, aconite and its preparations, emetic tartar, corrosive sublimate, cantharides, savin and its oil, ergot of rye and its preparations, oxalic acid, chloroform, belladonna and its preparations, essential oil of almonds, unless deprived of its prussic acid, opium and all preparations of opium and of poppies. It is a schedule which is also capable of indefinite increase at the will of the Council of the Pharmaceutical Society with the approval of the Privy Council, and therefore the effect of the legislation may be, I think, and am perfectly justified in saying, to prevent the exercise of the trade of a dispensing chemist by anybody except those who may lawfully do so, either under or notwithstanding this Act. Then the 3rd section, which is important in my point of view, is this——

Lord Justice Thesiger: The number of poisons may be added to by the Pharmaceutical Council?

Mr. Wills: Yes, my lord, with the consent of the Privy Council. It is a list capable of indefinite extension. However, it is a pretty ample list as it is, and you could not carry on the business of a dispensing chemist if you were prevented from dealing in chloroform, for instance, or prevented from dealing in one of the most ordinary drugs in these days in domestic medicines, aconite. The 3rd section is one on which I place some reliance. "Chemists and druggists within the meaning of this Act shall consist of all persons who at any time before the passing of this Act have carried on in Great Britain the business of a chemist and druggist in the keeping of open shop for the compounding of the prescriptions of duly qualified medical practitioners, also of all assistants and associates, who before the passing of this Act shall have been duly registered under or according to the provisions of the Pharmacy Act, and also of all such persons as may be duly registered under this Act." The subsequent section preserves the right of carrying on their business to those who had been chemists and druggists before the passing of the Act, subject only to the necessity for registration. I am trying in all these sections to see how it would bear on the case of a limited company, and if a limited company were in existence and could register itself at the time of the passing of this Act it would follow that it might remain for all time, if for all time it were profitable to carry on that business. Of course, with regard to ordinary and natural persons, in time the existing race of unqualified people would die out, but the unqualified corporation or association which was in existence at that time might go on for ever. The 4th section is: "Any person who at the time of the passing of this Act shall be of full age and shall produce to the Registrar on or before the 31st day of December, 1868, certificates according to schedule E to this Act that he had been for a period of not less than three years actually engaged and employed in the dispensing and compounding of prescriptions as an assistant to a pharmaceutical chemist or to a chemist and druggist as defined by clause 3 of this Act, shall, on passing such a modified examination as the Council of the Pharmaceutical Society, with the consent of the Privy Council, may declare to be sufficient evidence of his skill and competency to conduct the business of a chemist and druggist, be registered as a chemist and druggist under this Act." Then the 5th section is: "The persons who at the time of the passing of this Act shall have been duly admitted pharmaceutical chemists or shall be chemists and druggists within the meaning of the Act shall be entitled to be registered under the Act without paying any fee for such registration; provided, however, as regards any such chemist and druggist, that his claim to be registered must be by notice in writing signed by him and given to the Registrar with certificates according to the schedules C and D to this Act; and provided, also, that for any such registration" the person shall pay a fee.

Lord Justice Bramwell: I do not want to interrupt and I do not object to a critical examination of this Act. I should think it is necessary, although it may be called splitting hairs. I should think it is absolutely necessary; but is the general effect of the Act of Parliament that in future a qualification from the Pharmaceutical Society shall be obtained?

Mr. Wills: Yes, my lord.

Lord Justice Bramwell: And that for the past it shall apply to persons who have got a qualification from the Society or who have been *de facto* carrying on business.

Mr. Wills: That is so, my lord.

Lord Justice Thesiger: It is like that Apothecaries Act of 1815, I think it was, where a future qualification was to be got from the company, but persons actually in practice were entitled to remain.

Mr. Wills: Yes, my lord. Of course it would have been ruin to many people, and it was felt it would not do.

Lord Justice Bramwell: That is the general purport of it.

Mr. Wills: Yes, my lord. Schedules C and D seem to me very strong for showing that "person" in this Act of Parliament, or in this part of it at any rate, could not be intended to mean companies. Schedule C is the declaration of a person who was in business as a chemist and druggist before the Pharmacy Act. It is "I, ——— residing at ——— in the county of ———, hereby declare that I was in business as a chemist and druggist in the keeping of open shop for the compounding of the prescriptions of duly qualified medical practitioners at ———, in the county of ———, on or before the ——— day of ———." Then it is to be signed and dated. Then schedule D, which is a declaration to be signed by a duly qualified medical practitioner or magistrate respecting the person who was carrying on business as a chemist and druggist, is in this form: "I, ——— residing at ———, declare that I am a duly qualified medical practitioner [or magistrate], and that to my knowledge ———, residing at ———, in the county of ——, was in business as a chemist and druggist in the keeping of open shop for the compounding of prescriptions of duly qualified medical practitioners before the —— day of ——." Now, my lord, I do not know whether setting a corporation seal would answer to signing, but it is scarcely reasonable to suppose that the person who drew that was thinking of companies. Of course what he thought of is nothing to the purpose; but it is hardly possible that the Legislature should have used language of that sort if they intended to meet the case of limited companies.

Lord Justice Thesiger: I suppose it will be conceded to you, Mr. Wills, that in a great many of these sections the word "person" cannot possibly include corporations. If you take section 4, "Any person who, at the time of the passing of the Act, shall be of full age——"

Mr. Wills: So, again, where people present themselves for examination. A limited company cannot apply for examination.

Lord Justice Thesiger: Then it will be said that a certain qualification being required, a corporation cannot acquire, they may come within the general prohibition.

Mr. Wills: That is the argument; in fact, that was as I put it just now. If you cannot comply with the Act of Parliament, if you cannot present yourself for examination, by reason of your being incorporated, and be examined, so much the worse for you.

Lord Justice Baggallay: If it had been intended to exclude a corporation nothing would have been easier than to say "no corporation shall keep shop or sell poisons."

Mr. Wills: That is what it would come to. Now here in the 11th section there is a section which must have had its analogue if corporations had been intended to be touched by these Acts. In case of the death of any pharmaceutical chemist the registrar of deaths is to transmit to the Registrar under the Act a certificate and the Registrar is on receipt of notice to make the proper entry in his register. There ought to be an analogous provision that in case of the winding up of a company which had been registered under this Act, under sections 3 and 5 combined, a return should be made.

Lord Justice Baggallay: In the case of death, the executors have certain privileges, have they not?

Mr. Wills: They may carry on, by means of duly qualified assistants, so long as it is necessary to the winding up of the business. There is no provision of any sort or kind touching the case of a company. Then there is evidence of qualification to be given. An annual register is to be published and there again the language seems to show that nobody was thinking of a case like this. He is to make a correct register of all persons registered as chemists and druggists, and the names shall be in the alphabetical order according to the surname. Now, no one can tell what the surname of a registered company is. Where is the Apothecaries' Hall to go—under the "A's" or under the "H's?"

Lord Justice Bramwell: "Apothecaries' Company" they are probably called.

Mr. Wills: Yes, my lord. Is "Apothecaries" the Christian name and "Company" the surname, or *vice versâ*? Now, my lords, then comes section 15, which is, that after the 31st of December, any person who shall sell—that is the section upon which the present action is founded—"any person who shall sell or keep an open shop for the retailing, dispensing or compounding poisons, or who shall take, use, or exhibit the name or title of chemist and druggist or chemist or druggist, not being a duly registered pharmaceutical chemist or chemist and druggist, or who shall take, use or exhibit the name or title pharmaceutical chemist, pharmaceutist or pharmacist, not being a pharmaceutical chemist, or shall fail to conform with any regulation as to the keeping or selling of poisons made in pursuance of this Act, or who shall compound any medicines of the British Pharmacopœia, except according to the formularies of the said Pharmacopœia, shall for every such offence be liable to pay a penalty or sum of five pounds, and the same may be sued for, recovered and dealt with in the manner provided by the Pharmacy Act, for the recovery of penalties under that Act." Then section 16 is the section to which Lord Justice Baggallay called attention just now, which enables an executor or the representatives of a deceased pharmaceutical chemist to carry on business by means of properly qualified assistants so long as may be necessary for winding up, but no longer. Then there are regulations to be observed in the sale of poisons by section 17, which is the section which seems to me to indicate that the sale means, except under the section which has specific provisions, the actual physical act of handing over the counter, and does not point so much to being interested in the proceeds of the sale, because under this section it is provided that nobody shall sell unless the buyer is known to him, or he has a certificate of who he is and so on, and there is a penalty imposed upon the seller, and then it is said that the person on whose behalf any sale is made by any apprentice or servant shall be deemed for the purpose of this section to be the seller. That is not to apply to any legally qualified apothecary supplying medicine to his patient. Then, my lord, section 18 is—"Every person who at the time of the passing of this Act is or has been in business on his own account as a chemist and druggist as aforesaid, and who shall be registered as a chemist and druggist, shall be eligible to be elected and continue a member of the Pharmaceutical Society, according to the bye-laws thereof." Now, my lord, the bye-laws of the Pharmaceutical Society contain, of course, no provision for including companies or corporate bodies in any way on their list, or giving them any privileges through their recognized officers. Therefore, that is a section which again shows that we are thinking of natural persons. Then there are other sections. The following sections relate to the qualification for persons being elected on the Council of the said Society, which comprehends every person who has been in business on his own account as a chemist and druggist and so forth at the time of the passing of this Act. Of course, they do not mean these to include corporations under the word "person." In the 22nd section, again, there are provisions made that a certain fund which belongs to the said Society shall be applied to the use of distressed members and their widows and orphans and also for all persons who may have been and have ceased to be members or associates of the said Society or who may be or have been duly registered as "pharmaceutical chemists or chemists and druggists, and the widows and orphans of such persons." Of course, nobody supposes that a limited company or corporation would be intended to be included under that. Now, my lords, I really think I have drawn your attention to all the passages which are material in this Act of Parliament. I wish to admit the full strength of the argument *ad inconvenientem*. My construction shows that an amending Act is necessary to make this Act perfect, because there ought, of course, to be some provision for insuring that limited companies, if they carry on this business, should be properly qualified societies. There is this protection, that the person who effects the sale would be liable in one construction of the Act, if "sale" means as I have been submitting it does, the act of the person who receives the money and hands the thing over the counter; then there would be that protection, and he must be a regularly qualified assistant, or he would be liable to the penalties, and I grant that the protection is not complete.

Lord Justice Thesiger: I suppose you would say that any person who shall sell in the 15th section does mean the person actually selling.

Mr. Wills: I think so. My reason for thinking so is that section 17 contains a specific declaration of what the word seller means.

Lord Justice Thesiger: In that particular case for the purposes of that section the person on whose behalf the sale is made is to be deemed to be the seller, which you say seems to show that in the 15th section it does mean the actual seller.

Mr. Wills: I think so, my lord. That is how it strikes me.

Lord Justice Thesiger: And "for the purpose of this section," that is the 17th, "the person on whose behalf any sale is made by any apprentice or servant shall be deemed to be the seller." That seems rather to point out that in the 15th section it means the actual seller.

Lord Justice Baggallay: The 17th is much more sweeping. It covers wholesale dealers as well as retail.

Lord Justice Bramwell: I suppose in this 15th section, the words must be read in the same way in the plural, that is "from and after December 31, 1868, any person or persons ——"

Mr. Wills: Yes, my lord.

Lord Justice Bramwell:——"who shall sell or keep an open shop, or who shall take, use or exhibit the name or title of chemist and druggist, or chemist or druggist, not being a duly registered pharmaceutical chemist or chemist and druggist." You are to read it in the plural.

Mr. Wills: Yes, my lord.

Lord Justice Bramwell: How would that be? A. and B. are in partnership. A. is within the Act and is qualified. Are they both liable for penalties, or is B. liable?

Mr. Wills: Unless you read the Act in the same way that Lord Mansfield did, in that case it would be so. Lord Mansfield's case rather seems to be an authority in point if that question were to arise.

Lord Justice Bramwell: If it is held that if A. and B. are in partnership, A. is not liable if B. is qualified, and B. actually sells; then why not hold that neither A. nor B. is liable if neither A. nor B. sells, but C. their qualified shopman does?

Mr. Wills: I do not feel pressed by the word "sell," my lord, but I feel pressed by the words "keep open shop," because I cannot get out of that in the same way. It seems very difficult to say that my shopman or assistant is the person keeping open the shop.

Lord Justice Bramwell: Yes.

Lord Justice Thesiger: Then there is rather a strange construction if the person "who shall sell" means "actually" sell, and the person who keeps open shop means the master. There is nothing to hit the master apparently if he keeps a person who is not qualified.

Mr. Wills: There is nothing.

Lord Justice Thesiger: The person himself may be hit, but as the boy you spoke of just now and not the master.

Mr. Wills: It is the fact, my lord.

Lord Justice Bramwell: It is a curious expression, "Keep open shop." One would think that if they did it on the sly and did not keep open shop they would not be liable.

Mr. Wills: I think what they meant was to distinguish it from the case of the physician or medical man or apothecary making up his own medicines for his own patients. If that is what is meant I do not know. That is one of the sections that made me think that this Act of Parliament really was passed rather in the interests of the pharmaceutical chemists than in the interests of the public as to a considerable part of it, because there is no provision in this Act of Parliament except about the sale, if it has the limited meaning I suggest. There is no provision that would hit the case of a man keeping open shop by means of unqualified assistants, and I do not think the draftsman was thinking about that. I think he was thinking of keeping poachers off the business.

Lord Justice Baggallay: I suppose at the time this Act was passed, the idea had not struck anybody of persons being formed into a company to carry on the business of druggists?

Mr. Wills: It had been done for some time.

Lord Justice Baggallay: But no company had been formed for the purpose of this business.

Mr. Wills: Probably not for this purpose; but I am told the stores were already in existence and were beginning to carry on this business.

Lord Justice Baggallay: As early as 1868?

Mr. Wills: I am told so, my lord. It is a thing I do not know myself, but I inquired, and I was told that the Civil Service Supply Association, which was the earliest, began business in 1866. But substantially, your lordship is right.

Lord Justice Bramwell: Might not some of those societies at Oldham have been in existence at that time—the Pioneers?

Mr. Wills: They were in existence a long time ago. They are mentioned in Mr. Matthew Hill's life, which is much earlier.

Lord Justice Bramwell: There may have been—I do not know—not what is called a co-operative company (that is to say stores for the benefit of the customer rather than of the store); but there may have been a company that carried on business for profit, might there not, and sold drugs?

Mr. Wills: I should think so. I do not know. I believe, my lord, that Apothecaries' Hall is in that point. There is no doubt about that.

Lord Justice Baggallay: They are under a charter.

Mr. Wills: Yes, my lord; but if the construction contended for by the respondents is right here, their charter does not save them from this Act in any way. They are liable. It is almost a *reductio ad absurdum.* I do not think, my lord, I have much more to say, and I will reserve anything else I have to say for my reply. I submit it is really a *casus omissus.* I do not shrink from the suggestion that there are inconveniences.

Lord Justice Bramwell: You are bound to admit that if they had thought of it they would have put in companies; but they would have put in something you say which would have exempted them.

Mr. Wills: That would not, to use a vulgar expression, have "squelched" them altogether. This is an Act which prevented limited companies carrying on business as chemists and druggists altogether.

Lord Justice Bramwell: One word before you sit down or before you finish. Somebody ought to tell us what the court below said.

Mr. Wills: I beg your lordships' pardon. I was forgetting that. The case is reported.

Lord Justice Bramwell: They are subjected to a penalty. Is there any provision here or does it point to some general Act as to what is to be done with the penalties?

Mr. Wills: Yes, my lord. The penalties are provided for.

Lord Justice Bramwell: The penalty is to be levied on the goods and chattels, I suppose.

Mr. Wills: Yes, my lord. That is in the Pharmacy Act which is amended by this Act.

Lord Justice Bramwell: What is to happen if they have no assets on which the fine could be levied?

Mr. Wills: I do not think that is provided for. It is a county court execution. You may summon them. You might commit them to prison. County courts have that power.

Lord Justice Bramwell: How was the penalty recoverable? Is it recoverable in the county court under the Pharmacy Act?

Mr. Wills: Yes, my lord. It is section 15 in this Act which I have been calling your lordship's attention to, which gives the penalty. It says—"the same may be sued for and recovered and dealt with in the manner provided for in the Pharmacy Act" (that is the 15th and 16th Vic. cap. 61). Section 12 of that Act is this—"From and after the passing of this Act, it shall not be lawful for any person not being duly registered as a pharmaceutical chemist according to the provisions of this Act to assume or use the title of pharmaceutical chemist or pharmaceutist in any part of Great Britain, or to assume, use, or exhibit any name, title, or sign implying that he is registered under this Act, or that he is a member of the said Society, and if any person not being duly registered under this Act shall assume or use the title of pharmaceutical chemist or pharmaceutist, or shall use, assume, or exhibit any name, title, or sign implying that he is a person registered under this Act, or that he is a member of the said society, every such person shall be liable to a penalty of £5, and such penalty may be recovered by the Registrar to be appointed under this Act in the name and by the authority of the said Society in manner following, that is to say: In England or Wales, by plaint under the provisions of any Act in force for the more easy recovery of small debts and demands." Then by section 14, "All and every sum and sums of money which shall arise from any conviction and recovery of penalties for offences incurred under this Act shall be paid as the Commissioners of Her Majesty's Treasury shall direct." Now, my lord, of course the only way of enforcing that would be by the county court process—that is primarily by *fi. fa.*

Lord Justice Bramwell: That does not tell either one way or the other. Undoubtedly, corporations are subject to county court process.

Mr. Wills: Yes, my lord.

Lord Justice Bramwell: Now what did the court say?

Mr. Wills: I have the Pharmacy Act here, but I think I have said enough about what the original Act was. I did call your attention to the fact that this is an Act amending that Act—that that Act began by small beginnings, and the only prohibition there was against using the title. Your lordships will find I am sure, on looking through that statute—the original Act—I will not repeat the process, but by going through it section by section, I think it is impossible not to say that the notion of a corporate body or a limited company was not in the mind of the framer of the Act or of the Legislature when it passed that Act, and therefore presumably, this Act was intended to cover the same ground as that.

Lord Justice Bramwell: I do not know that there is anything in it; indeed, I think there is not, to say the truth, but by section 16 of the first Act a false declaration is made a misdemeanour on the part of the person making it. A corporation could not in its corporate capacity be guilty of a misdemeanour, could it?

Mr. Wills: Of some misdemeanours they can.

Lord Justice Bramwell: But they could not be guilty of the misdemeanour of making a false declaration.

Mr. Wills: No, they could not, because that implies a false mind. My lord, the case in the court below is reported in 4 Q.B.D., 313, but it is also much more fully reported in the *Pharmaceutical Journal*, which has done great justice to every one of the arguments on each side, I am sure. The Lord Chief Justice says this was an appeal from the decision of the judge of the Bloomsbury County Court.

Lord Justice Bramwell: I think you may omit the statements of facts.

Mr. Wills: Yes, my lord.

Lord Justice Bramwell: "Upon this state of facts the question presents itself," that is the middle of page 89.

Mr. Wills: Yes, my lord. "Upon this state of facts the question presents itself whether the defendant company as such is amenable to the penal enactment of the statute."

Mr. Lumley Smith: The constitution of the company, my lord, is, I think, worth a little attention, at the end of the first column.

Mr. Wills: I think that is mere matter of prejudice. It is what I have already stated. I said a person named Mackness, who carried on business as a chemist and druggist, thought it would suit his purposes to become a limited company.

Mr. Lumley Smith: He was a grocer.

Mr. Wills: I told the Court so. He got certain persons to take the requisite number of shares to make a limited company of it. They added to the business of grocers the business of dispensing chemists. I could not state it, I think, with less prejudice. I do think, both with regard to my learned friend the Attorney-General and Mr. Lumley Smith, it was a little unworthy of them in the court below to say so much about that, because really it cannot influence the judgment of the Court in any way in one way or the other. This is a limited company. It is within the provisions of the Limited Act.

Lord Justice Bramwell: Of the law of the land.

Mr. Wills: Yes, my lord. Whether Mr. Mackness was a very wicked person in bringing himself within the law or not, it did seem to me a little bit unworthy of my friends, the Attorney-General and Mr. Lumley Smith, to say so much as they did in the court below about it. It is either right or wrong.

Lord Justice Bramwell: Do not say unworthy—not dignified.

Mr. Wills: The learned judge says: "It was fully admitted on the argument, nor could it be contested, that if this had been an ordinary partnership the individual partners—at all events such of them as were not qualified under the statute—would have incurred the penalties which it imposes."

Lord Justice Bramwell: Was that admitted?

Mr. Wills: The only observation I have to make with regard to that, in excuse of myself for not contesting it more strongly, is that I was not aware of the case in Burrows, and it did seem to me that under the language of the Act of Parliament that that did follow, and that any unqualified person being associated as partner with a qualified person would still be keeping open shop without being qualified. But the court below had not their attention called, as they ought to have had, to the case in Burrows, which I referred to.

Lord Justice Bramwell: I am not sure that would have helped you, because there the court held that the man was not within the Act of Parliament because he did not carry on the mystery of brewing.

Mr. Wells: Yes, my lord.

Lord Justice Bramwell: But how could it be said of you as a corporation of the different members of the partnership—would not one as much as the other have kept open shop?

Mr. Wills: I should have thought that the man who exercised the trade of brewing did keep open shop if he were interested in it.

Lord Justice Bramwell: The art and mystery he exercised was not that of the trade of a brewer, but of making beer, was it not?

Mr. Wills; No, my lord, the trade of a brewer. "Set up, occupy or exercise any craft, mystery or occupation without being apprenticed." It was alleged in the declaration that he set up——

Lord Justice Bramwell: That must be something that relates to any dealings with other people.

Mr. Wills: Yes.

Lord Justice Bramwell: They held that he was not within the Act of Parliament, because although he sold beer as much as the other man, he did not make it.

Mr. Wills: Yes, my lord. The court, therefore, were justified in saying that I did not contest, as I probably should have done, if I had known of that case at the time, the proposition that the individual partners, at all events those not qualified under the statute, would all have incurred the penalties. "The intention of the Legislature appears clearly to have been to prevent any shop or establishment to exist for the sale of poisons, except under the immediate superintendence and control of a duly qualified proprietor. It is not enough that the proprietor employs a qualified person to manage the business. The master must himself be duly qualified."

Lord Justice Bramwell: Here again, is that so?—"Except under the immediate superintendence or control of a duly qualified proprietor." Is it to be said that if a duly qualified proprietor were ill and confined to his bed for six months, that he would be subject to penalties under this statute?

Mr. Wills: I do not think he would be subject to penalties if he never went near the place, if he owned the place.

Lord Justice Bramwell: So long as he was qualified.

Mr. Wills: He might have a number of unqualified assistants. It is a most incomplete Act.

Lord Justice Thesiger: That is assuming "the seller" means that, and even if it does not, even if it means the actual seller, still the master might leave his business entirely, so long as he is qualified; he might take no part in it for years.

Mr. Wills: It is a mistake to treat an Act of Parliament like that, drawn so carelessly in the interests of the public, as one as to which there is any difficulty in saying that there is a *casus omissus*, which has not been provided for. Then his lordship says, "The master must himself be duly qualified. Two parties could not combine to carry on the joint business of grocer and chemist, though the one attending to the latter department of the business might be a qualified chemist. There would be nothing to ensure in such a case that in the absence of the qualified partner the other might not take upon himself to act in his stead, and thus the security against fatal mistakes in the dispensation of medicines which the statute was intended to insure might be seriously compromised. The defendants are therefore within the scope of this legislation."

Lord Justice Bramwell: That is another difficulty. I do not say it is not right; but you do not accede to that, because, according to that, if there were two partners in a private co-partnership, one entirely qualified, and the other not, both of them would be liable.

Mr. Wills: Yes; both of them would be liable.

Lord Justice Bramwell: Because they would be persons keeping an open shop for the sale of drugs without such persons being qualified.

Mr. Wills: Yes.

Lord Justice Bramwell: It constantly happens, as everybody must know, that in country towns the business of a chemist is very rarely carried on separate from some other business.

Mr. Wills: It generally is in a grocer's shop in very small towns. What would you say to the case of a person who lent money on such terms as would constitute him a partner without a qualification. He would be within this legislation. "The defendants are therefore within the scope of this legislation; the case comes within the evil against which the statute was intended to provide a remedy. But they are said not to be within the statute as being an incorporated company, the main ground on which this contention rests being that the Act in question, in its prohibitory as well as penal clauses, uses the term 'person,' a term which it is contended cannot be properly applied to a corporate body. The objection thus founded on the use of the word 'person' in the penal clauses of the Act would seem at first sight to present some difficulty; but when the scope and purpose of this legislation are taken into account the difficulty does not appear to be insuperable." So that at all events I have the satisfaction of having made some impression on their lordships in that direction and showing that there was a difficulty. "Reliance was placed by the Attorney-General, in his argument in support of the appeal, on the enactment of the 14th section of the 7 and 8 Geo. IV., cap. 28,"—that is the one I read to your lordships, which provides that in respect of offences punishable by indictment or summary conviction "persons" shall include a body corporate. "But that Act," says the learned Chief Justice "is expressly confined to proceedings on indictment or summary conviction, and therefore cannot apply here where the proceeding is by civil action. It shows, no doubt, the disposition of the Legislature to include corporations under the general designation of person or individual in penal statutes, but the terms of the Act will not admit of its application to the present case." I think I might very fairly say it shows something else; it shows that the Lord Chief Justice felt that there was a necessity for such a definition where they intended so to deal with the matter. "To solve the question, we must therefore confine our attention to the statute itself on which this action is brought. That an incorporated company is within the mischief against which this legislation was directed is, I cannot help thinking, quite obvious." There, of course, I agree. "If a company, by reason of its being incorporated, is not within the provisions of the Act and amenable to its penalties, and effect is to be given to the argument of Mr. Wills, it necessarily follows that such a company might openly carry on the business of chemists and druggists and sell poisons without a single member of the company or even the person employed to conduct this portion of the business being qualified." There, my lord, the only criticism I venture to make on that sentence is that there, again, the Lord Chief Justice is dwelling upon that person, a member of the company, which seems to me to have really nothing to do with it. "The person actually selling the poisons might be amenable, and it was probably with a view to avoid this that, in the present instance, a qualified person was employed to manage this department of the defendants' business; but the company employing him would enjoy complete immunity. A person desiring to combine the business of a chemist and druggist with that of a grocer would have only to get one or two persons to join him, providing them with a share or two, as appears to have been done in the formation of this company, and so forming an incorporated company, to set the statute at defiance. It cannot be supposed that the Legislature can have contemplated a result so entirely at variance with the policy and purpose of the Act, or intended to place incorporated companies on a different footing in this respect from that of ordinary partnerships or individuals. It is, no doubt, possible that, although joint stock companies existed at the time this statute was passed, the formation of such companies for the purpose of combining trades hitherto carried on singly, and among other things for that of superadding the business of the chemist to that of the grocer or provision merchant, may not have been present to the minds of those who framed and passed this statute. Still, if the case, though unforeseen, is within the mischief which the Legislature had in view, and the enactment is large enough to embrace it without any forced or strained construction being put on the language of the Act, it is our duty to advance the remedy intended to be afforded. It is true that the term used in the first section of the Act is 'persons,' and that, ordinarily speaking, this word would not be applicable to a corporation." Therefore the court below seems to have thought at all events that, to take Lord Coke's remark in its integrity, "a person" ordinarily included corporation in Acts of Parliament. I ought to say, in justice to the court below, I take blame to myself. I do not think I understood the case quite so well then as I do now, and I did not point out to their lordships nearly so fully as I have done to-day the extent to which that habit of interpreting "person" to mean corporation had prevailed in modern legislation. I did point out to the court the Judicature Acts and the case of the Public Health Act of 1848 and the Public Health Act of 1875, but all these other cases I was not aware of. I did not expect to meet with quite so much difficulty on this subject. I had formed too sanguine a view of this case and did not point out to the court the ingrained habit of modern legislation. Besides the Acts I have mentioned, the same thing went on down to the Bankruptcy Act of 1869, which I forgot to mention just now. "But when the meaning and effect of the enactment is looked at without too close an adherence to its precise phraseology, it amounts to no less than a general prohibition to everyone not qualified according to the Act from dealing in poisons or carrying on the business of a chemist and druggist. The fallacy of the argument urged on behalf of the defendants is, that it assumes that the prohibition is addressed to individual persons; but the provision, being universal, must extend to all persons, whether acting in an individual or corporate capacity." Now, my lord, that is not quite a just representation, I think, of my argument, because if I had been properly understood below, I certainly did not mean to say that. What I meant to say was, looking at the Act altogether, see if you cannot detect that the notion of a corporation never was present to anybody's mind when it was passed. I certainly did not say that the Act assumed that the prohibition was intended for individual persons. I have no doubt the prohibition was supposed by the person who drew the Act to cover all cases that needed prohibition. "The defendants, it is true, in thus infringing the law, are not acting in their individual capacity."

Lord Justice Bramwell: If I understand that question I should have thought it meant this: the provision, being universal, must extend to all persons, whether acting in an individual or corporate capacity in this sense. Very well then, if you are members of a corporate company, yet if you are the people who keep open shop, and are not qualified, you are personally liable.

Mr. Wills: Yes, my lord, perhaps that is it.

Lord Justice Bramwell: Of course, you would not mind. You might be open to another proceeding; but that seems to me to be the proper consequence of what his lordship says there.

Mr. Wills: What appears to me must be meant is this: that persons who join together for the purpose of doing that which the Legislature have prohibited, would be hit in their individual capacity; but a person who was a member of a corporate body, which might or might not do wrong, unless he joined in the result, and did the wrong thing, I think could not be liable.

Lord Justice Bramwell: You cannot maintain an indictment against a corporate company for libel, can you, or can you not? I forget how it has been decided.

Mr. Wills: I think not, my lord. There was a good deal of discussion on that in the court below; but I think we could not find any case in which it had been held.

Lord Justice Bramwell: Suppose an Act of Parliament says any person publishing a libel should be subject to three years' imprisonment—suppose a publication by a company—there are corporations for the purpose of publishing a newspaper. The persons actually concerned in the publication of the libel, although they were corporators, would be within the statute.

Mr. Wills: I think so, if they were actually concerned in it so as to be principals, my lord.

Lord Justice Bramwell: There could not be a doubt about it.

Mr. Wills: In that case there could not be a doubt about it; it would not matter whether they were corporators or not. But if all they did was that they held shares in a company which published the *Times* or some other paper, I should not think that would make them individually liable.

Lord Justice Bramwell: I should think not. I think the consequence of what his lordship says here would be that all persons were addressed by the prohibition, and that they might say very well it is addressed to them, whether corporators or not.

Mr. Wills: I think that is so. Then his lordship goes on: "The defendants, it is true, in thus infringing the law are not acting in their individual capacity, and may not—but on this it is unnecessary to pronounce any opinion—be liable individually. But in their aggregate or corporate capacity they are breaking the law;"—that is the question;—"and being in the latter capacity, as well as individually within the prohibition, they must, if capable of being sued for it, be also amenable to the penalty, and must for this purpose be taken to be sufficiently persons within the meaning of the statute." There, my lord, I do not quarrel with that. If the penalty has been incurred they can be sued for it, but it does not advance the consideration of the question of whether this Act of Parliament really did touch the case of a corporate body. "The fact so strenuously insisted on by Mr. Wills, that in other sections of the Act the word 'person' is applicable to individual persons only, and not to a corporate body, only tends to show that the adoption of the business of chemists and druggists by incorporated companies like the present was not contemplated when the Act was passed." That is a good deal of what I have been saying, my lord.

Lord Justice Bramwell: That will not show that somehow or another, therefore, the Legislature has made provisions for a thing which was not contemplated. It may be so.

Mr. Wills: "It by no means shows that the prohibition being general and the mischief clearly within the statute the company, though as such they may be incapable of complying with some of its requirements, as for instance, to undergo examination under section 6, ought not to be held to be within the penal clauses of the Act, or should be allowed openly to break the law under the belief that they are beyond its reach. In the present case it so happens that a member of the company and who manages the chemical department of its business, Mr. Henry Edward Longmore, is a qualified chemist. But it is not as a member of the company that he so acts, but as the paid servant of the company." I venture to think that there there is the same fallacy, if I may respectfully say so, running through his lordship's judgment; that the fact of the individual members being qualified or not qualified had anything whatever to do with the matter in hand. "It is clear, therefore, that his being qualified will not exonerate the other members of the company who are not so. Nor would it be otherwise even if it were as a member of the company that he so acted. So long as any of the company are disqualified, the body is disqualified, and the one who, though himself qualified, acts for the body becomes a party to their offence, and becomes liable conjointly with them. The qualified chemist who, in partnership with a grocer, carried on the business of grocer and chemist would be as liable to the statutory penalty as his unqualified partner." That is the proposition your lordship was putting just now. Now, my lord, the rest of the judgment I do not think I need trouble your lordship with, for this reason. It turned on a point which I was very unfortunately misunderstood by the learned Chief Justice as taking, and upon which he stopped me in a very early part of my argument, and delivered judgment in my favour. Then the Attorney-General was heard upon it; it was a point I had not meant to take, and I had not meant to take it because I did not think it was tenable. It led to a very long discussion, and a very long argument indeed, by the Attorney-General, who disposed of it, having asked for leave to appeal. He then began again, and slew the warrior that I had never put in the fore-front. The point which was taken—it must have been my fault for so expressing myself—was this. His lordship said in terms: You have just struck the right chord; but I did not think I had. He understood me to contend that a corporate body could not be indicted or proceeded against summarily. I will not read it, but his lordship delivered judgment in my favour on that point on an earlier day. I could not get up and say I had not intended to take that point. I was never so embarrassed in my life. The Attorney-General then asked for leave to appeal, and after having asked for leave to appeal, the Lord Chief Justice invited him to a consideration of the point he had just dealt with, and the Attorney-General spent two or three hours in arguing that point. It never struck me to take that, because one has had so many cases in which one has had either to prosecute or to defend companies for misdemeanours, and I have had so many cases in the Court of Queen's Bench in which I have had to deal with summary convictions of companies.

Lord Justice Bramwell: This is an action to recover a penalty in the county court. Did the court at first say that a corporation could not be summoned?

Mr. Wills: Could not commit an offence so as to be subject to any penalty. They treated this as an offence. They said it was a breach of the statute, and therefore an offence, and I think for the moment the fact that it was a proceeding in the county court was a little lost sight off, and the learned Lord Chief Justice did really deliver judgment in my favour on that point, which I had not taken, that a corporate company could not be guilty of an offence, and could not be proceeded against, either by indictment or by summary conviction. The remainder of the judgment goes to that point, and therefore I do not trouble your lordship with any observations upon it.

Mr. Lumley Smith: My lord, I have an application to make on behalf of my learned friend the Attorney-General. He is anxious to be allowed to support this judgment, but he is still occupied at the Old Bailey by that case which is going on, and he wishes to ask the indulgence of your lordships if you will, after my learned friends have been heard to-day, allow him to be heard on Wednesday. I am told there are very few interlocutory matters.

Lord Justice Bramwell: Would you like it before you address us youself?

Mr. Lumley Smith: I do not think it will be necessary for me to say much to your lordships.

Lord Justice Bramwell: I think we are bound to accede to that application.

[Adjourned for a short time].

Mr. Wills: If your lordships will allow me, I will just hand in a portion of the argument and discussion to which I was referring just now, from which you will see that I was well founded in the definition I gave of that portion of the judgment to which I referred. Now, my lords, I propose to call your lordships' attention to Mr. Justice Mellor's judgment:—"I have come, with considerable hesitation, to the conclusion, that our judgment should be for the plaintiffs, and that both questions submitted to us must be answered in their favour. I was for some time inclined to think that the circumstances of the defendants' case were not within the contemplation of Parliament when the Pharmacy Act, 1868, was passed, and that although clearly within the mischief intended to be provided against, words sufficiently comprehensive had not been used in framing the Act to include the acts of the defendants, and that, consequently, it became a *casus omissus*. A fuller consideration of the provisions of the Act 31 and 32 Vic., cap. 121, has, however, brought me to the same conclusion as that expressed by my Lord Chief Justice in his judgment in this case. I think that the great object of the Legislature was to prevent the sale of poisonous or dangerous drugs by persons not qualified by skill or experience to deal in such commodities. It, therefore, proposed to form into one association all persons who for the future should alone be deemed to deal in the same, and who should be registered under the provisions of the Act which we are now considering. It accordingly provided for the interests of all chemists and druggists who had been in business as such previously to the passing of the Act, but with regard to the future it made careful provision for the examination and registration of all persons who should in future form the only qualified body of persons who should be permitted to keep open shop for the retailing or compounding of poisons, and I now think that the sections which mainly embarrassed me as to the extent of the prohibitive sections are really, when carefully considered, only the provisions regulating the steps which in future are to be taken by all persons who desire to obtain the privilege of keeping open shop and retailing, dispensing or compounding the poisonous drugs in question, and who, upon being registered as pharmaceutical chemists, or chemists and druggists, within the provisions of the Act, will become qualified so to do. To incorporate such a society, to whose members in future the sole privilege of keeping open shop as chemists, or chemists and druggists, for the sale, or dispensing or compounding poisons should be intrusted, rendered it necessary to prohibit all other persons, not so registered or qualified, from keeping open shop or retailing, dispensing or compounding such drugs for sale, and from assuming the title of pharmaceutical chemist, or chemist and druggist, and, therefore, whilst one set of sections are qualifying and intended to regulate for the future the mode in which persons should become qualified as members of the association, and to provide for the government of the body incorporated, the sections 1 and 15 of the Act which contain the prohibitory words, upon the meaning of which we have to decide, have an entirely distinct effect The object of those sections is absolutely to prevent the danger assumed to be likely to arise to the public by the keeping open shop for the retailing, dispensing or compounding poisons, by any persons not being qualified pharmaceutical chemists, or chemists and druggists, and the intention and scope of those sections and the general object of the Act is absolutely to exclude, from the time of the passing of the Act, all persons other than the registered members of the Pharmaceutical Society from keeping open shop or retailing, dispensing or compounding of poisons. Now, before the passing of the Act, 1868, all persons, whether 'natural persons' or 'artificial persons' constituted by incorporation for trading purposes, might either as individuals or as corporations have kept open shops and retailed, dispensed or compounded poisons. It was essential, therefore, to the effectuating the objects of the Act, that all persons, whether natural or artificial, should for the future be prevented from dealing as before in the prohibited matters; and the cases cited by the Attorney-General in his argument show that an incorporated company may commit an offence either of nonfeasance or misfeasance, and may be punished by indictment for the same as if the act had been done by a natural person. We may well, therefore, interpret the word 'person' in the 1st and 15th sections so as to include not only any natural person, but any artificial person created by the law, which would be capable of committing the offence referred to in the 15th section, as having committed it by the course of proceeding actually adopted by the defendants; and we are authorized upon the principle of decided cases to say not only that the 'offence' has been committed by the defendants, but that they are liable to be punished for it under the provisions of the 15th section."

Lord Justice Bramwell: I think the effect of my brother Mellor's judgment is this, every person, including corporation, is every body; it may be there are no clauses enabling a corporation, but the prohibition including corporations is every body. Under this it may be there are no provisions which will enable a corporation to qualify.

Mr. Wills: Yes, my lord.

Lord Justice Bramwell: Then you are liable to a penalty. That is the effect of my brother Mellor's judgment.

Mr. Wills: It is what I put before under the head of "so much the worse for you." The prohibition is general; the means of getting out of that prohibition are such as are inaccessible to a corporation—so much the worse for the corporation.

Lord Justice Bramwell: So much the worse for you if you cannot carry on that business.

Mr. Wills: Of course that may be so. The only thing I have to observe on that judgment—which of course is perfectly logical, if that is the intention of the prohibition; there it is and one cannot quarrel with it,—the only thing I have to remark is that it really takes no notice of the argument which I addressed to the court below, and which I have repeated to-day, which at all events, deserves to be disposed of in some way or other. It does not take the slightest heed of the fact that there are very numerous Acts of Parliament about this time which do treat the word "person" as requiring that kind of definition if it is intended to include it, and it gives the go-by altogether to everything that was said on the particular Act itself. Of course I do not complain of that; all I mean is, it does not dispose of the argument.

Lord Justice Bramwell: It takes no notice of this argument, as it seems to me, which would be of very little use to you, except in so far as this particular case is concerned, that if the statute hits you it hits you personally, the particular vendor, the man who does it. A., B., C. and D., keep open shop in the name of the corporation of something Supply Company, and therefore they are guilty of an offence.

Mr. Wills: There again that rather begs the question.

Lord Justice Bramwell: That may give you success in this case, that argument.

Mr. Wills: I venture to dispute the correctness of that proposition, that A., B., C. and D, keep open shop. I do not think they do. It is the incorporated company.

Lord Justice Bramwell: If the incorporated company publish a libel on A. B.?

Mr. Wills: That will not render the individual members liable.

Lord Justice Bramwell: Would it not in a criminal case? I should be sorry to think that.

Mr. Wills: If the purpose for which the corporation exists is that of publishing libels, granted; but, if I take shares in a railway company, for instance, and the railway company publish a libel in its report on one of its servants, it would be very hard to hold me criminally liable. I always thought that was the safeguard persons got in becoming members of a corporation, that they sink their individual essence. Of course, if they have personally interfered; for instance, the director who votes for a resolution that a libel shall be published, he is liable.

Lord Justice Bramwell: That is what it means.

Mr. Wills: But, as it seems to me, the individual corporator is not.

Lord Justice Bramwell: Certainly not the individual corporator.

Mr. Wills: I should hardly think so. I did not quite appreciate a good deal of this discussion. I have been all along in a great difficulty with regard to a great deal of the discussion which took place in the court below which was raised by the court as to the individual corporators. I have always felt a difficulty in dealing with it because the thing seems so clear.

Lord Justice Bramwell: I do not think it is an unimportant consideration, for this reason. Suppose that the penalty, if any, is incurred by the individual, and that A., B., C. and D. are the persons who are actively keeping the shop open, then A. may be a perfectly qualified person. Well, if it were a private partnership, and A.'s qualification would exonerate, you say it ought; but here, if A.'s qualification would not exonerate, then you come to what I cannot help considering a preposterous condition of things—that is to say, that A., B., C. and D. may carry on the business, A. being perfectly qualified, A. being always there, B., C. and D. being dormant parties, and not being there, and yet they are all liable te a penalty; whereas if A. were perfectly qualified and carried on the business alone and never came near the shop, and his assistants were not qualified, they would not be liable.

Mr. Wills: It is so. It seems almost a *reductio ad absurdum*.

Lord Justice Bramwell: It justifies one in saying that possibly some such consideration as this arises, whatever may be the mischief of the Act of Parliament the Legislature either has not hit it in every case or has hit it much too hard

Mr. Wills: Yes, my lord. In fact, my lord, it seems to me one is justified in saying that with so imperfect a piece of legislation that a view which is rather based on the assumption that it is a perfect piece of legislation intended to meet all cases and to meet them adequately is hardly just. It is a piece of—one does not like to say blundering legislation, because it is not one's business to rail at what the Legislature has done—but a piece of imperfect legislation, and in which, it is no injustice to say, there is an important class of cases which has escaped the attention of the Legislature, and as to which the Lord Chief Justice seemed to think my remark was very well founded, when I said it was very much better to allow the Legislature to remedy mistakes they have made than to strain Acts of Parliament in order to meet cases which might very probably have been meant to be met, but which are not met, as you find in this particular case. This is the result, that by straining the Act of Parliament to comprehend this case you do indirectly a great deal more than what you can credit the Legislature with, and you do that which I venture to say in 1868 could not have been done, and I am sure the Attorney-General, in his capacity as a member of the Legislature, would never propose to-day to the Legislature to do, namely, to shut up all these societies. With these observations, I leave the case in your lordships' hands.

Mr. Finlay: I am with my learned friend, Mr. Wills, and I do not propose to add very much to what has been said. Our proposition in the first place is this, that if there is an enactment that no person shall do a thing unless he complies with a certain condition, and that be one which in the nature of things a corporation cannot comply with, that the word "person" in the enactment is not to be read as including a corporation. A great deal was said in the court below about the passage in the 2nd Institute, and that was relied upon as laying down a general rule, that "person" is to include corporation. Apart from the authority of the passage,—and it is not a decision, it is a mere dictum by Lord Coke in his capacity as text writer,—but apart from that it is not a a general dictum such as is supposed, as appears from an examination of the language of the passage. It is a mere dictum as to the construction of the particular statute. The statute is one that relates to the erection of hospitals by any person seised in fee.

Lord Justice Bramwell: I do not think you need trouble yourself about that. I am not going to say anything disrespectful of Lord Coke at this time of day, but it is such a long way beside the present question. I see the court did not rely on it, and it is not necessary to go into it.

Mr. Finlay: Not in the judgment, my lord, but a great deal was said about it in the course of the argument. When one looks carefully at the passage, it will be seen that it does not even affect to lay down any general proposition.

Lord Justice Bramwell: All Lord Coke says is that "person" may mean corporation.

Mr. Finlay: In this statute. The word in the passage is that it includes corporations as a rule. I think when one looks at the passage critically that that is the result. I am not going to trouble your lordships by discussing it further after what has been said.

Lord Justice Thesiger: Would your argument go as far as to contend that in modern times "person" without any interpretation clause, cannot mean a legal as well as a natural person?

Mr. Finlay: I do not think it is necessary for me to say that. All that I say is that in deciding whether "person" includes corporation, one must look at the matter of the statute and at the context, and if it appears from the context that the provisions and conditions imposed are conditions that corporations cannot possibly comply with, then "person" is not to be read as including corporations. That was strongly illustrated in a case in the first Leach Crown Cases, page 180—arising on a statute of George II.—Harrison's case. The judges were dealing with the statute of George II. against forgery, and that provided against forgery with intent to defraud any person. The judges decided the word "person" there would not include a corporation, so that the intent being to defraud the Bank of England, a pardon was granted, on the opinion of the judges. The head note is this, after referring to another point in the case, as to the entry of the receipt of money under the statute of George II., cap. 22, it goes on thus:—"But that statute did not extend to cases where the offence was committed with intent to defraud a corporation until the 18 George III., cap. 18." That is certainly a very strong case indeed to show that the word "person" does not necessarily include a corporation. If one were to remark on the case as decisive, instead of it being the rule that "person" includes corporation, one would say the rule is the other way, because certainly the case was positively within the mischief the statute intended to deal with. Then, my lords, the Factories Act. It may perhaps be worth while just to mention that, in 6 George IV., cap. 94, the words of the 2nd section are "for advances made on the security of goods by any person or persons, body or bodies, politic or corporate," so that very clearly the Legislature thought it necessary to mention bodies corporate or politic in addition to persons. Then in the 5th and 6th Vic. they use simply the word person without an interpretation clause, providing that person shall include corporations as well as individual persons. So that it is really very difficult to say after such decision that there is any rule of law that the word person is to include corporations. A case was decided upon the Mortmain Act, the case of Walker *v.* Richardson, which I only refer to for the purpose of illustrating that principle, that in deciding this principle the context of the Act must be looked at. That is in 2 Meeson and Welsby, 882.

Lord Justice Baggallay : The context there would include the preamble.

Mr. Finlay : Yes, my lord. Baron Alderson says :—"The statute would seem not to extend to the present case since it speaks in the preamble of improvident alienation or disposition made by languishing or dying persons to the disinherison of lawful heirs," which words are not applicable to bodies corporate. And Baron Parke says :—"The 3rd section must be considered with reference to the enacting part of the section which refers to grant, by any person or persons whatever." That extends only to grants by natural persons. Now, my lord, we come to the question whether this particular statute was meant to include corporations, and I am going to say very little upon it because I think every point has been made already.

Lord Justice Baggallay ;—The reference to the context including the preamble would rather tend to the view that the evil is to be guarded against as much in the case of a corporation as in the case of an individual.

Mr. Finlay : Yes, my lord; but at the same time the preamble would seem to contemplate the case of an individual actually keeping shop in the sense of being there and attending to the business. That is the recital that it is necessary that those who are engaged in keeping shop should have a practical knowledge of the business. And if that is to be referred to, one might say that in aid of the contention that the words "sell" or "keep open shop" in the 15th section are not satisfied unless the master takes some active part in the business. What I was about to say with reference to the statute is this, that the 1st section provides: "It shall be unlawful for any person to sell or keep open shop for retailing, dispensing, or compounding poisons, or to assume or use the title of chemist and druggist, or chemist, or druggist, or pharmacist, or dispensing chemist or druggist, in any part of Great Britain, unless such person shall be a pharmaceutical chemist, or a chemist and druggist within the meaning of this Act, and be registered under this Act." Now, it is impossible for a corporation to be registered under this Act, having regard to the provisions of the Act as to registration. Can it on any principle be contended that if a section of an Act of Parliament says no person shall do a particular thing unless he comply with a particular condition, and that condition is one which in the nature of things a corporation cannot comply with; can it on any principle be said that that enactment is to extend to a corporation ?

Lord Justice Bramwell: Mr. Finlay, your argument is like this. It shall be unlawful for any person to sell or keep open shop unless such person shall do what he cannot do.

Mr. Finley: Yes, my lord; it comes to that. If the word "person" is to be used as including corporation it comes to that.

Lord Justice Bramwell: "Any" person and "such" person are the same. "Such" person is evidently not a corporation, because he cannot be. He cannot be within the scope. But, if "any" person and "such" person is the same, then "person" is not corporation. Q. E. D.

Mr. Finlay: Eliminating what is immaterial it comes to this. No corporation shall keep open shop for the sale of drugs unless the corporation is registered, which no corporation shall be. It is an enactment of that sort. Surely the question whether "person" includes corporation is, to say the very least of it, an open one, and when you find that the provision of the Act is one that a corporation cannot comply with, it leads to the inference that the word "person" does not include corporation. The question is, what is the extent of the prohibition by the Act? With great submission to the judgment of the court below, the question is, what is prohibited—what persons are prohibited—and to start with the assumption that the Act prohibits all persons, including corporations, from doing a particular act, is, of course, to decide the very question under discussion.

Lord Justice Bramwell: Suppose the words had been, "It shall be unlawful for any person to sell," and so forth, "unless such person shall have been bound apprentice and have served his time?"

Mr. Finlay: Then it would have been contended that inasmuch as a corporation cannot be apprenticed they are not entitled to carry on the business. Take another illustration. Suppose it were, "No person shall carry on business unless," as might have happened some years ago, "he first took the oath of allegiance." A corporation could not do that, and therefore the corporation could not carry on the business. That is really the whole case, and I will not say any more about it.

The further argument was adjourned until Wednesday.

The hearing of this case was resumed on Wednesday morning, when the argument for the respondents was commenced by the Attorney-General, as follows :—

The Attorney-General : May it please your lordships, I appear with my learned friend, Mr. Lumley Smith, for the respondents in this case, and I hope to be able to satisfy your lordships that the decision of the Court of Queen's Bench was correct. The question which was raised by my learned friend, Mr. Wills, for the appellants, was very fully argued, and no doubt it is present to your lordships' minds. It seems to me the question entirely depends on the construction of the Pharmacy Amendment Act of 1868. My learned friend referred to matters outside of that Act, but I do not think you will come to the conclusion that those matters to which my learned friend did refer have much, if anything, to do with this case. My learned friend, Mr. Wills, did, I believe, draw your attention to a number of statutes in which there were interpretation clauses, to show that the word "person" in this particular statute is to include corporations, and so on. I have no doubt there are a number of statutes in which, for abundant caution, interpretation clauses of that kind are inserted, and I dare say I should be able to find your lordships statutes in which there is no such interpretation clause, and statutes in which the word "person" must include corporations if it be necessary to do so, but I take it that the general rule is laid down very well by Lord Coke in the 2nd Institute, page 122, and it is this, "That the word 'person' in the abstract includes corporations, the exception is where 'person' occurs alone in one part of the statute, and 'person' or body corporate in another, in which the word 'person' alone does not include the word corporate." That is the doctrine laid down by Lord Coke, and it seems to be a doctrine founded in good sense, and one which ought to prevail. I do not mean to say that that would entitle me to your lordships' decision, because after all, the question must be, what did the Legislature intend when the particular Act to which your lordships' attention is referred, was passed. I think it is very important to consider in whose interest this statute was passed. It is not, as I gather from my learned friend's argument was rather shadowed out by him, at least so I understand, that this is an Act passed in the interest of pharmaceutical chemists. That is not so. This is a statute which is passed in the interest of the public, and for the protection of the public, and the preamble of the Act shows very clearly that this is so, because the preamble is this, "Whereas it is expedient for the safety of the public."

Lord Justice Bramwell: I should think that there could not be a doubt about that, Mr. Attorney, any more than that all the statutes which require examination of medical men, or of solicitors previous to their being admitted, or what not, are not made for the benefit of the body whom they will join, but for the benefit of the public.

The Attorney-General: Those statutes are made perhaps for the benefit of both, because if a man devotes himself to a particular profession, and spends time and money in securing the requisite knowledge in carrying on that business, perhaps the Legislature thinks it well that he should be protected from any invasion.

Lord Justice Baggallay: This is an extension or amendment of the Act of 1852, which expressly states that it is for the public safety.

The Attorney-General: The amending Act, to which I refer your lordship's attention, expressly states so. I do not know that it is necessary to argue this point. I only wish to draw your lordship's attention to the preamble, because it is very explicit and throws great light upon the other parts of the Act.

Lord Justice Bramwell: The presumption is against protection now-a-days.

The Attorney-General: That is a political question into which I would rather not enter. There are people in this world who think protection is a good thing.

Lord Justice Bramwell: Not many.

The Attorney-General: I think a good many, my lord.

Lord Justice Baggallay: Not enough to raise the presumption that the Legislature would pass an Act for protection.

The Attorney-General: It is not necessary for me to argue that point to your lordship, but if it is assumed that this is for the protection of the public, that is all I want to make out. I should like to read the preamble, because it is very important. The preamble is this:—"Whereas it is expedient for the safety of the public that persons keeping open shop for the retailing, dispensing or compounding of poisons, and persons known as chemists and druggists, should possess a competent practical knowledge of their business, and to that end, that from and after the day herein named, all persons not already engaged in such business should, before commencing such business, be duly examined," and so on. No doubt at the time this Act was passed it was known that great danger was incurred in consequence of persons being able to get without any difficulty poisons. The Act only applies to poisons; it does not apply to drugs ordinarily, but to poisons, and those poisons are inserted in a schedule. Before this Act was passed, any person might go into any druggist's, or any shop in fact, and purchase any poison he thought proper, which no doubt was a very dangerous thing. Then we come to the first section: "From and after the 31st day of December, 1868, it shall be unlawful for any person to sell or keep open shop for retailing, dispensing, or compounding poisons, or to assume or use the title chemist and druggist, or chemist or druggist, or pharmacist, or dispensing chemist or druggist, in any part of Great Britain, unlesss such person shall be a pharmaceutical chemist, or a chemist and druggist within the meaning of this Act, and be registered," and so on; and conform to such regulations. Now, therefore, the mischief that the statute was intended to remedy was this, that persons could very easily obtain poisons, and perhaps much injury ensued, and the remedy intended to be applied was to prevent any shop being kept open for the sale of poisons, or to prevent the sale of poisons in any shop which was not kept by a qualified person. I use that expression for the sake of brevity. My learned friend, Mr. Wills, says that this case of the corporation was a *casus omissus*, and the Legislature had not in their minds a corporation. I do not care whether it is a *casus omissus* or not. The Legislature had in their mind this, to prevent any shop being kept open for the sale of poisons, except by particular persons, that is to say, qualified persons, and surely it appears from this 1st section of this statute that that was the object of the Legislature. If it was the object of the Legislature to prevent any shop being kept open for the sale of poisons except by qualified persons it was their object to prevent their being kept open by corporations as well as by anybody else. Just conceive what would be the consequence, assuming for a moment that I am not right, if your lordships will be kind enough to do so, in saying this was the object which the Legislature had in view. Then if a corporation is not within the terms of this Act, although the Legislature has intended to provide that no shop shall be kept open for the sale of poisons, except by qualified persons, nevertheless every corporation in the country might keep open a shop for the sale of poisons, and without it being at all necessary for the corporation to employ any qualified person, if corporations are not within this Act. Take this particular corporation, which was formed in the curious way which has been described to your lordships for the purpose, apparently, of evading the law—this London Supply Association. The London Supply Association might sell arsenic, strychnine, prussic acid, or oxalic acid to any extent without having a single qualified person there who would see that the poisons were properly labelled, or that the public were in any way protected. That must be of consequence, and surely that would be an entire frustration of the object which the Legislature intended to accomplish.

Lord Justice Baggallay: If it is not inconvenient to you I should like to ask you one question before we go any further. Do you limit the meaning of the words "to keep open shop?" Do you consider the only person who keeps open the shop is the person who receives the profit derived from the shop, or the person who presides and manages the shop?

Lord Justice Bramwell: The master.

The Attorney-General: The master.

Lord Justice Baggallay: The person who would derive profits from keeping the shop.

The Attorney-General: Who would have the profits or a share of the profits. I put it as high as this. If you have a partnership of five persons, I take it that the five persons would keep that shop, and that all five of them must be qualified.

Lord Justice Baggallay: Is it not a possible construction that a person may be said to keep an open shop who has the management and control of the shop?

The Attorney-General: No, my lord; I think not.

Lord Justice Baggallay: I only suggest it. I do not say that it is my view.

The Attorney-General: If so, a man who, having nothing at stake,—who cannot be proceeded against practically, I mean, because he has nothing to lose,—anybody might put a man of that kind, if he happened to be qualified, into a shop, and all would be right, although he might carelessly sell poisons and persons might be very much injured, and no proceedings could be taken against the master. The master is the interested person. He is the person who has entire control over the business, and the master making a profit out of the business, or hoping to make a profit out of the business, is the person who generally sees that that business is properly carried on. A mere servant, at a weekly wage, who has just enough to enable him to subsist on, has no particular interest in the matter besides. Take the words, "It shall be unlawful for any person to sell or keep open shop;" what would be the meaning of those words ordinarily? If one is asked whether a man is keeping open shop, surely the answer would be, "Yes, he is," if he is the master of the shop—if he is the owner of the business. Put aside for a moment this question of qualification; supposing the question were who was keeping open the shop which belonged to Swan and Edgar, Regent Street, could it be said that the principal clerk there, or the principal assistant was keeping open the shop?

Lord Justice Baggallay: I only asked the question because it had been passing through my mind. Does the proprietor sell, or the person actually standing behind the counter?

The Attorney-General: I think the proprietor sells. Undoubtedly, if the proprietor sells by an agent, he sells. It may be that the servant would sell as well.

Lord Justice Thesiger: There is a little doubt, possibly, about that, Mr. Attorney, taking the 15th section compared with the 17th. In the 17th, where they intend the master by the word "seller," they say so expressly, and that looks rather as if they had considered that when "sell" or "seller" is used before it refers to the man who actually sells. I do not say that that affects your argument.

The Attorney-General: Under the 17th section there is this difference that the acts there described subject the person committing them, if I recollect the section rightly, to a criminal prosecution. The acts mentioned in the 15th section do not subject the seller or the person who keeps open the shop to a criminal prosecution, but subject him to a civil action.

Lord Justice Thesiger: The words I refer to are in the middle of section 17.

The Attorney-General: The words are these. After describing what is to be done, it says, "And for the purposes of this section the person on whose behalf any sale is made by any apprentice or servant shall be deemed to be the seller, but the provisions of this section, which are solely applicable to poisons," and so on. Those are the words. If those words had not been inserted here, it would have been quite possible that any servant of the keeper of the shop, who sold a poison without the proper label, and without the box, bottle, vessel, wrapper or cover in which the poison is contained being correctly labelled by the name of the article and the word "poison," and with the name and address of the seller of the poison, might be proceeded against criminally, as it is a summary proceeding before the magistrates, which may result in a conviction.

Lord Justice Baggallay: There appeared to me to be this difficulty. If selling has reference to the person who actually sells, who may be a qualified assistant, and the prohibition upon keeping open shop is to be applied to the master, you may have a possible case of the sale by an assistant being perfectly lawful, whereas, keeping the shop by the master is unlawful, and liable to a penalty.

The Attorney-General: That would be so. I think that is a very excellent reason, my lord, for not adopting the construction of my learned friend. Because, take a shop where poisons are sold, a shop, we will suppose, into which the public are invited by an advertisement, "Poisons procurable here;" that shop is kept open by unqualified persons. It is their shop; they get all the profit and they keep a wretched, broken down druggist—a man who has been a dissipated character, who has brought himself to the verge of ruin—and for 15*s.* a week they put him in that place to sell in this business, and he sells the poisons, and very likely kills a whole street. Then he could be proceeded against, according to the construction suggested for the moment by your lordship, by civil action, which would result in nothing, because he would never be able to pay the £5 penalty, and the keepers of the shop who got the profits could not be proceeded against at all. That would certainly be an extraordinary result.

Lord Justice Baggallay: Only the case you have put presumes that the person who sells is a person who is supposed to be competent to sell by having passed his examination.

The Attorney-General: Yes; he is qualified.

Lord Justice Baggallay: Qualified to deal with the article he sells.

The Attorney-General: He has no interest in the business, he does not care what happens. Surely the intention of the Legislature was to fix on some responsible person, to make it the duty of some responsible person to keep open the shop and to effect the sale, not necessarily by his own act, but by his servants if required. Of course, if a man is keeping open a shop for the sale of poisons, he knows that he may, in the event of a mistake being made, be rendered liable in damages, or be rendered liable to pay penalties, and of course he becomes very careful, and the business is properly and carefully conducted; otherwise not. Then again, if I may say so, in answer to Lord Justice Thesiger's remark, it does not seem to me that there was any particular necessity for describing in the 1st section who the seller is, or who the person keeping open the shop is. It was not necessary that there should be any such paragraph inserted in that section as is inserted in the 17th section. But when you come to the 17th it is necessary in order that the matter may be made clear. Let us take for instance the first provision in this 17th section, it shall be unlawful to sell poisons without the proper label, and the label is to contain the name of the article, and the word "poison," and the name and address of the seller of the poison. Now, if there had been no explanatory paragraph anybody might have assumed that if an assistant in the shop had sold this poison the label which was to be put upon it ought to contain his name, and not the name of the keeper of the shop. Then again it goes on, "and it shall be unlawful to sell any poisons of those which are in the first part of schedule A under this Act, or which may hereafter be added thereto, to any person unknown to the seller, unless introduced by some person known to the seller." I take it that means that the poison must not be sold to the person unknown to the pharmaceutical chemist, the keeper of the shop, not that it may be sold to a man who happens to be known to the assistant who effects the sale and hands it over to the customer. Therefore to make that clear, there it is necessary that you should have a paragraph explaining who that seller is. I dare say I might pick out other provisions in this section which would also demonstrate the necessity for this paragraph. "And on every sale of any such article the seller shall, before delivery, make or cause to be made an entry in a book to be kept for that purpose," and so on. Those two illustrations I think will suffice to make my argument clear. What I wish to lay before your lordships on this part of the case is this. "Seller" in this statute means the same thing as the keeper of the open shop. The keeper of the open shop means the proprietor, the owner, the person who carries on the business, or the persons who carry on the business.

Lord Justice Thesiger: If that be so, Mr. Attorney, then the public has less protection than it would have had if the seller meant the person actually selling, because in that case the proprietor must be qualified, and the person actually effecting the sale is not. If your view be right, so long as the proprietor is qualified he may leave the shop entirely in the hands of that famous boy Mr. Wills referred to, and poison the whole street.

The Attorney-General: So he may; but then if this Act requires the proprietor to be qualified, and as the proprietor would be liable for all the injury which would or might be occasioned in consequence of any mistake, he is not likely to allow—I do not say unqualified persons—but to allow any careless person to make sales of poisons. If I am at liberty to refer to what one knows about it, I might say, is it conceivable that poisons are not sold in the shops of pharmaceutical chemists always by pharmaceutical chemists? I presume that there are many persons in those shops who sell drugs and poisons who have not the requisite qualification, that is, have not been subjected to examination.

Mr. Justice Bramwell: Can you tell me this. Supposing a wholesale house which sells poisons, say, dealers in arsenic by the ton, for ought I know; must they be registered under this Act?

The Attorney-General: No, my lord, there is an express provision with regard to wholesale dealers. It is in section 16, I think. Perhaps I had better read section 16, because something was said by my friend about this section and about the consequences which might happen.

Lord Justice Bramwell: It says: "It shall not interfere with the business of wholesale dealers supplying poisons in the ordinary course of wholesale dealing."

The Attorney-General: Allow me just to read this, as a good deal was said by my friend about it. "Nothing hereinbefore contained shall extend to or interfere with the business of any legally qualified apothecary, or of any member of the Royal College of Veterinary Surgeons of Great Britain, nor with the making or dealing in patent medicines" (though I do not know why patent medicines were exempted, "nor with the business of wholesale dealers." My learned friend said if the contention which was presented by the respondents was right, the Apothecaries' Society would be prevented from selling. But that is not so, because the Apothecaries' Society was incorporated by charter, and that charter was confirmed by an Act of Parliament, the 55 George III., and all the members of the corporation are apothecaries, and therefore the corporation itself is an apothecary.

Lord Justice Bramwell: I do no not know about that.

Lord Justice Baggallay: Query a duly qualified apothecary. It does not necessarily follow that every individual member is a duly qualified apothecary within the meaning of this Act.

Lord Justice Bramwell: Let me ask you this question. There is a firm of chemists, every one of whom is a member of the Pharmaceutical Society—six of them. They take in the son of one of the partners, who is also a member of the Pharmaceutical Society. I rather think, there being seven, they must then register as a company, must they not?

The Attorney-General: I think there cannot be a partnership of seven persons unless they are registered.

Lord Justice Bramwell: Then what would happen? would the firm be at liberty to carry on this sale of poisons?

The Attorney-General: Not according to my construction.

Lord Justice Bramwell: Because *quâ* corporation they would not be a pharmaceutical chemist.

The Attorney-General: Is your lordship assuming there may be corporations? I was under a mistake about that. I understand that the provision as to there not being a partnership of more than seven persons applies to banking only.

Lord Justice Bramwell: I think not, I think you are wrong there.

The Attorney-General: The words are:—"No company, association, or partnership consisting of more than ten persons shall be formed after the commencement of this Act for the purpose of carrying on the business of banking unless registered as a company."

Lord Justice Bramwell: I think there is some other one.

Lord Justice Baggallay: The 6th section of the Companies Act provides that any seven or more persons associated for any lawful purposes may become registered.

The Attorney-General: The Lord Justice Bramwell puts the case to me of the proper number. Then it goes on, "no company, association, or partnership consisting of more than twenty persons shall be formed after the passing of this Act for the purpose of carrying on any other business that has for its object the acquisition of gain," and so on.

Lord Justice Bramwell: You are not likely to get twenty chemists into partnership, to be sure. It is no use testing the meaning of this Act of Parliament by supposing impossible cases, therefore I withdraw my question.

The Attorney-General: I daresay your lordship might say that my construction by the construction under which or by reason of which I wish to except the Apothecaries' Company might be somewhat strained; there is nothing in the case to show it, but I was told that all who belong to this company are qualified apothecaries.

Lord Justice Bramwell: But are they pharmaceutical chemists?

Lord Justice Baggallay: They are licentiates.

The Attorney-General: They are within the exemption of section 16. Section 16 is that "nothing in this Act shall apply to any legally qualified apothecaries or any member of the Royal College of Veterinary Surgeons." It may be that although it was intended to qualify all apothecaries there may be a slip, but I do not know that that will invalidate my argument or affect it at all. It is clearly the intention to protect the Royal College of Veterinary Surgeons, and if the Royal College of Veterinary Surgeons is to be protected or excepted, one cannot very easily see why the Society of Apothecaries should not be protected—duly qualified apothecaries.

Lord Justice Baggallay: It is perhaps rather difficult to say so, but it is not a protection to the Royal College of Veterinary Surgeons, but to all individual members of the College, and in the same way the protection is to individual apothecaries; possibly if every member must be an apothecary it may make the corporation apothecary too.

The Attorney-General: If the members of the Apothecaries' Company are not apothecaries they ought not to be protected, but it so happens that they are. Then it goes on, "And upon the decease of any pharmaceutical chemist or chemist and druggist, actually in business at the time of his death, it shall be lawful for any executor, administrator, or trustee of the estate of such pharmaceutical chemist or chemist and druggist, to continue such business, if, and so long only as such business shall be *bonâ fide* conducted by a duly qualified assistant." That shows what the intention of this Act is, and that throws great light, I think, on the 1st section, because if it had been the intention of the Legislature that persons should be safe, that people who kept this open shop should be safe, if sales were effected by a legally qualified assistant, it would not have been necessary to insert this provision; but when the Legislature had to deal with the case where the pharmaceutical chemist or druggist died, and it was necessary that his business should be carried on until the estate was wound up and realized for the benefit of his family, then it inserts this express provision.

Lord Justice Thesiger: I think that does fortify your view as to the meaning of the word "sell" very much.

The Attorney-General: And also keep open; because take the case of a chemist who died, leaving a widow, and leaving the whole of his business by his will to his widow. Of course she is not a qualified chemist, but she would keep open this shop; she would be the person who would keep open the shop, and unless there had been some such provision as this, the unhappy widow in the case supposed would have been liable to be sued for the penalty. Then the Legislature says no; we will have an express provision to meet that case, and if the widow conducts the business until it is wound up, by means of a duly qualified assistant, she shall be protected.

Lord Justice Baggallay: She would be in a better position than her husband. Her husband could not have carried on the business unless he were qualified, but she may carry it on by a qualified assistant.

The Attorney-General: That is to meet that which is a very hard case, because the business might have been destroyed otherwise. Then it goes on, "A duly qualified assistant within the meaning of this clause shall be a pharmaceutical chemist." Then there is another analogous provision which I think was relied on by my learned friend, which perhaps I had better refer to here. This is section 11. "Every registrar of deaths in Great Britain, on receiving notice of the death of any pharmaceutical chemist or chemist and druggst, shall forthwith transmit by post to the Registrar," and so on. Now I understand my friend to argue that this is applicable to a person, and it cannot be applicable to a corporation because a corporation cannot die, it goes on for ever unless it is wound up. Well, but then my reply to that is, I do not say that it is applicable to a corporation, I say that a corporation cannot carry on the business of a vendor of poisons. It may be a misfortune that it should not be able to carry on the business of a seller of poisons, but the Legislature has said that it shall not, and therefore it is not necessary that the death of a corporation should be certified, and the name of the corporation struck off. I do not know that it is necessary that I should go to this extent, but it seems to me that even if a corporation consisted of twenty-five members, every member being a qualified pharmaceutical chemist, I would submit that they could not carry on that business of keeping open a shop for the sale of poisons, because the individuality of the members is, so to speak, done away with, and the corporation is an obstruction. I do not say that it is necessary, perhaps it may be imprudent of me to present that proposition to your lordships; but it seems to me that that would follow from the language of this Act. Then, if I am right in saying that the 1st section was intended by the Legislature to prohibit the selling of poisons, or the keeping open of a shop for the sale of poisons by anybody except by a properly qualified person or persons, and, if I am right in my contention that the seller spoken of in this section is the master, and that the keeper of the open shop is the master, then it would be clear, I think, that the Legislature did intend that no one—corporation or person—should keep open shop for the sale of poisons, and should sell poisons as the master by his own hands, or by the hands of his agents, unless he was duly qualified. Therefore, it must come to this, that no shop should be kept open for this purpose unless by a duly qualified person. Then that would exclude a corporation by the intention of the Legislature. And supposing it had stopped there, whether there would have been any remedy or not against a corporation keeping open shop for the sale of poisons, could it be said that it was intended by the Legislature that a corporation might open a shop for the sale of poisons? I should think that if there had been no subsequent clause imposing a penalty, or giving a remedy, if a corporation did open a shop for the sale of poisons, the corporation would have infringed and disobeyed this Act, and might be liable to prosecution for so doing. Then there follow several sections which describe the various kinds of qualification, and the registration of pharmaceutical chemists, and chemists and druggists, and so on, and sections providing for the examinations; and then at section 10—"It shall be the duty of the Registrar to make and keep a correct register in accordance with the provisions of this Act, of all persons who shall be entitled to be registered under this Act, and to erase the names of all registered persons who should have died, and from time to time to make the necessary alterations in the addresses of the persons registered under this Act." The argument I have used on the 11th section is, I think, applicable to that too. It might be said you cannot erase the name of a corporation because a corporation does not die; but the answer to that is, "Oh! but then a corporation cannot carry on this business." Then comes section 15, and that is the important section which gives the remedy. "From and after December 31, 1868, any person who shall sell or keep open shop for the retailing, dispensing or compounding of poisons, not being a pharmaceutical chemist, or shall fail to conform to any regulations as to the keeping or selling of poisons within the regulations of this Act, or who shall compound," and so on, "shall, for every offence, be liable to pay the sum of £5, and the same may be sued for, and recovered and dealt with in the manner provided by the Pharmacy Act for the recovery of penalties;" that is to say, the action must be brought in the county court. That is the provision of the Pharmacy Act of 1852. If the mischief is what I say, and the corporation keeping open shop are within the mischief, or when they do that they constitute the mischief which was intended to be remedied, surely there is no reason simply because the word "person" is used that therefore "person" could not include corporation. Lord Coke says, "That it does include corporations unless there is some thing in the suit to show that it was intended it should not." And though the Court of Queen's Bench at first when this case was being argued were inclined to come to the conclusion that corporations were not within this section, because corporations could not be rendered liable for torts; upon cases being cited to the court bearing on this subject, to which I can refer if necessary,—but I should think that it was not necessary to show that corporations can be rendered liable for torts—their lordships in the Court of Queen's Bench came to the conclusion that that point, at all events, was not fatal to the plaintiffs. Then take such a case as this. Supposing a corporation is got up for the purpose of evading this law, as apparently this was,—at all events, just the number which was required to make a corporation took shares,—supposing they had no knowledge of chemistry or of poisons, no qualification of any sort, but they simply want to make a profit. They know very well that if they can sell poisons they will have a large sale, and can make an enormous profit by the sale of poisons; indeed, chemists and druggists appear to me to make an enormous profit out of everything they sell; they want to do a fine business; they turn themselves into a corporation or into a limited company. The real owner of the business has perhaps nearly all the shares, and the others have just a sufficient number of shares to qualify them. Then they open this shop and they sell poisons to any extent, and there is not a single individual who has anything to do with the business who knows one poison from another. Surely the consequences would be alarming; but supposing, in addition to doing that, although the corporation is not qualified and the members of the corporation are not qualified, they stick up over their door, "London Supply Association, Pharmaceutical Chemists."

Lord Justice Bramwell: No.

The Attorney-General: They would not be liable for doing it. They would not be liable to any penalty. They might add they were chemists and druggists, and they would be liable to no penalty. Why? Because, according to my learned friend, a corporation is not included in this Act, it is a *casus omissus.* That must be the consequence, I do not see how anybody can avoid coming to the conclusion that that must be the consequence. And so in that way the whole of the provisions of this Act, which were intended for the benefit of the public, and to protect the public from danger, and to preserve the health and lives of the public would be evaded, as they were evaded in this instance. And there would be no necessity, as far as I can see, in such a case to have any qualified person about the premises at all. There is no provision for it. In this particular case they did appear to have had a qualified person there to sell the poisons and dispense the drugs. On the other hand it is found in the case that on some occasions at all event poisons were sold by unqualified persons.

Lord Justice Bramwell: I want you at some time or other to meet a difficulty which has occurred to me. I quite agree with you that a corporation may be guilty of a tort, there is no doubt about that. For instance, a publishing company may publish a libel and be liable. I do not say they could be indicted for it.

The Attorney-General: I think they could.

Lord Justice Bramwell: But generally speaking, the law directs itself against the illegal acts of individuals, not corporations, now may not this be a solution? I am not going to give judgment against you, or for you, or anything of that sort, but merely telling you what has occurred to me. The Act of Parliament says, "it shall be unlawful for any person to sell, keep open," and so on. There is a corporation which does sell and does keep open. Is not the true construction of the Act of Parliament that the persons who do it, who do it actually, who do it *de facto*, are the persons who are prohibited by section 1, and who by section 15 are liable to these penalties? If that is right it would go to show that this present action in the county court was not maintainable, but it would go equally to show that you might maintain an action against the individuals who carry on this business, if they are not within the Act of Parliament. Do you follow me? Is not that the more rational meaning of the Act of Parliament, if I may venture to say so? Then you may say—Now I will sue you, A. B., because I say you are keeping open a shop for the sale of poisons? He says, No, I am not. Why are you not? He says, Because I am one of a corporation, it is a corporation that does it. Then you reply, Well; but I say you do it; it is you who are doing it in fact. Just suppose that in your code you were to say, It shall not be lawful for any person to publish a libel on anybody else, and whoever does shall be subject to an indictment to be punished by fine and imprisonment. Then the corporation publishes a libel. You could not indict the corporation, you would indict the individual. If he said, But I am one of the corporation; I am the assistant, or the shopman, or the servant, the answer would be, It is you who have done it. Have I made myself understood?

The Attorney-General: I think so. The answer, I think, by a member of a corporation would be thus: You might take a corporation formed to carry on the business of a large chemist. We may assume a corporation formed to carry on the joint businesses of Bell and Company, in Oxford Street, and Savory and Moore, about the largest chemists in the country. You might have a corporation consisting of two hundred or three hundred, some of them, we will say, ladies, living at the very extremity of Englant, north or south, who never go near the premises, and who do not know anything what is done there at all. How could it be reasonably said that they are within the provisions of this Act of Parliament?

Lord Justice Bramwell: I agree unless it should be shown that they specially order the unlawful act. Then you go to the man who is actually doing it.

The Attorney-General: Nobody can be actually doing it; no member of a corporation will be actually doing it.

Lord Justice Bramwell: Still you go to the man who does it.

The Attorney-General: Then the man who does it would escape.

Lord Justice Bramwell: Why?

The Attorney-General: He does not keep open the shop.

Lord Justice Bramwell: That is what I doubt; under this Act of Parliament I doubt if he does it. It is he who does it *de facto*; he is the man who actually does it. You say to him, What is your excuse? He would say, I do not do it.

The Attorney-General: Take a corporation such as I have described. It must necessarily carry on its business by means of a manager or assistant. The members, the corporators, may know, and probably would know, nothing in the world about it. Still, the shop is there; it is kept open for their profit; the sales are all made on their behalf. Could it be said that it was the intention of this Act of Parliament to make the assistants and managers liable and not the master?

Lord Justice Bramwell: Why not?

The Attorney-General: Because it says so.

Lord Justice Bramwell: Though you have a master, he would be liable, too,—the individual and the master,—because one man would do it and the other would order it.

The Attorney-General: Why not the corporation?

Lord Justice Bramwell: Because I am not sure you could make out the corporation did order it.

The Attorney-General: How could you make the manager liable if he were duly qualified?

Lord Justice Bramwell: If you could not hit the manager because he is a duly qualified chemist, then you ought not to hit these people, provided they are. It seems to me the whole thing becomes more rational in that way. Take the case of a dormant partner, a non-interfering partner in a chemist's shop; two men, or a man and a woman, if you like, partners in a chemist's shop. The woman never appears and never has anything to do with it, but the man is a duly qualified chemist; would it not be a very unreasonable thing to say it could not subsist without both the man and woman being liable to a penalty?

The Attorney-General: I do not see anything unreasonable in it.

Lord Justice Bramwell: Do you think a woman ought not be a chemist?

The Attorney-General: They may be chemists or anything they like if they become qualified.

Lord Justice Bramwell: Women become qualified under this Act?

The Attorney-General: Yes, may lord, there are several. I would let women with all my heart do anything they like that is decent and proper, but let them be qualified. If your lordship's view was correct it would come to this—that a class of people who had no qualification and no knowledge might keep open a shop, and they might take a partner who happened to be qualified; who was a dormant partner and never came near the place at all, and they would be protected.

Lord Justice Bramwell: There are no end of difficulties in this Act; that difficulty would be retorted upon him in this way. A. B. is owner of a chemist's shop, he has got an assistant in whom he has unlimited confidence and who may be perfectly competent. A. B. is a pharmaceutical chemist and the assistant is not.

The Attorney-General: Then A. B. is responsible.

Lord Justice Bramwell: For what?

The Attorney-General: For keeping open shop.

Lord Justice Bramwell: But he is a pharmaceutical chemist.

The Attorney-General: He is responsible for any damage that may arise.

Lord Justice Bramwell: Not for a penalty?

The Attorney-General: No; but for the proper conduct of that shop. It is to his own interest that it should be properly conducted.

Lord Justice Baggallay: In order to see that I am quite right as to what I understand to be your construction of the statute, I should like to put one case of everyday occurrence. Take the case of a duly qualified pharmaceutical chemist in a country town. The trade of a chemist is not a very good one in a country town, and he joins with it the trade of a grocer. He is a duly qualified chemist, and he has in his employment a man who is very well qualified for weighing out a pound of tea and making up a pat of butter in the grocery department, and he sends that man round to make up a box of pills which may contain some preparation of aconite, which is one of the poisons in the schedule. Would there be any penalty on any person in that case according to your construction?

The Attorney-General: Is your lordship assuming that the chemist enters into partnership with anyone?

Lord Justice Baggallay: No, he is entirely alone. He is a pharmaceutical chemist by examination and registration, but the business is not sufficient to maintain him and he joins the business of grocery to that of chemist and druggist. In the grocery department he has a very good assistant for a grocer, who weighs out pounds of tea, makes up pats of butter and things of that kind; but he sends him round to sell some of the poisons contained in the schedule A, or to make up pills which have got aconite in them. Would either he or the assistant be liable to a penalty according to your construction of the Act?

The Attorney-General: Not under the 15th section.

Lord Justice Baggallay: I mean under that section. That is the case we are dealing with at present. I thought that would be your answer.

The Attorney-General: Both the owner and seller in that case would be properly qualified men.

Lord Justice Baggallay: He might be liable to a penalty if he put a non-qualified man to do the work, but that would not be under this statute; at least I do not think it would.

Mr. Wills: Nor under any other.

The Attorney-General: I do not think he would be liable. If that were so, and that were the intention of the Legislature, the Legislature would have said so.

Lord Justice Baggallay: I thought that would be your reply. I merely wished to see if I rightly followed your construction of the Act.

The Attorney-General: Yes, my lord; at first I thought you were referring to the case of a partnership. What Lord Justice Bramwell put was about individual members of a corporation.

Lord Justice Bramwell: It would be the directors who would be hit, if anybody.

The Attorney-General: The directors, as a rule, know nothing about it.

Lord Justice Bramwell: I was going to that. I do not want to suggest it, but suppose no penalty had been provided, and there had been a prohibition that it should be unlawful. It would have been an indictable misdemeanour.

The Attorney-General: Yes, my lord.

Lord Justice Bramwell: Who would have been indicted then?

The Attorney-General: I do not know. Corporations have been indicted for misfeasance in certain cases. Cases are cited in the Court of Queen's Bench.

Lord Justice Bramwell: They are indictable for non-repair of a road. That there is no doubt about.

The Attorney-General: I am sorry I have not brought the authorities with me. In the Court of Queen's Bench the Lord Chief Justice says: "Being thus of opinion that a company, though incorporated, is none the less within the prohibition of the statute, I come to the remaining question whether such a company is capable of being sued for the penalty provided by the 15th section. Upon this point the authorities referred to by the Attorney-General in his argument appear to me to afford a satisfactory answer. Although it is true that a corporation cannot be indicted for treason or felony, it was established by the case of Reg. *v.* The Great Northern of England Railway Company that an incorporated company could be indicted for misfeasance—as in cutting through and obstructing a highway—though they could not be indicted for treason or felony or offences against the person."

Lord Justice Bramwell: Have they ever been convicted? It is very easy to indict anybody or anything; but have they not been convicted of a nuisance?

The Attorney-General: Yes, my lord.

Lord Justice Bramwell: A corporation may be guilty of nuisance, may it not?

The Attorney-General: Yes, my lord. I believe I am quite right in saying they have been convicted. The difficulty, of course, is what would happen when they have been convicted.

Mr. Wills: I think, in one case, my lord, either the Great Northern, or the Manchester, Sheffield and Lincoln, I forget which, they shunted backwards and forwards over the road that leads to the station at Lincoln. They were indicted. I think there were two or three trials; but they were convicted, I know.

Lord Justice Bramwell: I think that may be done; but that really would be a corporate act. Then you would say this keeping open a shop is?

The Attorney-General: I should suppose what would happen would be this: the corporation would be indicted for a nuisance, and supposing the case is proved against them, and the jury returned a verdict of guilty, then the judge would sentence the corporation to the payment of a fine. I suppose that could be done as a common law misdemeanour, and the punishment for a common law misdemeanour is fine or imprisonment, or both. The judge would sentence the corporation to pay say £1000, and I suppose there would be some means in law to enforce the payment of the fine. I cited three cases in the Queen's Bench on this subject; one of them, I think, is not mentioned. The first case is Yagra *v.* The Bank of England, in the 16th East, page 6. In this case several instances are given of actions against corporations for false returns to writs of *mandamus*. Then there is, again, the case of The Queen *v.* The Birmingham and Gloucester Railway Company. That was an indictment for a misfeasance. And then there is further the case against the Great North of England Railway Company, which is a case of misfeasance—cutting through and obstructing a highway. The Lord Chief Justice goes on to say: "In the present instance we are dealing not with an indictment or information, but with an action in a civil court. Though the sum to be recovered is no doubt a penalty for the infraction of the statute, the means to be resorted to for its recovery are of a purely civil character. If a corporation can be indicted for misfeasance, I am wholly at a loss to see why it may not be proceeded against in a civil suit for the recovery of a penalty which it has incurred by disobedience to a statutory prohibition." I should think that there could be no doubt about that, that they may be proceeded against, always provided that they were within the Act; and there would be no difficulty in suing a corporation for a penalty in respect of a corporate act, always provided it was the intention of the Legislature that the corporation should be liable.

Lord Justice Bramwell: I think you contend that if there were six partners chemists, and one of them was not qualified, the whole six would be liable to the penalty for keeping open a shop.

The Attorney-General: I think so, my lord.

Lord Justice Bramwell: You contend that?

The Attorney-General: At all events, the one who was not qualified would be liable.

Lord Justice Bramwell: But would the others?

The Attorney-General: I do not know. If your lordship asks me what my opinion is, I should say, "yes," because they have not complied with the statute. But it is not necessary.

Lord Justice Bramwell: I asked you what you contend.

The Attorney-General: I should say, my lord, it is not necessary for me to contend that.

Lord Justice Bramwell: If there were seven of them, and they were incorporated, the corporation would be only liable to one penalty.

The Attorney-General: Yes.

Lord Justice Bramwell: Then a corporation can infringe the Act on cheaper terms than individuals.

The Attorney-General: The Act says it shall be unlawful for any person to say or do so-and-so—to keep open a shop. I do not think anyone can contend that this word "person" in the first section may not be read "persons." I think it is Lord Brougham's Act which would apply to that, which says that the singular includes the plural; and, therefore, if you read it in this way, "From and after this date it shall be unlawful for any persons to keep open a shop unless they are qualified," what would that mean, except that they must be all qualified?

Lord Justice Bramwell: But only one penalty.

The Attorney-General: Perhaps only one penalty. If my construction is right it would be only one penalty.

Lord Justice Bramwell: Then afterwards it goes on, "And if any person——"

The Attorney-General: Again you must read the plural for the singular, "And if any persons."

Lord Justice Bramwell: "Any person or persons shall, and such person or persons shall," and so on.

The Attorney-General: Yes, my lord.

Lord Justice Bramwell: I have often said I think there is a great deal of very—what shall I say—lively criticism on Acts of Parliament by people who, if they were to draw them, would draw them, perhaps, as well as those who have drawn them. But this certainly is a very curious Act of Parliament, because it says it shall be unlawful for any person to sell poisons, not one poison, so that an individual to be liable for selling must sell "poisons."

The Attorney-General: In one place it says, "it shall be unlawful to sell any poison." Which section is your lordship referring to?

Lord Justice Bramwell: To the 1st section.

The Attorney-General: I do not think that this Act is drawn as clearly as it might be. But there again Lord Brougham's Act comes in, that the plural must be the singular and the singular the plural.

Lord Justice Bramwell: You say that "poisons" may be "poison."

Mr. Wills: No; under Lord Brougham's Act singular may mean plural; but not plural singular, I think.

The Attorney-General: I have a pretty clear recollection of it, and it says the plural shall mean singular, and singular plural, if I recollect rightly; and masculine shall mean feminine, and feminine masculine. My friend has looked at it more recently than I have; but I believe that is right. It would have been better if the gentleman who drafted this had stuck to the singular or the plural all throughout. But in order to get rid of the little trouble of saying "poison or poisons," he has used sometimes one and sometimes the other.

Lord Justice Bramwell: That comes in after about keeping open shop; but I suppose under the first words of the Act of Parliament if a man met his friend in the street, and this friend were to say to him, I want some poison to kill a dog, or what not, and his friend says, I happen to have a little bottle of prussic acid in my pocket, and sold it to him, he would be subject to a penalty under this Act of Parliament.

The Attorney-General: I think he would. I dare say that this word "sell" was levelled against such an act as that. I understand and believe—of course your lordship will only take it as part of my argument that it may be so—that there was before this Act passed a practice of hawking about opium in various country districts, and people began to like opium, and preferred it to alcohol—a most dangerous and pernicious thing. Hawkers used to take about little supplies of opium and sell in country districts.

Lord Justice Bramwell: Then that same person, if he were ever so much a pharmaceutical chemist, would be within section 17 and subject to a penalty there.

The Attorney-General: If he did not comply with the provisions.

Lord Justice Bramwell: I have supposed it is a sale in the street.

The Attorney-General: He might put a label on it—put poison on it, sold by John Jones. In that case I presume the vendee would have been introduced to the seller.

Lord Justice Bramwell: Now, I should like to put this case. Suppose a man who sold a bottle of poison to his friend had been sent out by a pharmaceutical chemist to deliver it to somebody—not dishonestly selling, but saying I will let you have this, and going back and getting another; who would be liable to the penalty then? I should think the individual, would he not?

The Attorney-General: I should think so.

Lord Justice Bramwell: You would say because he would not be authorized to sell by his master—true.

Mr. Wills: I beg your pardon, Mr. Attorney, the plural does include the singular, and the singular the plural in Lord Brougham's Act.

The Attorney-General: I thought so. Before I sit down I should like to call your lordships' attention to the 17th section. I do not want to repeat it all over again, but there are certain things which must be done provided for by the 17th section, and which are to be done on the sale of any poison. Any person selling poison otherwise than as herein provided shall, upon a summary conviction before any justice, be liable to a penalty not exceeding £5 for the first offence, and £10 for the second, and so on. Very well; supposing a servant of the corporation sold a poison and did not label it properly, it is clear that the corporation would be liable to this penalty, because the penalty is to be recoverable by a summary proceeding, and the provisions of 7 and 8 Geo. IV., cap. 28, would apply. I do not say it was necessary that the provisions I am about to read should be inserted in this statute, or any statute, but they are in this statute, and they are these: the 7th and 8th Geo. IV., cap. 28, section 14, provides, "That whenever a statute relating to any offence, whether punishable by indictment or conviction, in describing the offence or offenders uses words importing the singular number, or masculine gender only, it shall be understood to include several matters as well as one matter, several persons as well as one person, males as well as females, and bodies corporate as well as individuals." So, in that case, the body corporate would be clearly liable. Therefore, this very serious consequence would ensue. The corporation is an abstraction—it cannot itself sell in the ordinary sense. It must employ somebody else to sell, and if the person who was employed by the corporation sold the poison and did not label it poison or did not put the address upon it, or did not do any of the other things which are mentioned in this 17th section, the corporation would be liable to the penalty of £5, and yet if a corporation keeps open a shop and advertises it as a shop for the sale of poisons, and infringes in any way it thinks proper the provisions of the 1st section the corporation cannot be made liable, apparently, because the remedy is by civil action instead of by summary proceeding or criminal procedure. That is a very extraordinary thing.

Lord Justice Bramwell: Supposing the assistant was in the shop, and the customer was known to him and he sold the goods.

The Attorney-General: I do not think that would be enough.

Lord Justice Bramwell: Who would be liable?

The Attorney-General: The master.

Lord Justice Bramwell: Would anybody else?

The Attorney-General: I think so. Surely it is not enough that the person to whom the sale is effected shall be known to the assistant. Let me read that part of the section again; "and it shall be unlawful to sell any poison of those which are in the first part of Schedule A to this Act, or may hereafter be added thereto under section 2 of this Act, to any person unknown to the seller, unless introduced by some person known to the seller."

Lord Justice Bramwell: Who was the seller?

The Attorney-General: I will show your lordship in a moment. "And for the purposes of this section the person on whose behalf any sale is made by any apprentice or servant shall be deemed to be the seller."

Lord Justice Thesiger: Then you cannot construe the words literally and strictly. I mean if "seller" is to mean "sellers," then if there were three or four chemists and druggists, properly qualified, in partnership, unless the buyer were known to all of them there would be strictly and technically an offence. That cannot be intended.

The Attorney-General: Surely if a man is known to a member of a partnership, he is known to the partnership.

Lord Justice Thesiger: I doubt that.

The Attorney-General: If there are five partners it does not follow that because all five of them are sellers that one of them is not a seller if he is known to A. and B., and is not known to C. and D. A. is the seller although he sells generally with B., C. and D.

Lord Justice Bramwell: The perplexities about this Act are never ending. If it was necessary to make that statement in section 17, and otherwise, the seller would have been the *de facto* seller; does not that show that in other sections of the Act of Parliament seller means the *de facto* seller?

The Attorney-General: No, my lord. I tried to point out why it was necessary in this section to define seller. Take the very beginning of it. It shall be unlawful to sell any poison, either wholesale, and so on, which is not labelled with the name of the article and with the name and address of the seller of the poison. Therefore it is obvious it is desirable to clear that up, it might be construed to be the name of the actual seller, the immediate seller. Then, again, it shall be unlawful to sell any poison, and so on, to any person unknown to the seller. Again that is ambiguous. Again it is necessary to have that cleared up. There are obvious reasons why the seller should be explained in this section, which do not apply to sections 1 and 15, and, moreover, there is this further reason, that in section 17 we are dealing with a criminal act, and the remedy is a criminal proceeding; in sections 1 and 15 it is a civil proceeding.

Lord Justice Baggallay: If I follow your contention aright as to the construction, you would say that not only for the purpose of section 17, but for the purpose of all the rest of the Act, the person on whose behalf the sale is made is to be deemed the seller.

The Attorney-General: That is my contention, only I say that it was not necessary to express that in section 1, whereas there were some reasons for stating it in section 17, because it might possibly be thought by anybody reading section 17 that the particular man who made the sale would be liable to the criminal proceeding.

Lord Justice Baggallay: If it was intended to be so throughout the Act, it would have been very convenient to have stated so and not to have stated it in the individual terms in which it is.

The Attorney-General: I do not mean to say the Act might not have been drawn to make the intention a great deal clearer. But that is an observation which might be made with regard to a great many Acts.

Lord Justice Bramwell: I should think under section 3, if there were a corporation that might apply to the Apothecaries' Company, "Chemists and druggists within the meaning of this Act shall consist of all persons who, at any time before the passing of this Act, have carried on in Great Britain the business of a chemist and druggist in the keeping of open shop for the compounding of prescriptions." And the Apothecaries' Company have done such a thing, have they not?

The Attorney-General: I understand so. They have for many years.

Lord Justice Bramwell: Admirable medicines they sell, according to my humble judgment. Then that would exempt them, which was considered one argument against you.

The Attorney-General: I think it would.

Lord Justice Bramwell: It strikes me that the 3rd section authorizes the Apothecaries' Company going on and continuing.

The Attorney-General: Yes, my lord.

Lord Justice Bramwell: It is not to be lawful for them to do it, unless he shall be a pharmaceutical chemist or a chemist and druggist within the meaning of this Act. Then a chemist and druggist within the meaning of this Act, shall consist of all persons who at the time carried on business. You say "person" there means a corporation, and that would exempt the Apothecaries' Company.

The Attorney-General: Either under that section of the Act the Apothecaries' Company would be exempted or under section 16.

Lord Justice Bramwell: I do not see why under section 16.

Mr. Wills: They must be registered also.

Lord Justice Bramwell: Must they?

Mr. Wills: Yes, my lord, under section 1 they must be registered under the Act.

Lord Justice Bramwell: They could go and get themselves registered.

The Attorney-General: That is the general provision.

Mr Wills: If they can sign that form. I do not know whether they can.

Lord Justice Bramwell: However, what I was going to say was this: If the 3rd section hurts you with that difficulty, I think perhaps you are entitled to retort that is a *casus omissus* of the Apothecaries' Company; and if the 3rd section hurts you with that difficulty, if it is one, does not it do this? Does not it show that corporations might be chemists within the meaning of the Act, and also that the provisions of the Act are such that no future corporation could be formed?

The Attorney-General: It might be.

Lord Justice Bramwell: If so, why?

The Attorney-General: Because they cannot be qualified.

Lord Justice Bramwell: I know, that is why; they cannot fly, because they have no wings; but why should not they have them? That is what I meant by why If the Legislature contemplated that existing corporations might continue their business, why has it made no provision for new corporations?

The Attorney-General: Because the only corporation which was contemplated was the Apothecaries' Company, and the Apothecaries' Company, as I understand, consists altogether of qualified apothecaries.

Lord Justice Bramwell: I should think this must be read, *mutatis mutandis*, "I, residing at ———, in the county of ———, hereby declare that we, a corporation, carry on business," and so on.

The Attorney-General: I do not myself see why, because immediately before the passing of this Act there happened to be one corporation which it was necessary to protect or except, that therefore it would follow that it was the intention of the Legislature to enable all other corporations to sell poisons. Your lordships will bear in mind that this Act only applies to the sale of poisons, it is not to be supposed that people cannot sell drugs. I have no doubt all the co-operative stores sell drugs and I suppose they also sell poisons, but it is very undesirable that they should be allowed to do so. Now, my lords, having placed my argument before your lordships, I hope intelligibly, I should like now to read the judgment. I do not know whether my friend read it.

Lord Justice Bramwell: Yes.

Lord Justice Baggallay: Does the Act of 1869 throw any light upon it? I think it only had reference to veterinary surgeons.

The Attorney-General: The Act of 1869 is an Act to amend the Pharmacy Act, and the 1st section is this— "Anything contained in the first fifteen sections of the recited Act shall not affect any person who has been registered as a legally qualified medical practitioner before the passing of this Act; and the said clauses shall not apply to any person who may hereafter be registered as a legally qualified practitioner, and who, in order to obtain his diploma for such registration shall have passed an examination in pharmacy; nor shall the said clauses prevent any person who is a member of the Royal College of Veterinary Surgeons of Great Britain, or holds a certificate in veterinary surgery from the Highland and Agricultural Society of Scotland, from dispensing medicines for animals under his care." Under the Medical

Act of 21 and 22 Vic., cap. 90, apothecaries are medical practitioners. The schedule of medical practitioners begins thus—members and licentiates or extra-licentiates of the Royal College of Physicians of London; and it goes through a number of others; and No. 8 is licentiates of the Society of Apothecaries of London, so that they are medical practitioners. Then, my lords, I will just refer to the Acts about solicitors. Could a corporation carry on business as a solicitor? Could there be a Universal Legal Advice Company, Limited, sending their clerks before judges in chambers, conducting business in the course of drawing deeds, and so on?

Lord Justice Bramwell: Clearly not as personal and individual acts, because if a man instructs a solicitor to appear for him his appearance is accepted. You must test it in this way: not the business of a solicitor proper, but that which is auxiliary business, that of preparing conveyances.

The Attorney-General: I do not know whether a conveyancer has to undergo the qualification or not.

Lord Justice Bramwell: Surely the Solicitors' Act prohibits anybody who is not a licensed conveyancer from drawing and charging for conveyances, or as a solicitor. Surely that must be so.

The Attorney-General: I think so. There is a penalty on persons acting in the business of solicitors, unless they come within particular classes—conveyancers and so on, I believe.

Lord Justice Bramwell: So that you may put that illustration what would happen if a corporation did it?

The Attorney-General: If it was only necessary to take out a licence, I do not know whether a corporation might not take out a licence, but if it is necessary that there should be a qualification that the person who does the business should pass an examination, I should say the corporation cannot.

Lord Justice Thesiger: The judgment of the court below has been read.

The Attorney-General: Then I will not trouble your lordships by reading the judgment, but I should just like to refer to this passage in the Lord Chief Justice's judgment, where he says—"Upon this state of facts the question presents itself whether the defendant company, as such, is amenable to the penal enactments of the statute. It was fully admitted on the argument, nor could it be contested, that if this had been an ordinary partnership the individual partners, at all events such of them as were not qualified under the statute, would have incurred the penalties it imposes. The intention of the Legislature appears clearly to have been to prevent any shop or establishments to exist for the sale of poisons except under the immediate superintendence and control of a duly qualified proprietor." Then a little further on he says—"It is no doubt possible that although joint-stock companies existed at the time this statute was passed, the formation of such companies for the purpose of combining trades hitherto carried on singly, and among other things for that of superadding the business of the chemist to that of the grocer or provision merchant, may not have been present to the minds of those who framed and passed this statute. Still, if the case, though unforeseen, is within the mischief which the Legislature had in view, and the enactment is large enough to embrace it without any forced or strained construction being put on the language in the Act, it is our duty to advance the remedy intended to be afforded." It does not seem to me that I can say more upon the matter, which is fully before the court.

Mr. Lumley Smith: My lord, I have nothing to add except that as the Attorneys' Act has been mentioned, I think it was under the old Attorneys' Act that where an attorney carried on business as an attorney, but had an unqualified partner, that there the partner was liable to penalties. That was decided, and I put that forward to meet this case which my friend quoted of Reynard *v.* Chase. This is an old case reported in Burrows, in which it was held that a man who was not qualified was not liable to a penalty. I should pair off against that the decisions under the Attorneys' Act, where it certainly was held that the unqualified person who had acted as a partner was liable to penalties.

Mr. Wills: I do not know if my friend thinks there is any analogy in the Attorneys' Acts, because I am quite certain of this from all I know of them that they require to be very carefully examined. There are many misconceptions prevalent as to what is and what is not prohibited by them. I know I have had occasion during the last two or three years, for the Incorporated Law Society, to look into the Acts of Parliament, and we have found things which are commonly supposed to be prohibited cannot be hit by anything in the Act. I do not know enough of them to say whether or not there is any analogy in these cases, but in dealing with them I am sure it would not be safe to adopt this without looking to see what the terms of the Acts are. I am not sure that they do not contain conditions such as you describe—the condition of the person who takes an unqualified partner. I will not say one way or the other. I only say that I am sure you cannot draw any satisfactory analogy without looking to see if the language of the Acts would justify your lordships in questioning the construction put upon the words of this Act. Now, with regard to the principal subject in dispute between us, I propose to say very little, because I cannot add materially to what I said before. I knew very well what the great portion of my friend the Attorney-General's argument would be, because I had the advantage of hearing it before, and I have not heard from him to-day anything more than I heard in the court below, and therefore there is not very much more for me to say, but I do wish to point out this. I think I may sum up a large part of what one has to say on each side of the question in almost one or two sentences. In the first place I say that when you look at section 1 and you find a prohibition to a person to keep open shop and to sell poison unless he shall comply with certain regulations and do certain things and, you find that these things are things which in the very nature of them a corporation cannot do, it is at least as good an argument to say that the corporation was not thought of by the framer of the Act, as to say because several things are to be done which a corporation cannot do, it incidentally follows that—what I am sure cannot be the real intention of the Legislature—no corporation can, under any circumstance, carry on this trade. Then as following that out, the second observation I would make, and it is a broad one and lies on the surface, is this, and it goes to the very root of the thing. There is nothing objectionable in itself in this business being carried on by corporations. There is nothing objectionable in the money being found and the establishment being kept by corporations, provided the actual thing done is done by qualified persons; and if the Act were really as complete as it is incomplete, or if it were an Act which was really *bonâ fide* prepared for the purpose which it professes to have, the protection of the public, and that these sections were not really the trade protection of a set of persons, provision would have been made to meet the case of companies. I cannot suppose that in the year 1868 my learned friend the Attorney-General, or any member of the Government in the House of Commons, would have had a chance of passing an Act which said in terms that any business of this kind should be prohibited to corporate existences. Therefore, if you find that language has been specially used which can only in a strained way be construed to apply to them, and if you find one set of terms used throughout the Act (and in many places it is impossible to read the word "person" as comprehending corporation), surely the case is a broad one, that it is a *casus omissus*, and that the framer of the Act, in drawing the Act, and the Legislature, in passing the Act, were thinking of the ordinary common case of a physical natural person carrying on business, and meant to hit that case, and that nobody thought of the case of corporate existences. Surely if they had done so it is reasonable to suppose that what would have been done would have been a prohibition to such associations enacted. There is no difficulty in the Attorney-General working hard now, and he can do very much what he likes at present, and I dare say will be able to do so for a good while to come. There is no difficulty in his going to Parliament and getting an Act of Parliament of this kind if the protection of the public requires it. I do not think it does, because the Act is incomplete as it is. I contended before that, as far as the word "sell" is concerned, it hits the person actually and physically making the sale. I do concede to the Attorney-General what he said that is not so adequate a protection as putting a penalty on the owner of the shop.

Lord Justice Bramwell: Do you say that in the 1st section the word "seller" applies to the actual shopman in the shop who sells the drug, or to his master?

Mr. Wills: In the 1st section, does your lordship mean, or the first of the two sections we have been discussing?

Lord Justice Bramwell: The 1st section.

Mr. Wills: Where it is "sell or keep open shop for retailing or dispensing."

Lord Justice Bramwell: Do you mean to say the seller there means the master or the shopman?

Mr. Wills: I have been contending that it means the shopman, for this reason. If that section stood alone, and if the 15th stood alone, I do not think I should so contend, because it seems to me that what was in the mind of the man who wrote those words when preparing section 1 was that he wrote down "sell," and then it occurred to him, but the master very often will not sell. He first thought of the master who effected the sale with his own hand, and then it occurred to him, "Oh! but very often it is sold by an assistant, and therefore I will say 'keep open shop.'"

Lord Justice Bramwell: It occurred to me that the explanation of that section is this. He began by saying: "If any person shall sell;" but says somebody, "You will not be able to prove the sale, but you will be able to prove the keeping of the shop to sell, and people do not keep shops to sell without selling," and therefore he put in "selling or keeping open shop to sell."

Mr. Wills: That probably is so *ex majore cautelâ*.

Lord Justice Bramwell: That would indicate that the master was meant.

Mr. Wills: I think so. I do not think, looking at it and applying common sense to these matters, that if it were not for the 17th section, I should be disposed to think as at present advised that the reasonable construction was that seller meant the same person as kept open shop, and that both of them meant to hit the master and not the man; but then comes section 17, which is very carefully prepared, and that says in this particular section the seller shall mean the person to whom the shop belongs.

Lord Justice Baggallay: A special penalty is fixed to a branch of that section.

Mr. Wills: A special penalty recoverable in a particular way. It is a carefully drawn section. It would follow, and it does follow, from any construction however elaborate, that may be put on the words of that section, that an offence would be committed if the master of the shop is not the person who actually makes the entry in the book, because the entry which is to be made in the book is to be made by the seller. Then come these subsequent words which say, "For the purposes of this section seller shall mean the owner of the shop." Of course in practice, and in reasonable practice, the person who makes the entry is not the owner of the shop, who knows nothing but what his man goes and tells him, but it is the person who actually effects the sale. He is responsible and there seems to be no reason why the hand of the master should be concerned in making that entry. Therefore, this is an incomplete piece of legislation, and I cannot help thinking that an injustice is done to those sought to be affected by it, by treating it as a complete and effective piece of legislation, which was intended to hit all round and which contains perfect provisions in itself.

Lord Justice Bramwell: Who is liable under section 15? that part which says, "or who shall compound any medicines of the British Pharmacopœia, except according to the formularies of the said Pharmacopœia." That would be the assistant who compounded them, would it not?

Mr. Wills: I should think so, my lord. If so, there is a change of person. If the original idea of the draftsman was kept up, the keeping open shop ought to relate to the master here with regard to compounding. It is very difficult to say that that means anybody except the person who actually does it.

Lord Justice Bramwell: Are you willing to adopt the argument in the alternative which I have suggested to the Attorney-General, that the statute is applicable to persons, that it is not applicable to corporations, but that the directors of this company might be charged with the penalty? Say you have kept open this shop, you were the managers—you were the principals—you have kept it open for the benefit of your corporation who are personally liable; therefore unless you are within the Act of Parliament, and so on. That is an argument which, if well founded might relieve you of all trouble in this particular case.

Mr. Wills: And might be just as disastrous in another.

Lord Justice Bramwell: When they brought the action against you for £5 penalties, and charged the managers with being the people who did it.

Mr. Wills: I confess I have not considered that question at present sufficiently to deal with it.

Lord Justice Bramwell: I wish you had thought of it. Speaking for myself, I may say that I think possibly this action may have been brought wrongly—that it ought to have been brought against the man who did it. On this sort of general principle the Act of Parliament which created illegalities made them in individuals and not in corporations, unless you find something in them expressly making it so.

Mr. Lumley Smith: You can sue a firm now by their corporate name.

Lord Justice Bramwell: You sue them in their partnership name now, certainly; that is true.

Mr. Wills: I see there are directors. I was looking to see whether there were directors of this company or not. After the hard names which had been used again by my friend, the Attorney-General, about evading Acts of Parliament, about the broken-down chemists and druggists being employed, it seemed possible it might turn out that there were no directors at all in the company, but I find there are.

Lord Justice Bramwell: How many?

Mr. Wills: There are three. I should think they are neither of them qualified.

Lord Justice Bramwell: I want to know why, in all good sense, if these three men are pharmaceutical chemists, as they well might be——

Mr. Lumley Smith: It is found by the case that Longmore is the only person who was qualified. He was a shareholder, but he only had one share.

Mr. Wills: That we must meet when our day comes, and we must consider it. I confess I have not considered it at present. Of course I must grant this. I am not going to stand up here and say that any man may indirectly break the law, if the law is broken, where he cannot do it directly. If he is really breaking the law in his individual capacity he must answer for it. Of course, there always comes the question whether he is. My argument, I think, to a great extent would be the same, namely, if this is a *casus omissus*, if the carrying on of this business by corporate bodies is not forbidden by this Act, and is not hit by it, then the persons who avail themselves of that state of the law are not breaking the law. As far as I can at present see the question would be to some extent the same as in this. I submit to your lordships, generally and shortly, that it is safer to allow a thing, which, as your lordships might think the Legislature might very well have made provision against, to let it go by—let the Legislature take care of itself, and the public—than to strain penal Acts of Parliament for the purpose against whom it was not meant. As an illustration of the incompleteness of this Act, because it is on that I am dwelling now, I cannot but think myself that if the Legislature had thought of the case of corporate bodies and limited companies, which were very largely in existence at that time, carrying on this kind of business as well as others, that they would have made reasonable provisions; because there can be no objection in itself to any business of this kind being carried on by capital found in that way any more than any other, and the real objection is to having these drugs dealt in by persons who do not know how to use them.

Lord Justice Bramwell: You may say to the Attorney-General, the case of a corporation is not within the mischief, because a corporation may have a properly qualified dispenser to serve out its drugs, and then it would not be within the mischief; but here general words, if they comprehend the case, comprehend one not within the mischief. Do you follow me?

Mr. Wills: I do, my lord. There is this also, showing really the incompleteness of this Act. It is the effect of this Act that a properly qualified person may live in Rio de Janeiro, Timbuctoo, or anywhere else, and carry on a business of this kind in London by means of a set of people, not one of whom possesses a qualification, and yet no offence would be committed, if the Attorney-General's view is right. If my view is right, that it is the seller who sells, and as was suggested by the court, I do not know what view the court may take of it, that keeping open the shop is answered by the person who does actually keep open the shop, then he is hit; that is, the unqualified person who deals in this sense for another person is hit by it. But if the Attorney-General's reading is right, and these words mean to affect the master,—and he must say so for the purpose of the present case,—if so, then if I happen to possess a qualification, I may live on my means, I may have the whole business of this kind, which it is supposed the public want this ample protection against, carried on by people who are totally unqualified. "Oh," says the Attorney-General, "it is his interest to have properly qualified people, and therefore it is not necessary." Of course that applies equally to the case of a limited company. It is their interest, because they would be civilly responsible in exactly the same sense, and in exactly the same way as a natural person would be.

Lord Justice Bramwell: I should like to put this. A company constituted for the retailing of goods, one of these co-operative associations, but no particular goods specified—none enumerated—if such a thing as this is unlawful, it would be *ultra vires* the directors to sell it, and the corporators would have a right to say you have no more authority to do this than you have to do any other illegal or prohibited thing. Who would be liable then, the corporators or the directors who did it?

Mr. Wills: Civilly, do you mean, or under the penalty clause?

Lord Justice Bramwell: Under the penalty clause, if you please.

Mr. Wills: I cannot help thinking it must be the persons who actually did it.

Mr. Lumley Smith: Corporations have been held liable for the fraud of their managers. That was so in Barwick's case.

Lord Justice Thesiger: That would be carrying on the authorized business of the company in an unauthorized way. The question here would be whether there was any authority from an individual shareholder, or all the shareholders who carry on the business, at all.

Mr. Wills: I cannot help thinking, my lord, that the mere fact of my being a shareholder in a company which does an unlawful act, that unlawful act not being specifically the object of the corporation, which the directors, as persons who carry on the business of the company, might do or might not, cannot make me liable to penal clauses for an offence. It would be a most alarming notion. We are most of us, more or less—some of us much less, but all of us more or less—shareholders in railway companies, canal companies, or one species of investment of that kind or another, and it would certainly startle us very much to be told that if those companies go and do an act which subjects them to a penalty, that we should be personally liable. I can understand it, of course, if the directors say to their servant, now, you go and do the illegal act; and he does it, on all ordinary principles it seems to me they are liable just as they would be if they did it themselves. It does not matter that they are entitled directors of a corporation.

Lord Justice Thesiger: That might be a question as to how the fund should be supplied. Supposing the corporation does an improper act, which the corporation may have been prosecuted for, the shareholders might raise the question whether the directors who had actually authorized that unlawful act had any right to take the funds of the company to pay the fines; but it could not prevent the corporation being liable to be indicted.

Mr. Wills: Not at all. I am dealing with the case of an individual corporator—of an individual shareholder. It would not prevent the corporation being liable clearly, if it were incident to the business. If it is completely outside the business then I imagine it is not the act of the corporation; it is *ultra vires*, using that difficult and ambiguous term in, I think, its proper sense, because it is an act which then is expressly or impliedly prohibited by the constitution of the company, and therefore in that sense is *ultra vires*. Then when it is *ultra vires* in that sense, I suppose even the corporation is not liable.

Lord Justice Thesiger: I do not know that. You may be right, but I should think the corporation there would be liable for doing it *de facto*. They have done it.

Mr. Wills: There always comes the question, I know it is a very difficult question under the particular circumstances, whether it is really the corporation who has done it. If it is a thing beside the business of the corporation, and is expressly or impliedly prohibited by their constitution and their deed, then I suppose it is really not the Act of the corporation, but the act of the individual or individuals who have carried it out, executed it, or authorized it, and which would be, I should think—I put the proposition with great submission, because I know the difficulties which have arisen, but I should think that under those circumstances it would not be the act of the corporation, but would be the act of the individual who authorized it. Now, my lords, I venture for all these reasons to submit to your lordships that it is better to confine the Act to what we can clearly see that it did mean, than to attempt to give it a completeness which we cannot give altogether, because we cannot make it satisfactory from beginning to end by extending it to a case which could hardly have been within the intention of the Legislature. I will only venture to remark, in conclusion, that my friend, the Attorney-General, has not thought fit, as far as I can see, to refer in any way to the numerous instances which I cited from the statute book, as showing that the habit of the Legislature has been to introduce an extending clause into the definition or interpretation of Acts of Parliament, where in cases of Acts of Parliament containing provisions of this kind, imposing penalties or granting rights to persons, it has been thought necessary to extend it, or justice required, that it should be extended to corporations. I cannot help thinking that the Attorney-General, who has no doubt heard what has been said, must have felt that I made good that point—and I cannot help thinking that I have—that the habitual practice of the Legislature has been to insert such clauses where they meant them to be so extended. In these very statutes, in three or four in stances, it is very clear that it is done. In the Bankruptcy Act I know it is the same; I happened to look the other day. I jumped over a long period, but I showed that up to the present time that has been the constant practice of Parliament; and I do venture to submit to your lordships that is a consideration which cannot be thrown out of your minds when your lordships are deciding the question that is raised in this case.

Lord Justice Baggallay: Is this statement in the judgment of the Lord Chief Justice admitted by you,—"Longmore, as has been been stated, is, and at the time of the sale of the poisons in question was, a duly registered chemist and druggist within the Pharmacy Act, 1868, and the business of the drug department was conducted by him with the aid of two qualified assistants. He, with the two assistants, attended regularly to the drug department, and to nothing else."

Mr. Wills: That is found in the case.

Lord Justice Thesiger: I suppose he purchased the drugs as well as sold them?

Mr. Wills: That I cannot tell.

Lord Justice Thesiger: That is rather an important part of the business as regards the protection of the public.

Mr. Wills: I cannot go beyond the four corners of the case. I think Mr. Russell's statement of fact does find that Longmore and these two other persons were persons who attended to this department, and to nothing else.

Mr. Lumley Smith: You will find as a fact, also, in the case, that on one occasion when poison was sold, it was sold by a person not qualified.

Lord Justice Baggallay: Is it stated there?

Mr. Lumley Smith: Yes, my lord; the evidence is set out as part of the case.

Mr. Wills: I will read the case.—"The said William Mackness is the managing director of the said company. He is not a duly registered pharmaceutical chemical or chemist and druggist within the meaning of the said Pharmacy Act, 1868. Henry Edward Longmore is the only shareholder who is a 'pharmaceutical chemist' or 'chemist and druggist' within the meaning of the Pharmacy Act, 1868. The business of the said company is carried on at 113, Tottenham Court Road aforesaid, and includes amongst other departments for the sale of various goods a chemist and druggist's shop or drug department, which is an open shop for the retailing, dispensing and compounding poisons within the meaning of the Pharmacy Act, 1868. The said poisons are sold to the public, and not merely to members of the defendant company. The said Henry Edward Longmore is, and at the time of the sale of poisons hereinafter mentioned was, a duly registered chemist and druggist within the Pharmacy Act, 1868, and the business of the said drug department was at the several times aforesaid and is conducted by the said Henry Edward Longmore, with the aid of two qualified assistants. The said Henry Edward Longmore (with the aid aforesaid) at the times aforesaid attended and still attends regularly to the said drug department and to nothing else, and he and his assistants were and are the servants of the defendants, the company, and paid by salary or wages. On the 4th of February, 1878, the said H. E. Longmore, acting on behalf of the defendants, sold at the said premises two pennyworth of red precipitate. On the 20th of February, 1878, the said H. E. Longmore, acting on behalf of the defendants, sold at the said premises two pennyworth of oxalic acid. On the 19th of March, 1878, the said H. E. Longmore, acting on behalf of the defendants, sold at the said premises solution of perchloride of mercury as an ingredient in a prescription made up by him. On the 20th of March, 1878, the said H. E. Longmore, acting on behalf of the said defendants, sold at the said premises a pennyworth of white precipitate."

Lord Justice Baggallay: That is the whole of the case, is it?

Mr. Lumley Smith: You will find on the next page that this packet was sold without any label.

Lord Justice Baggallay: Is it found on the special case?

Mr. Lumley Smith: Yes, my lord. It shows it was unskilfully sold.

Mr. Justice Baggallay: That might have made him liable to the other penalty. Can you refer me to the decisions under the Attorneys and Solicitors' Act? Can you mention any particular case?

Lord Justice Thesiger: Have you a copy of the county court judge's judgment?

Mr. Lumley Smith: If you would like to have it in print, my lord, we can furnish you with it. It is printed in the *Pharmaceutical Journal.* Tench *v.* Roberts was one case I referred to, in Maddock and Guilder, 145; and Hopkinson *v.* Smith, in 1 Bingham, page 13. The county court judge gives his reasons at the end of the case; but if your lordship would like to have the judgment, it is printed.

Mr. Wills: My lords, on looking at the words of the Act of Parliament, they are so broad, I do not think they can leave any doubt. They provide that any solicitor, and so on, acting for any person, not being qualified, or permitting or suffering his name in any way to be used, and so on, in any action, suit, or matter, or signing any process, or doing any act which will enable an unqualified person to appear or practise in any respect, and so on.

Lord Justice Bramwell: Is there anything about drawing conveyances?

Mr. Wills: I do not think there is, my lord. I know I looked at the matter some time ago. There is the Stamp Act, that is all.

Lord Justice Bramwell: We must take time to consider our judgment in this case.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Fruit.—The fermentation would be probably that of the sugar present in the fruit juice, and might be prevented in the usual manner.

A. W. R.—Your complaint being of a personal nature should be addressed to the Board of Examiners, from whom no doubt it would receive due attention.

T. W.—See a paper on the preparation of glycerine jelly for microscopical purposes, by Mr. Pocklington, in vol. v. of the present series of this Journal, p. 401.

J. G. R.—Your purpose could probably be accomplished with one of the ordinary black hair dyes.

E. S.—We can only recommend you to consult the various recipes for hair dyes that have been given from time to time in this Journal.

T. Keown.—Application should be made to the authorities of the particular University from which it is desired to obtain the degree.

G. Cormack.—Canning's 'Select Notes and Formulæ,' is published by J. Davis, 201, Old Kent Road, S.E.

P. Murray.—Different recipes are given in the ordinary recipe books, but it is very doubtful whether any of them have any efficacy.

"*Hibernicus.*"—The answer given last week to your question was quite correct.

D. W. John.—According to Stillé and Maisch ('Dispensatory,' p. 926) the medicinal properties of *Mitchella repens*, Linn., are exceedingly indefinite, it being reputed to be diuretic, tonic, and astringent, and capable of facilitating childbirth if taken for several weeks before the close of pregnancy.

Communications, Letters, etc., have been received from Messrs. Strachan, Leigh, Baldock, Ellwood, Cooke, Whiston, Frazer, Leay, Haydon, Bennett, Jackson, Stainer, Young and Postans, Boothman, Brown, Hellowell, Lorimer, Secretary of Leicester Association, M. P. S., C. J. B., J. B., Pot. Brom., Minor.

THE DIFFUSIVE PROPERTIES OF SOME PREPARATIONS OF IRON.*

BY PROFESSOR REDWOOD.

Attention has recently been directed to the properties possessed by oxide of iron as it exists in dialysed iron, and founded on the observation of these properties it has been inferred that dialysed iron is a very inert preparation. The iron exists here in what Graham has designated the colloidal state, in which it has a very low diffusive power. It was observed by Graham that substances which in solution possessed very low diffusive power were characterized by the absence of the crystallizing property and that they generally formed gelatinous hydrates, while substances of high diffusive power generally belonged to the class of crystalline bodies. Hence the names *colloid* and *crystalloid* applied to these two classes of substances.

But although substances of very low diffusive power are always found to be uncrystallizable, it cannot be inferred that the absence of crystalline property will be necessarily attended with low diffusive power. I proved this experimentally many years ago, and briefly stated the fact in a communication made to this Society on Dialysis in 1862. Yet the opinion appears to be often entertained that the diffusive property of substances in solution bears some relation to the power they possess of assuming a crystalline condition; and as we have now several preparations of iron, largely used and considered to be efficacious medicines, which are entirely devoid of the power of crystallizing, it may be of use to show the position which these and some other preparations occupy with regard to their diffusive properties.

If, as stated by M. Personne in his recent communication to the French Academy of Medicine, a notice of which appeared in the *Pharmaceutical Journal* of last November, dialysed iron is incapable of being absorbed during its passage through the intestinal canal, and is therefore inactive, and if this is due to the colloidal state of the iron, it might be expected that other preparations of iron would, at any rate to some extent, owe their activity as medicinal agents to their diffusive properties.

Now among the preparations of iron which have become most largely used in medicine are the scaled preparations, which, in common with dialysed iron, are often preferred to the crystalline salts of iron on account of the absence of the inky taste which characterizes the latter. This absence of inky taste and strong styptic property may tend to induce a belief that the scaled preparations of iron are either colloidal, like dialysed iron, or at least that they are deficient in diffusive power, for colloids are usually marked by absence or deficiency of taste.

The experiments, the results of which I am about to lay before the Society, were made for the purpose of showing what the relative diffusive power of some of the salts of iron is, and to what extent this is connected, in such salts, with their crystalline or amorphous condition.

The dialyser used in the experiments consisted of a glass jar, the membrane-covered mouth of which was 5½ inches in diameter; and this rested in the mouth of a white earthen dish. Two thousand grain-measures of either a 5 per cent. or a 10 per cent. solution of the salt used was put into the glass jar, and 25 ounces of water into the dish. The diffusate was usually removed at the expiration of two, but sometimes of three, days, at the commencement of an experiment, although a longer time was allowed for each separate diffusion when the action became sluggish towards the end of an experiment.

1. *Citrate of Iron, Ferric Citrate.*—Some simple citrate of iron was made in the usual way, by dissolving to saturation, moist, recently precipitated hydrated peroxide of iron, in solution of citric acid. After being scaled and dried at 212°, it was found to contain 32·29 per cent. of ferric oxide, Fe_2O_3. Aided by heat it was perfectly soluble in water, the solution being acid to test paper. 200 grains of this salt dissolved in water to make 2000 grains (10 per cent. solution) was put into the dialyser. At the expiration of two days the diffusate was removed, evaporated to dryness, and the residue dried at 212° F. It amounted to 51·26 grains, or 25·63 per cent. of the salt, and on being incinerated it gave 22·45 grains or 43·75 per cent. of oxide of iron. It thus appeared that the iron was diffusing more rapidly than the acid with which it had been combined. Fresh water being introduced into the dish the diffusion subsequently went on more slowly, but the results still showed that the iron was diffusing more rapidly than the acid. At the end of fifteen days, 125·59 grains of the salt had passed through the membrane.

The results of the experiment are given in the following tabulated statement:—

200 grains of citrate, containing 64·58 grains of Fe_2O_3 in dialyser.

Days.	Amount of salt diffused.	Amount of Fe_2O_3 in diffusate.	Per cent. of salt diffused.	Per cent. of Fe_2O_3 in diffusate.
2	51·26	22·45	25·63	43·75
4	44·81	19·45	22·41	45·63
4	20·50	8·67	10·25	42·26
5	9·02	4·10	4·51	45·45
14	6·37	3·68	3·18	57·77
29	131·96	58·35	65·98	
	Residue in dialyser.			Per cent. Fe_2O_3 in residue.
	4·86	2·75	—	56·65
Total . .	136·82	61·10		
Loss . .	63·18	3·48		
	200·00	64·58		

It will be seen that of the 200 grains of the salt, containing 64·58 grains of Fe_2O_3, put into the dialyser, 131·96 grains of salt, containing 58·35 grains of Fe_2O_3, had diffused in twenty-nine days, and that there was then a residue in the dialyser amounting to 4·86 grains of salt, containing 2·75 grains of Fe_2O_3. There was thus an apparent loss in the process of 63·18 grains of salt, but of only 3·48 grains of Fe_2O_3, the latter no doubt partly arising from adhesion to the septum. No entire cessation of diffusion was observed.

The citrate of iron used in the experiment was, as it always is, acid to test paper, and the first two diffusates were so also, but the third and subsequent diffusates were neutral, indicating the disappearance of some of the acid radical.

2. *Ammonio-citrate of Iron.*—This salt, as met with in commerce, usually contains about 30 per cent. of peroxide of iron, Fe_2O_3, but the proportion

* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, March 3, 1880.

varies in different samples. Several samples were submitted to dialysis.

(2, *a.*)—A 10 per cent. solution of ammonio-citrate, containing 30·21 per cent. of Fe_2O_3, was dialysed and the results examined as in the previous experiment. At the expiration of two days, 124·59 grains or 62·29 per cent. of the salt had diffused, and this contained 27·22 per cent. of Fe_2O_3. At the end of another four days, 25·79 grains more of the salt with 32·90 per cent. of Fe_2O_3 had diffused, making the total diffusate in six days 150·38 grains, or 75·19 per cent. of the salt put into the dialyser, and 70 per cent. of the iron contained in the salt. The diffusion afterwards went on very slowly, yielding only 3·79 grains in ten days, and at the end of twenty-two days from the commencement, when the diffusion had nearly stopped, the dialyser contained 20·26 grains of a salt in solution, in which the Fe_2O_3 amounted to 61·61 per cent.

(2, *b.*)—A 10 per cent. solution of a salt containing 30·9 per cent. of Fe_2O_3 was dialysed for two days. The diffusate gave 108·94 grains, or 54·47 per cent. of dried salt, containing 27·9 per cent. of Fe_2O_3. In four days more another diffusate was obtained, giving 37·36 grains, or 18·68 per cent. of the salt, and containing 34·44 per cent. of Fe_2O_3. In this case 73·15 per cent. of the salt and 70 per cent. of the iron contained in the salt had diffused in six days. The diffusion then, as in the previous experiment, went on very slowly, and at the end of sixteen days it had nearly stopped, although the dialyser still contained 19·55 grains of a salt with 52·48 per cent. of Fe_2O_3 in it.

(2, *c.*)—A 10 per cent. solution of a salt containing 30·65 per cent. of Fe_2O_3 was put into the dialyser. In two days the diffusate gave 96·11 grains, or 48·05 per cent. of the salt, and this contained 31·42 per cent. of Fe_2O_3. In four days more another diffusate was obtained, which yielded 27·60 grains, or 13·8 per cent. of the salt, and contained 37·46 per cent. of Fe_2O_3. In this case 61·85 per cent. of the salt, and 66·15 per cent. of the iron contained in the salt, had diffused in six days. The diffusion had now entirely stopped, although there still remained 32·45 grains of a salt containing 22·55 grains of ferric oxide in the dialyser.

In the three preceding experiments, the solutions used, and the diffusates obtained, were neutral to test paper. The citrates employed were apparently good commercial samples, well scaled and perfectly soluble, but they evidently differed in constitution, as indicated by difference in the results of their diffusion, for they were all treated similarly and subjected to the same conditions. It will especially be observed that diffusion in the case of (2, *c.*) ceased entirely at the end of six days, although the dialyser still contained 32·45 grains of a salt in which there were 22·55 grains of ferric oxide, but this being in the form of a highly basic salt was no longer diffusible.

With the view of trying the effect of altered conditions on the salt used in the last experiment, a solution made alkaline with ammonia was used as follows:—

(2, *d.*)—A 10 per cent. solution of the citrate used in experiment (2, *c.*) was made strongly alkaline with ammonia. In two days the diffusate gave 92·65 grains, or 46·32 per cent. of a salt containing 32·59 per cent. of Fe_2O_3. Another diffusate was obtained in four days more which yielded 17·55 grains, or 8·77 per cent. of salt containing 51·22 per cent. of Fe_2O_3. In this case 55·09 per cent. of the salt, and 63·93 per cent. of the iron had diffused in six days. And now, at the end of six days, diffusion had stopped, as in the previous experiment, while the dialyser still contained an undiffusible salt containing 68·38 per cent. of Fe_2O_3.

The following table will show the principal results of dialysis in the preceding four experiments:—

Ten per cent. solutions (200 grains of ammonio-citrate of iron in 2000 grains of solution) dialysed for six days.

	Amount of salt diffused.	Per cent. of salt diffused.	Per cent. of Fe_2O_3 in diffusate.	Diffusion on sixth day.	Per cent. of F_2O_3 in salt not diffused.
(2, *a*)	150·38	75·19	28·2	not ended	61·61
(2, *b*)	146·30	73·15	29·5	not ended	52·48
(2, *c*)	123·71	61·85	32·7	ended	69·49
(2, *d*)	110·20	55·10	35·5	ended	68·38

Having observed that diffusion stopped when the salt in the dialyser became highly basic, and that the diffusate as well as the contents of the dialyser became more and more basic as the process proceeded, results which I shall have to refer to hereafter, I thought that probably by starting with a salt containing less than the usual proportion of oxide of iron the diffusion might be carried further than it had been found possible to carry it in the preceding experiments.

I obtained a good, well-scaled, neutral, and perfectly soluble sample of ammonio-citrate of iron, containing only 25·92 per cent. of Fe_2O_3. 10 per cent. and 5 per cent. solutions of this salt were submitted to dialysis, in the way already described, and the results obtained are given in the following tabulated statements:—

(2, *e.*)—10 *per cent. Solution.*

Days.	Amount of salt diffused.	Per cent. of salt diffused.	Per cent of Fe_2O_3 in dried diffusate.
2 . .	92·23 grs.	46·10	21·56
2 . .	30·62 „	15·31	32·23
3 . .	23·37 „	11·68	33·13
3 . .	8·16 „	4·08	35·50
3 . .	2·27 „	1·13	37·40
4 . .	·55 „	·27	39·43

At the end of twenty-eight days, diffusion having stopped, the salt still left in the dialyser was found to contain 61·26 per cent. of Fe_2O_3.

(2, *e.*)—5 *per cent. Solution.*

Days.	Amount of salt diffused.	Per cent. of salt diffused.	Per cent. of Fe_2O_3 in dried diffusate.
2 . .	66·65	33·32	25·07
2 . .	25·73	12·86	30·12
3 . .	17·91	8·95	32·44
3 . .	6·4	3·2	35·88
3 . .	2·47	1·23	36·01
4 . .	1·64	·82	38·94
6 . .	1·14	·57	40·01

At the end of twenty-eight days, diffusion having stopped, the salt in the dialyser was found to contain 68·54 per cent. of Fe_2O_3.

3. *Potassio-Tartrate of Iron, Tartarated Iron.*—This salt, which, until the adoption of the process now given in our Pharmacopœia, was commonly supplied in the form of an imperfectly soluble powder, is now produced in soluble transparent scales. But as it is more susceptible of change from slight variation of the conditions to which it is subjected, it is less uniform in composition and properties than the salt previously referred to,—the

ammonio-citrate. Several samples of potassio-tartrate of iron were submitted to dialysis.

(3, *a*.)—A 10 per cent. solution of potassio-tartrate containing 31·09 per cent. of Fe_2O_3 was put into the dialyser. In two days 94·02 grains or 47·01 per cent of the salt had diffused, containing 22·67 per cent of Fe_2O_3. In four days more a further quantity of 25·99 grains, or 12·99 per cent. of the whole was obtained, containing 32·97 per cent. of Fe_2O_3, Only slight diffusion took place beyond this. The residue left in the dialyser at the end of ten days contained 65·36 per cent. of Fe_2O_3.

(3, *b*.)—A 10 per cent. solution of potassio-tartrate, containing 36·25 per cent. of Fe_2O_3, submitted to dialysis gave in two days a diffusate from which 53·01 grains, or 26·5 per cent. of a salt containing 8·82 per cent. of Fe_2O_3 was obtained. In four days more another product of 22·32 grains, or 11·16 per cent. of the whole, and containing 7·03 per cent. of Fe_2O_3 was obtained. The residue left in the dialyser contained 62·70 per cent. of Fe_2O_3.

(3, *c*.)—A 10 per cent. solution, the same as the last, but rendered alkaline with potash, after being dialysed for two days gave a diffusate containing 79·83 grains, or 39·91 per cent. of dry salt, with 12·31 per cent. of Fe_2O_3. In another four days, 33·7 grains or 16·85 per cent. of the salt had diffused, containing 10·71 per cent of Fe_2O_3. The residue in the dialyser contained 60·30 per cent. of Fe_2O_3.

The following table gives the principal results of the preceding three experiments :—

Ten per cent. solutions (200 grains of potassio-tartrate of iron in 2000 grains of solution) dialysed for six days.

	Amount of salt diffused.	Per cent. of salt diffused.†	Per cent. of Fe_2O_3 in diffusate.	Diffusion on the sixth day.	Per cent. of Fe_2O_3 in salt not diffused.
(3, *a*)	120·0	60·0	24·9	not ended	65·36
(3, *b*)	75·33	37·66	8·2	not ended	62·70
(3, *c*)	113·53	56·76	11·8	not ended	60·30

It thus appears that the potassio-tartrate of iron is a less diffusible salt than the ammonio-citrate, and this especially applies to the iron as a constituent of the salts. It also appears on comparing the results of experiments (3, *a*) and (3, *b*), that the salt containing the larger proportion of oxide of iron diffuses more slowly than the other, and that the diffusate contains a smaller proportion of iron.

4. *Citrate of Iron and Quinine.*—This preparation, for which, in its most approved form, an available process was first published in the present edition of the British Pharmacopœia, although a somewhat indefinite, or at least an undefined, compound, is an important and valuable medicine, and it seemed desirable in connection with the present object of this inquiry to determine the extent to which it is capable of undergoing diffusion through a membrane.

A 10 per cent. solution, containing 200 grains of a good sample of citrate of iron and quinine, gave a diffusate in two days yielding 76·8 grains of dry residue, containing 21·65 per cent. of ferric oxide. In two days more it gave a further diffusate yielding 21·18 grains of dry residue containing 28·8 per cent. of ferric oxide ; and again, in two days more it gave 16·6 grains of a residue with 27·7 per cent. of oxide, making the salt diffused in six days equal to 57·29 per cent. of that put into the dialyser. The proportion of quinine in relation to the iron was not determined in this case, and in this and other respects further experiments have yet to be made ; but it is evident from the results obtained that citrate of iron and quinine is a freely diffusible preparation.

5. *Sulphate of Iron, Ferrous Sulphate*, $FeSO_4.7H_2O$. —A 10 per cent. solution (200 grains in 2000 grains of solution) slightly acidulated with sulphuric acid and dialysed for two days gave a diffusate yielding 36·4 grains of ferric oxide, and dialysed for four days more it gave a further diffusate yielding 14·7 grains of ferric oxide, thus making the amount of iron, reckoned as ferric oxide, diffused in six days, 51·1 grains, corresponding to 35·7 grains of iron, and as the salt put into the dialyser contained 40·2 grains of iron, it follows that 89·2 per cent. of the iron had diffused in six days.

The experiment was carried on for two days longer, in which time a further diffusate yielding 3·76 grains of ferric oxide was obtained, making the total amount of iron diffused in eight days equal to 96 per cent. of the whole.

6. *Persulphate of Iron, Ferric Sulphate.*—A solution was made by dissolving 200 grains of ferrous sulphate, converting it into the ferric salt, and making it up to 2000 grains. The solution therefore contained the same amount of iron as that used in the preceding experiment, namely, 40·2 grains Fe. Dialysed for two days it gave a diffusate yielding 34·9 grains of ferric oxide, and in four days more it gave a further diffusate, yielding 14·2 grains of ferric oxide, thus making the amount of iron as ferric oxide 49·1 grains, corresponding to 34·12 grains of iron, diffused in six days, or 85·3 per cent. of the iron put into the dialyser.

The experiment was carried on for two days longer, when a further diffusate was obtained, yielding 4·1 grains of ferric oxide, making the total amount of iron diffused in eight days equal to 93 per cent. of the whole.

7. *Chloride of Iron, Ferrous Chloride*, $FeCl_2.4H_2O$.—A 10 per cent. solution, 100 grains in 1000 grains of solution, dialysed for two days gave a diffusate, yielding 33·96 grains of ferric oxide, and dialysed for four days more it gave a further diffusate, yielding 4·3 grains of oxide, making 38·26 grains of ferric oxide, corresponding to 26·8 grains of iron, or 95·7 per cent. of the iron contained in the dialyser, diffused in six days.

8. *Perchloride of Iron, Ferric Chloride.*—100 grains of ferrous chloride converted into a ferric salt, and diluted to 1000 grains, gave results nearly coinciding with those of the ferrous chloride.

On comparing the results of the foregoing experiments, it will be seen that while the sulphates and chlorides, and especially the latter, stand pre-eminent in regard to the extent and rapidity with which they undergo liquid diffusion through a membrane, it cannot be said, in a medical sense, that the scaled preparations, and especially those made with citric acid, are deficient in diffusibility, for the latter being given in much larger doses than the former would be absorbed into the system to fully an equal extent.

9. *Dialysed Iron.*—Although most of the experiments hitherto described in this paper were made simply for the purpose of showing the relative diffusibility of preparations of iron which are used in medicine, without reference to dialysed iron, and of ascertaining how far the diffusive property of such preparations is affected by their crystalline or amorphous condition, yet as the immediate object of pub-

lishing the results at this time was to show that the scaled preparations of iron of the Pharmacopœia are not subject to the objections which have been recently urged against dialysed iron, I have been led to make some experiments with the view of ascertaining how far the properties ascribed to dialysed iron are really possessed by it, and are likely to affect its medicinal efficacy.

Dialysed iron has been largely introduced to the notice of the medical profession, and strongly recommended as an efficacious chalybeate, which is free from objections that attach to other chalybeate medicines. It would appear to have some strong recommendations if it could be clearly shown that it is capable of being absorbed during its passage through the intestinal canal. But while it is freely admitted that it has the advantage of being nearly tasteless, free from astringency, and not liable to cause constipation or gastric disturbance, it has at the same time been broadly asserted that it is perfectly inert on account of its colloidal nature,—that the oxide of iron is precipitated in the stomach in a state in which it is insoluble in the acids of the stomach and incapable of undergoing liquid diffusion.

The following experiments were made with a sample of dialysed iron containing 5·28 per cent. of ferric oxide and ·23 per cent. of chlorine. The iron was completely precipitated by adding to the dialysed iron twenty times its volume of water of the London water supply.

(9, *a*)—The oxide of iron obtained from 100 grains of the dialysed iron by addition of 2000 grains of New River water, was collected on a filter, washed with distilled water and digested with water to which hydrochloric acid of known strength was gradually added until the oxide of iron became apparently dissolved, a clear and permanent, although not brilliant, reddish-brown liquid resulting. It was found that 1·44 grains of hydrochloric acid (HCl) was thus required for the 5·28 grains of oxide of iron. This solution was put into a dialyser, but at the end of two days not a trace of iron had passed through the septum.

(9, *b.*)—Another similar quantity of precipitated oxide was digested with double the quantity of hydrochloric acid, namely 2·88 grains of HCl, but the result at the end of two days was the same. None of the iron had diffused.

(9, *c.*)—Another similar quantity of oxide, namely, 5·28 grains, was digested with 7·5 grains of hydrochloric acid (HCl), this being the quantity required for converting the ferric oxide into ferric chloride, in the event of such conversion occurring. In this case it was found that after the liquid had been in the dialyser for two days a very small quantity, ·1 grain, of the iron had diffused.

In the last three experiments the oxide had been digested at a temperature of 100° F., for about an hour, before putting the liquid into the dialyser.

(9, *d.*)—In this experiment the oxide of iron and hydrochloric acid, in the proportion for forming ferric chloride, were boiled together for several minutes, and the liquid after cooling was put into the dialyser. At the end of two days a trace of iron had passed through the septum, but not more than in the preceding experiment.

The hydrochloric acid in these experiments was greatly in excess of that usually present in the free state in the stomach, which according to Lehmann is about ·125 per cent.

A suggestion having been made that the colloidal iron of dialysed iron, although not diffusible when brought into a state of apparent solution with hydrochloric acid, even when this is much in excess of what is required for such solution, might be taken up by the albuminoids in the stomach and thus rendered assimilable, experiments were made in that direction.

(9, *e.*) A dilute solution of albumin with hydrochloric acid was digested for two hours with dialysed iron at 100° F., and then left in a dialyser for two days, but no iron was found in the diffusate.

(9, *f.*)—A peptone was prepared by dissolving 50 grains of coagulated albumin with 2 grains of pepsin in 500 grains of 1 per cent. dilute hydrochloric acid, adding 50 grains of dialysed iron, and digesting them together for two hours at 100° F. This was put into a dialyser for two days, but here again not a trace of iron was found in the diffusate.

In view of these results it can hardly be conceived that dialysed iron should be an active or efficacious medicine. At any rate it remains for those who advocate its use to suggest a theory by which medicinal activity may be reasonably ascribed to a substance having the properties which this preparation has been proved to possess.

[*The discussion on this paper is printed at p.* 723].

HOW TO USE GLUE.*

Every one, almost, can use glue in a fashion, but few know how to apply it so as to obtain all its advantages. Pieces of wood carelessly glued together will come apart under the slightest strain, while the same cementing material, applied as it should be, will hold the pieces together so tenaciously that if a fracture occur, it will be at a new place and not at the joint. The 'Workshop Companion' gives the following practical and useful directions for the selection of glue and its proper application. It says:

Good glue is hard, clear (not necessarily light-coloured, however), and free from bad taste and smell. Glue which is easily dissolved in *cold* water is not strong. Good glue merely swells in cold water, and must be heated to the boiling point before it will dissolve thoroughly.

Good glue requires more water than poor, consequently you cannot dissolve six pounds of good glue in the same quantity of water you can six pounds of poor. The best glue, which is clear and red, will require from one-half to more than double the water that is required with poor glue, and the quality of which can be discovered by breaking a piece. If good, it will break hard and tough, and when broken will be irregular on the broken edge. If poor, it will break comparatively easy, leaving a smooth, straight edge.

In dissolving glue, it is best to weigh the glue, and weigh or measure the water. If not done there is a liability of getting more glue than the water can properly dissolve. It is a good plan, when once the quantity of water that any sample of glue will take up has been ascertained, to put the glue and water together at least six hours before heat is applied, and if it is not soft enough then, let it remain longer in soak, for there is no danger in good glue remaining in pure water, even for forty-eight hours.

From careful experiments with dry glue immersed for twenty-four hours in water at 60° Fahr., and thereby transformed into a jelly, it has been found that the finest ordinary glue, or that made from white bones, absorbs

* From the *Druggists' Circular and Chemical Gazette*, February, 1880.

twelve times its weight of water in twenty-four hours; from dark bones, the glue absorbs nine times its weight of water; while the ordinary glue made from animal refuse absorbs but three to five times its weight of water.

Glue, being an animal substance, it must be kept sweet; to do this it is necessary to keep it cool after it is once dissolved, and not in use. In all cases keep the glue-kettle clean and sweet, by cleansing it often.

Great care must be taken not to burn glue, and, therefore, it should always be prepared in a water-bath.

Carpenters should remember that fresh glue dries more readily than that which has been once or twice melted.

The advantage of frozen glue is that it can be made up at once, on account of its being so porous. Frozen glue of same grade is as strong as if dried.

If glue is of first-rate quality, it can be used on most kinds of wood work very thin, and make the joint as strong as the original. White glue is only made white by bleaching.

Liquid Glue.—1. A very strong glue may be made by dissolving 4 ounces of glue in 16 ounces of strong acetic acid by the aid of heat. It is semi-solid at ordinary temperatures, but needs only to be warmed, by placing the vessel containing it into hot water, to be ready for use.

2. Dilute officinal phosphoric acid with two parts, by weight, of water, and saturate with carbonate of ammonia; dilute the resulting liquid, which must be still somewhat acid, with another part of distilled water, warm it on a water-bath, and dissolve it in enough good glue to form a thick syrupy liquid. It must be kept in well-closed bottles.

3. A most excellent form is also *Dumoulin's Liquid and Unalterable Glue.* This is made as follows: Dissolve 8 ounces of best glue in $\frac{1}{2}$ pint of water in a wide-mouthed bottle, by heating the bottle in a water-bath. Then add slowly $2\frac{1}{2}$ ounces of nitric acid, sp. gr. 1330, stirring constantly. Effervescence takes place under escape of nitrous acid gas. When all the acid has been added, the liquid is allowed to cool. Keep it well corked, and it will be ready for use at any moment. It does not gelatinize, or putrefy, or ferment. It is applicable to many domestic uses, such as mending china, wood, etc.

Mouth Glue.—Good glue, 1 pound; isinglass, 4 ounces. Soften in water, boil and add $\frac{1}{2}$ pound fine brown sugar; boil till pretty thick, and pour into moulds.

Portable Glue.—Put a piece of shredded gelatine into a wide mouthed bottle; put on it a very little water, and about one-fourth part of glacial acetic acid; put in a well-fitting cork. If the right quantity of water and acid be used, the gelatine will swell up into worm-like pieces, quite elastic, but at the same time firm enough to be handled comfortably. The acid will make the preparation keep indefinitely. When required for use, take a small fragment of the swell gelatine, and warm the end of it in the flame of a match or candle; it will immediately "run" into a fine clear glue, which can be applied at once direct to the article to be mended. The thing is done in half a minute, and is, moreover, done well, for the gelatine so treated makes the very best and finest glue that can be had. This plan might be modified by dissolving a trace of chrome alum in the water used for moistening the gelatine, in which case, no doubt, the glue would become insoluble when set. But for general purposes, there is no need for subsequent insolubility in glue.

ASPIDOSPERMINE.*

BY G. FRAUDE.

Some account of this alkaloid has already been given by the author. The bark containing it is that of *Aspidosperma quebracho blanco* (Schlectendahl). Further analyses show aspidospermine to have the composition $C_{22}N_{30}N_2O_2$. Concerning its preparation, the author finds that the liquors obtained after a precipitation of the alkaloid by means of sodium carbonate yield a further quantity by treatment with phosphotungstic acid. This precipitate is treated with baryta-water, and the solution thus obtained with carbonic acid to precipitate the barium; the alkaloid is then extracted by means of alcohol from the residue left on evaporation. One part of aspidospermine is soluble in 6000 parts of water at 14°; this solution has a bitter taste. It is also soluble in 48 parts of alcohol (99 per cent.) at 14°, and in 106 parts of pure ether at the same temperature.

A small quantity of aspidospermine treated with a few drops of concentrated sulphuric acid, and then with a little lead peroxide, gives a cherry-red coloration, which has a violet shade if the alkaloid is not quite pure.

Iodic anhydride and sulphuric acid produce the same reaction, whilst potassium dichromate and sulphuric acid give a brown zone slowly changing to an olive-green. Chlorine reacts on aspidospermine suspended in water, producing a white flocculent mass, which is not dissolved by hydrochloric acid; this compound begins to decompose at 145°. Bromine acts similarly.

Aspidospermine sulphate, $(C_{22}H_{30}NO_2)_2H_4SO_4$, is obtained by evaporation and drying at 120° as a hard, transparent, resinous mass. The *hydrochloride* $3(C_{22}H_{30}N_2O_2)+4HCl$, has similar properties to the sulphate. By treating solutions of the base with potassium chromate the *chromate* is obtained as a yellow precipitate, which on exposure to the air becomes green. The *perchlorate* is obtained by adding aqueous perchloric acid to a not too dilute solution of the base.

Hydrochloric acid solutions of the base are precipitated by potassium mercuric iodide in yellow flocks; by potassium sulphocyanide, as a white flocculent precipitate; by iodine dissolved in potassium iodide, as brown flocks; by picric acid, as a yellow precipitate; and by tannin, as a white precipitate. Further, these solutions reduce Fehling's solution when boiled with it.

According to Penzoldt (*Berl. klin. Wochenschrift*, 1879, 14), the bark of *Aspidosperma quebracho blanco* has important medicinal properties.

* From *Ber.*, [12], 1560—1562. Reprinted from *Journal of the Chemical Society*, January, 1880.

THE MEMORIAL TO THE BOARD OF TRADE RESPECTING THE WEIGHTS AND MEASURES ACT.

Since the meeting of the Council on Wednesday last a reply has been received from the Board of Trade to the Memorial then mentioned* as having been forwarded by the President of the Pharmaceutical Society respecting the carrying out of the Weights and Measures Act as affecting chemists and druggists. The following is the text of the Memorial and Reply:—

"Pharmaceutical Society of Great Britain,
"17, Bloomsbury Square,
"London, W.C.
"February 25, 1880.

"To the Committee of Privy Council for Trade.

"The Council of the Pharmaceutical Society desire to bring under the notice of the Board of Trade certain difficulties, misconceptions and varied readings of the Weights and Measures Act, 1878, so far as regards 'apothecaries' measures,' which have arisen in the minds of those with whom rests the administration of the law.

"Inasmuch as these measures have always been, and must continue to be, of an entirely different character from the ordinary commercial measures hitherto subject to supervision, it is hoped that the Pharmaceutical Society will not be deemed intrusive in thus appealing to the highest authority.

"At present, apparently, the 'standards' have been only partially distributed; the time, therefore, seems fitting for some authoritative reading of the Act to be

* See p. 718.

placed in the hands of the various district inspectors with the new standards.

"The following different opinions have been brought to the notice of the Pharmaceutical Society, and seem to require correction:—

"1st. One inspector, on being applied to for the purpose of verifying and marking the graduated measures used by chemists, informed the applicant that those only could be verified which contained the given quantity when 'full to the brim,' and that no subdivisions would be marked. Such measures would be perfectly useless.

"2nd. Another inspector gave it as his decision that glass measures must be made 'partly of glass and partly of metal.'

"3rd. A third inspector intimated to chemists in his district, as long ago as July or August last, that their measures should be sent to him for verification. Many measures graduated in the usual manner were so sent, and returned to their owners with his mark of authority. More recently, the same inspector, on measures being sent to him, has verified them only as to a small number of graduations, excluding others absolutely necessary for the sale of drugs as well as for compounding them. Thus from a 2-ounce measure which requires fourteen subdivisions he has virtually abolished seven.

"Much difference of opinion seems to exist as to whether the subdivisions of graduated measures are to be verified at all, or merely the top line, indicating what may be called the denomination of the measure.

"The doubts of inspectors have probably arisen from their being in possession only of the bronze standards, and it may be hoped, therefore, that on receiving graduated glasses from the 'Standards Office' they will get a clearer insight into their future work. For verifying 'standards' the graduated pipettes would no doubt be extremely accurate in the hands of skilled operators, but for the use of the ordinary officers throughout the country the graduated beakers would be more suitable and sufficiently correct.

"It is hoped that on the delivery of the graduated standards to local authorities attention will be particularly directed to the Order in Council, dated August 14, 1879, in which apothecaries' measures are very fully described, and a careful study of which would apparently render the working of the Act easy.

"It is of importance also that there should be uniformity of charge for verifying and marking measures, and in consideration of the number of graduations necessary on glass measures that charge should be very moderate, if it be compulsory to verify all of them. At present it appears to be uncertain how far the scale of 'Fees to Inspectors,' set forth in the 5th schedule of the Act of 1878, is to be applied to graduated apothecaries' glass measures.

"It has been asserted that all weights and measures used in any distict must bear the authoritative stamp of that district. According to the reading of the Council of the Pharmaceutical Society it appears that if a person require to have weights or measures verified it must be done by the inspector of his own district; but that once verified they may be used in every district within the scope of the Act.

"The Council would be glad to have this authoritatively stated.

"GEORGE W. SANDFORD,
"*President.*"

"Board of Trade,
"(Standards Department),
"7, Old Palace Yard, S.W.,
"March 3, 1880.

"*Weights and Measures Act*, 1878.

"Sir,—I am directed by the Board of Trade to acknowledge the receipt of your communication of the 25th ultimo, enclosing a Memorial to this Board on the difficulties which seem to exist among some inspectors as to the verification of apothecaries' weights and measures, and to make the following reply:—

"In the first place, I have to point out that the justices and town councils are charged under the above Act with the duty of verifying all weights and measures used in trade, and that it is for these local authorities to give to their inspectors such instructions with regard to apothecaries' weights and measures as they may deem requisite.

"I am further to point out that the Board of Trade can give no authoritative opinion as to the legal construction of the Act, and consequently any opinion which they might offer on the legal questions adverted to in the memorial would be of no authority, and might only mislead.

"They are, however, always anxious to secure uniformity of practice in the various districts of inspection, and are therefore ready to give any information in their power as to providing standards, and verifying weights or measures. If, having regard to the opinions of the inspectors referred to in the memorial, your Society should think it right to call the attention of their respective local authorities to the inconveniences arising from the different practices adopted in their respective districts, the Board of Trade, on their part, are only too glad to help the Society by any means in their power.

"Although the verification of measures and weights for the use of chemists and druggists is a work requiring more than ordinary care, the Board are unable to see, either in the use or cost of the standards necessary for verification, any reason why local authorities can not efficiently carry the Act into effect with regard to such weights and measures. In commercial centres the present inspectors might perhaps at first find an unusual amount of verification work to do, but the local authorities have, under the Act, power to appoint additional inspectors if they are really wanted.

"The Board of Trade are advised that an apothecaries' ordinary graduated glass measure containing ten or fifteen subdivisions may be accurately verified in four or five minutes, by anyone having the least technical knowledge, and that the cost of a complete set of standard glass measures for the use of an inspector, as shown in the attached diagram, is not more than £1.*

"The Standards Office is prepared, moreover, as notified in the regulations (A. 5), issued last year, to verify standards for the use of inspectors, either of 'pipette,' 'beaker,' or 'flask' shapes.

"Each subdivision or line on a graduated glass measure should be verified by separate comparison with a standard in the manner shown in the diagram.

"At the Standards Office measures are verified under the Act whether they are made partly of glass or partly of metal, or whether they are made wholly of glass or wholly of metal. It is evidently necessary, as indicated in the memorial, that a glass measure should be verified by a standard made also of glass.

"The amount of fees to be taken by local authorities for verifying apothecaries' (with other) weights and measures has been under the consideration of this Board, and a circular on the subject will be shortly issued to all local authorities.

"Finally, as it would appear that a measure or weight once stamped by a local inspector need not bear the authoritative stamp of the particular district in which it may be used, it is probable that in some districts the local authorities may hardly deem it necessary at present, for verification purposes alone, to provide standards of apothecaries' weights and measures.

"I am, sir,
"Your obedient servant,
"T. H. FARRER.

"The President of the
"Pharmaceutical Society
'of Great Britain,
"17, Bloomsbury Square, W.C."

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* It is intended to print the diagram in an early number.

The Pharmaceutical Journal.

SATURDAY, MARCH 6, 1880.

DISPENSING CHEMISTS' CHARGES.

After the unreasonable complaints that have appeared in some of the newspapers on this subject, it is especially satisfactory to find one of the leading medical journals dealing with it in a temperate and sensible manner. We should have been glad to see some medical practitioner of acknowledged authority, who was also cognizant of the services rendered by dispensing chemists, come forward individually and point out that it would be impossible to render those services on the basis of a remuneration such as the grocer or draper is content with; but, failing this, the expression of opinion in the *Lancet* of last week may fairly be taken as representing the views of the better class of medical practitioners, and as calculated to remove erroneous impressions on the part of the public.

The position taken up by Mr. Sandford in his letter to the *Times* is thoroughly accepted by the *Lancet*, and it is admitted that the dispensing chemist can never be remunerated for the special knowledge and special responsibility of his calling by a mere reference to the cost of the drugs he dispenses. It is on the contrary admitted that he must be paid, not only for his own special knowledge, but for that of his assistants for whose services he often has to pay highly.

At the same time it is held to be desirable, for the sake of patients requiring medicine, that the charges of dispensing chemists should not be so far beyond the actual cost of drugs as to constitute any impediment to medicines being obtained by all classes. While admitting it may have been too readily assumed that dispensing chemists alone are to be blamed for the existence of any such disadvantageous influence, it is held that in consequence of being, in regard to the public somewhat more neutral and less personally interested than the medical man is in the importance attaching to the supply of drugs to satisfy the need of sick persons, dispensing chemists have acquired the habit of regarding drugs and the preparations of them according to physicians' prescriptions rather as luxuries to be well paid for than as necessaries to be supplied abundantly on the basis of moderate profits.

In reference to this point the *Lancet* remarks that the hard necessities of life compel medical men to adapt their charges to the means of their patients, and it is held that a similar adaptation has not been sufficiently applied by dispensing chemists. As a consequence of this it is considered that many cases are but "slightly healed," or driven to medical charities, when a more thorough curative result and a maintenance of independence might have been secured if it were easier to obtain the required supplies of medicine. Though we do not altogether give our assent to this opinion to the extent that the *Lancet* seems to suggest, we thoroughly concur with our contemporary in thinking that the chemists of this country only want to see that the very importance of their calling necessitates its adaptation to the means of the bulk of the people, and that in this adaptation lies the secret of the further development and future prosperity of pharmacy.

But while sharing this opinion we must also point to the necessity of its being made apparent how the dispensing chemist is to get a chance of adapting the charge for his services to the requirements and necessities of the general public. Dispensing as now carried out by pharmacists is to so great an extent limited to supplying the wants of the wealthier class, that this circumstance has tended to make the dispensing chemist look upon it as a matter of luxury rather than otherwise, and it is this consideration of the subject which leads us to recognize a plan by which all requirements may be satisfied. We are glad to learn from the *Lancet* that there is a general feeling in the medical profession that the time has come when the work of dispensing should be discontinued by medical practitioners and relegated to chemists. Such a course would not only leave medical men more time for their special work, but by increasing the business of dispensing chemists materially facilitate the adoption of a lower scale of charges for medicine dispensed by them.

It is indeed discreditable that, in this age of division of labour, no means have been devised of entirely separating the work of the dispenser from that of the medical man, and that, notwithstanding the application of tests to ensure educational qualification and the possession of skill by every dispensing chemist before he can commence business, that portion of his business should so often be conspicuous only by its absence, as it is in many provincial places.

But in referring to this point and in rescinding the assumption that chemists only were to blame the *Lancet* says it is certain that many medical men in general practice find chemists reasonable enough in their charges and ready enough to take dispensing duties off their hands by an arrangement which leaves the medical man responsible to the patient for medicines, while the chemist acting as dispenser is paid by the medical man. We join with the *Lancet* in asking why such an arrangement should not be more extensively and generally adopted? Its advantages on both sides are manifest, and it would soon, we think, be apparent that the advantage to patients would also be considerable.

As regards the facilities for obtaining medicine according to the prescription of consultants, the *Lancet* fairly points out that it must be a matter of great importance to the public to be able to command careful and neat dispensing of first rate drugs at any hour of the night or day at their own door, and on the other hand it must be a matter of interest to the dispensing chemist to do this work on terms that will not alienate his neighbours and customers. It seems, however, probable that it is less in regard to this kind of business than in regard to the dispensing of medicines in provincial places and the poorer parts of large towns that there is room for a considerable reform and for the adoption of a system by which the medical men will gain freedom from irksome duties and the dispensing chemists a more suitable occupation than they are sometimes constrained to take up. This is an object towards which the trade has long been looking forward hopefully, and we trust that there may soon be evidence that medical men are generally willing to do their part in promoting its realization.

THE CHEMISTS' BALL AND THE BENEVOLENT FUND.

We are glad to be able to announce that the anticipation expressed by the Chairman at the recent Chemists' Ball, as to its possible relation to some who were not present, has been fully realized, for at a meeting of the Committee held last week, to wind up the business, it was decided to give to the Benevolent Fund a donation of thirty guineas out of the proceeds of this most successful gathering.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association will be held on Thursday next, the 11th inst., when a paper will be read by Mr. H. Allen, on "Wind and Weather." A report will be made on "Materia Medica" by Mr. R. H. Parker.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The next meeting of the above will take place on March 10, at 32a, George Street, Hanover Square, when a paper on "Vegetable Foods: their Manufacture and Nutritive Value," will be read by Mr. F. W. Collinson. The chair will be taken by the President, Mr. F. W. Branson.

DIGESTIVE FERMENTS AND ARTIFICIAL DIGESTION.

Among the series of lectures announced to be delivered at the Royal College of Physicians during the present month, the Lumleian Lectures, by Dr. W. Roberts, upon "Researches on the Digestive Ferments and the Preparation and Use of Artificially Digested Food," will probably be of special interest to some of our readers. These lectures will be delivered on the 12th, 17th and 19th inst., at five o'clock each day.

We have received a report of the Executive Committee of the Chemists and Druggists' Trade Association, but are compelled from want of space to defer its publication till next week. We observe that in consequence of the appointment of Mr. Haydon as Secretary of the Birmingham Chamber of Commerce his resignation has been accepted, and that candidates for the office lately held by him are invited to send in applications as stated in an advertisement to be found on another page.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, March 3, 1880.

MR. GEORGE WEBB SANDFORD, PRESIDENT.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT.

Present—Messrs. Atkins, Bottle, Churchill, Frazer, Gostling, Greenish, Hampson, Hills, Richardson, Robbins, Savage, Shaw, Squire, Symes, Williams and Woolley.

The minutes of the previous meeting were read and confirmed.

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Bucher, William Henry.
Cherrington, George Widdowson.
Corlett, Edwin.
Drew, Henry William.
Fryer, Charles Harry.
Park, Charles James.
Tanner, Herbert.
Taylor, James Bennett.
Wise, Joseph Norman.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Drew, Henry William ....London.
Fryer, Charles Harry ....Brighouse.
Griffith, Samuel ....Weston-super-Mare.
Park, Charles James ....Devonport.
Porter, Thomas.....................Rochdale.
Tanner, Herbert ....Wendlebury.
Taylor, James Bennett ....Bedford.

The following, an Associate of the Society before 1842, having tendered his subscription for the current year, was elected a Member of the Society:—

Prevett, John ....Sheffield.

Chemists and Druggists.

The following registered Chemists and Druggists, who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected Members of the Society:—

Hulme, Thomas ....Pendleton.
Low, Joseph ... .London.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Culverwell, John Sayer ....Southampton.
Hooper, William ....Nagasaki (Japan).
Kenny, Thomas ....Hull.
Pattrick, George ....Crayford.
Taylor, George ....Bournemouth.
Walker, William ....Greenock.
Watson, Robert ....London.

Modified.

Frizell, Richard W....... . ...London.

ASSOCIATES.

The following, having passed the Minor examination and tendered (or paid as apprentices or students) their subscriptions for the current year, were elected "Associates" of the Society:—

Abington, Leonard Yates ......Newcastle-un.-Lyne.
Austin, Alfred ....Birmingham.

Bancroft, James ....Halifax.
Carveth, William Uglow.........Plymouth.
Christopherson, Fred ....Ipswich.
Cooper, Henry Samuel ....Droitwich.
Fry, Samuel ....Bishops Waltham.
Gossling, William Richard ......Wimborne.
Hobson, George William.........Buxton.
Jenkins, Evan ....Lampeter.
Jones, John Albert ....Liverpool.
Kennett, Edward...................Sandgate.
Killick, Charles Rowe............London.
Naysmith, Andrew ....Arbroath.
Newton, George Harry ....Ashby-de-la-Zouch.
Peake, William Alexander ......Charlton-in-Dover.
Robinson, George Duncan R....York.
Taylor, Fred ....Exeter.
Thomas, John ....Crosswell.
Wale, George ....New Malden.
Welstenholme, Abel Joseph ...Southport.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Adcock, Herbert Dickson ......Alcester.
Bays, James Thomas ....Peterborough.
Braithwaite, John Oldham ......London.
Davis, Ifor............................Dowlais.
Darroll, William Burwell ......Warminster.
Fairbanks, William John ......London.
Foster, Henry Simpson ....Rotherham.
Fraser, Alexander ....Lochmaben.
Fuller, Arthur Edward ....Cambridge.
Greaves, Harry.....................Wakefield.
Green, Charles Alfred Parker...London.
Gribble, Edmund Arthur ......Stockwell.
Griffin, John Willifer ....Banbury.
Hubbard, Henry Joseph.........Norwich.
Ivatt, Albert........................Cottenham.
Jackson, Walter ....Catterick.
Keene, Walter F. W. ....Margate.
Pegg, James Alfred...............Mansfield.
Sheffield, Arthur John...........Beverley.
Siddall, George Ward ....Plymouth.
Swift, Augustus Dickerson......Spalding.
Thomas, Richard ....London.
Tucker, Percy ....Exeter.
Whyte, Peter ....Fraserburgh.

One person was restored to his former status in the Society upon payment of the current year's subscription and a fine.

Restorations to the Register.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:

David Powell Evans, 8, Battersea Park Road, Surrey.
Charles Read, West Street, Banwell, Somerset.

Additions to the Register.

The Registrar reported that—

Angus Sinclair Brown, Doncaster,
John Watson, 6, Parsonage Grove, Laisterdyke, Bradford,
George Edward Ransom, Kirmington, near Ulceby, Lincolnshire,
William Augustine Tolley, 69, Wharfdale Road, King's Cross, London, N.,

having severally made the statutory declaration that they were in business before the passing of the Pharmacy Act, 1868, and these declarations having been duly supported by duly qualified medical practitioners, their names had been placed on the Register.

Auditors' Report.

The Secretary presented the auditors' report and the balance sheet, which had been already submitted to and approved by the Finance Committee.

Mr. Williams suggested that any discussion on the accounts should be adjourned to the next meeting.

The Vice-President suggested that the report of the auditors had better be adopted, leaving any discussion of the balance sheet to the next meeting. The financial statement and the balance sheet covered two distinct periods.

The President said the auditors' report simply referred to the correctness of the amounts, and any discussion on details could not affect it.

Mr. Woolley said he had only received the financial statement on Saturday last, and that he had not been able to go into it.

Mr. Bottle thought it premature to discuss the auditors' report, as the bye-law stated it was to be presented at the Council meeting in May.

Mr. Churchill asked what was meant by saying that the two statements referred to two distinct periods.

The Secretary explained that the one was the actual statement of money received and money paid during the year; the other represented the general financial position of the Society.

It was then resolved that the report of the auditors and the balance sheet now presented be received, but that the consideration of both should be deferred until the next meeting of the Council.

The Secretary said that he hoped any member who wished to put questions with respect to the accounts would give him notice beforehand, so that he might be prepared to reply to them.

Reports of Committees.

FINANCE.

The report of this Committee was received and adopted, and sundry accounts ordered to be paid.

HOUSE.

The report of this Committee included a recommendation that a room at the top of the house should be converted into a bedroom for the house porter.

The report was received and adopted.

The President said he was glad to say that the alteration had been already carried out, and a very comfortable room had been made, in which the porter slept for the first time on the previous night. The arrangement would be very much for his benefit, and add to the security of the premises.

Mr. Bottle suggested that as the room was very large, a slip might be partitioned off, and used for storage.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£15 to a registered chemist and druggist formerly a member, and now suffering from severe illness.

£15 to the widow of a registered chemist and druggist.

£10 to a registered chemist and druggist, aged 70, and suffering from chronic disease. Applicant has had three previous grants.

Two other cases were before the Committee, but no grant was recommended, applicants having received relief very recently.

The report and recommendations were received and adopted.

LIBRARY, MUSEUM AND LABORATORY.

The Librarian's report had been received and included the following particulars:—

	Attendance.	Total.	Highest.	Lowest.	Average.
January	Day	396	21	4	15 nearly.
	Evening	184	16	5	9 ,,

Circulation of books.	Town.	Country.	Total.
No. of entries	149	74	223
Carriage Paid		£1 4s. 6d.	

The following donations to the Library had been reported, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Commentar zur österreichischen Pharmacopoe, von F. C. Schneider und A. Vogl, 3e Aufl., 1880, Lief. 4. From Dr. Vogl.

Cooley, A. J., Cyclopædia of Practical Receipts, 6th ed., 1880, pt. 16 (conclusion). From Messrs. Churchill.

Institute of Actuaries, Journal, 1879. List of Members, 1879. From the Institute.

Owens College, Manchester, Calendar, 1879-80. From the College.

Prior, R. C. A., On the Popular Names of British Plants, 3rd ed., 1879. From the Author.

Royal Institution, Proceedings, 1879. From the Institution.

Squire, P., Companion to the British Pharmacopœia, 12th ed., 1880. From the Author.

Squire, P., Pharmacopœias of London Hospitals, 4th ed., 1879. From Alex. Bottle, Esq.

The Committee recommended the purchase of the following books for the Library:—

Beale (L. S.), How to Work with the Microscope, 5th ed., 1880.

Bloxam (C. L.), Chemistry, 4th ed., 1880.

Dioscorides, De Materia Medica, comment. illustr. C. Sprengel, 1829-30.

Educational Year-Book for 1880.

Skertchly (S. B. J.), Physical System of the Universe, 1878.

Theophrastus, Opera omnia, ed. ill., F. Wimmer, 1866.

The Professors had attended the Committee, and reported satisfactorily as to their respective classes.

The Curator had reported the average attendance in the Museum to have been:—Morning, 10; Evening, 2. He had also reported that he had received from Kew another case of Indian drugs from the late India Museum, and the Committee resolved that a special letter of thanks be sent to the India Office.

The following donations to the Museum had been received:—

Specimens of Indian Dill Seed and Oil distilled from it in England. From Mr. Umney.

Fruit of *Strychnos Ignatii*. From Professor Henslow.

Applications for duplicates of Indian drugs had been received from Professor Fluckiger, of Strassburg, Professor Herlant, of Brussels, Professor Henslow, of St. Bartholomew's Hospital, Herr Dittrich, of Prague, and Herr Oberdorffer, of Hamburg. Duplicate specimens had been exchanged with University College Hospital.

The Curator had been instructed to report what duplicate specimens he had at his disposal, and also any applications he might receive for them.

The Committee recommended that a complete set of parliamentary papers be procured regularly as published, at a cost of £16 7*s*. for the session.

The report and recommendations of the Committee were received and adopted.

WEIGHTS AND MEASURES.

This Committee had held two meetings, at the first of which a series of questions was agreed to, to be sent to the Local Secretaries and Members of the Council. At the second meeting, held February 25, it appeared from the replies received that no steps had yet been taken to carry out the provisions of the Act as regards apothecaries' weights and measures. A memorial to the Board of Trade had been agreed upon, which had been forwarded.

The PRESIDENT said he had received an acknowledgment from the Board of Trade of the receipt of the memorial.

Mr. RICHARDSON said the authorities at Leicester had decided not to take any steps at all at present.

Mr. HAMPSON said he had not been able to attend the Committee, but he should like to know if the desirability of endeavours to obtain a repeal of this portion of the Act had been considered.

The PRESIDENT replied in the negative.

Mr. HAMPSON thought the subject was well worthy of consideration. It seemed to him a mistake had been made in acquiescing in this legislation as it affected chemists and druggists. The State required from them certain qualifications, and yet, after that, it claimed the right to go in and inspect their professional utensils. He had no objection to the public being protected to the extent that it should be sure of obtaining the due weight or measure of articles sold over the counter in the ordinary retailing of drugs and chemicals, but a distinct line should be drawn between that kind of business and the work of the dispensing department. He thought the Council should seriously consider whether it would not be desirable to ask the Legislature to relieve chemists and druggists from this legislation. This was only a beginning, and the next step would probably be to authorize the testing of dispensing scales. The inspectors who usually tested the accuracy of weights and measures of the ordinary rough kind were totally unfit to carry out the Act of Parliament fairly. He saw no end to the difficulties which would arise unless it were repealed.

Mr. GREENISH said the views just expressed were entertained by more than one member of the Committee. It was stated at the first meeting of the Committee that the Act could not possibly be carried out as regards chemists' measures, and also that chemists being taxed about 50 per cent. on the value of their measures, which would be the result, would be very unjust. He thought the only way out of the difficulty would be to get that portion of the Act repealed.

The PRESIDENT said the question of repealing the Act did not come properly before the Committee, which was appointed under certain circumstances. A communication had been addressed to Mr. Farrer, a deputation had waited on him, and he suggested that a memorial should be presented to the Board of Trade, which he said would no doubt be considered and receive a reply which would be useful. The work left to the Committee was simply to prepare the memorial, not to consider the repeal of the Act. Apothecaries' weights and measures were introduced into the Act at the suggestion of the Council, because otherwise their use would have been illegal. It must be remembered that weights and measures used in dispensing might also be used in the way of trade; the same 2 ounce measure used in dispensing might be used to sell tincture of rhubarb or castor oil, and the inspector had a perfect right to examine it. The State had a right to see that the law was carried out properly. It was nonsense to say that because a man was highly qualified he was necessarily an honest man. Of course he ought to be so, but there were some men who were not what they ought to be; but whether they were or not, the honest man who had his measures right would have no objection to the inspector coming and seeing them. As far as chemists were concerned he thought the Act was a boon to them, because they could now get glass measures much more carefully graduated than they could before. If the inspectors were unfit to do the work, that was the business of the Government; The trade stood now in a very good position with the Government, and he did not think the smallest difficulty was likely to arise, especially if the Government would give such an answer to the memorial as would authorize the Council to send out a circular to the local authorities, which would tend to bring about the easy and uniform working of the Act.

Mr. HAMPSON said he understood on a previous occasion it was stated that Mr. Farrer said he had no authority over these gentlemen, and that any circular sent out would be merely a matter of suggestion.

The PRESIDENT said Mr. Farrer said his board had not the duty of interpreting the Act; that rested with the county boards, borough councils, etc.; at the same time a report had been issued, inviting local inspectors to communicate with the central board in case of doubt or difficulty.

Mr. ROBBINS said he had lately called on the inspector of his district, who was very attentive, and showed him his standards and the method of using them. The measures were open at the top and required no skill in using, as they had merely to be brim-full. He had a 1 oz. and 2 oz. measure, but could only use the 1 oz. The drachm measure was done by a pipette. He said he had not marked any measures for chemists, not having had any application except from one wholesale house. He also said that chemists need not fear anything like prosecution at present. His opinion was that if nothing were said about it the Act would become a dead letter as far as 2 oz. measures were concerned.

Mr. SYMES remarked that the replies received to the circular implied that no steps had yet been taken, and yet the memorial said that certain complaints and misconceptions had arisen, which would suggest there was a considerable amount of agitation amongst inspectors and the trade. Whilst approving of any memorial which the Council might send to the Board of Trade, he must say he disapproved of sending a circular to the inspectors direct.

The PRESIDENT thought it would be time enough to consider sending such a circular when the Council was in a position to do so.

Mr. SYMES said he would obey the President's ruling, though he thought others had gone considerably more wide of the subject than he had. By the very action the Council was now taking it was inviting interference on the part of the inspectors, and if continued long enough, it would lead to persecution. If the matter were only left alone the trade would be much better off. The President had said that the misconception or qualification of the inspectors was not the business of the Council, and if that were correct, it seemed to him the Council would be interfering in a matter which was clearly not its business.

Mr. RICHARDSON thought one good result from the Act would be the introduction of more accurate glass measures, for in his experience nothing varied more than those now sold. The same difficulty might not be experienced in London as was in the provinces, but he could only say the whole of the Leicester chemists were very much dissatisfied with the Act, and they hoped it would not be carried out at all. They felt very much, as Mr. Hampson had pointed out, that it was an insult to them as educated men that the Act should have been passed. He should like to ask if surgeons who kept dispensaries would be obliged to comply with it.

The PRESIDENT said the deputation which waited on the Board of Trade was informed that it would have nothing to do with compounding medicines, but the same measures which were used in dispensing were also used in selling by retail, and the possession of measures not properly authorized was an offence under the Act. The Council was not inviting interference at all. He had also seen the Westminster inspector, who showed him certain standards he had received; some were bronze measures, and some inspectors were using these, but they would not answer every purpose, because there were no graduations between 1 oz. and 2 oz., or between 5 oz. and 10 oz.

Mr. ATKINS could not join in any of the encomiums on this Act of Parliament so far as it affected chemists, but he feared it was rather too late to contemplate a reaction. It was passed and must be accepted. As far as he could see in his own neighbourhood the Act was a dead letter and was likely to remain so. With regard to one remark of the President, as to the appointment of the officials being a Government act, that was hardly correct, because the inspectors were to be appointed by the local authorities, though their appointments must be confirmed. Most of these gentlemen were simply waiting on providence, waiting for instructions and asking what was to be done. They were really doing nothing and he hoped they would not do anything. From time immemorial, in the country, chemists had been exempt as a privileged body from the action of inspectors—at least in his district—being considered specially qualified and educated, and they had never been interfered with. To show the ignorance which existed with regard to this matter, he might mention that a few days ago some measures were sent to a public institution by order of the secretary; they were obtained from a well-known house in London, but they were all returned with the inquiry if the official stamp had been affixed to them. Of course the answer was that no official stamp had yet been furnished or could be obtained.

Mr. FRAZER said the President had stated that the Act took no cognizance of measures used in dispensing; but as he understood, any conviction under the Act would not be for the use of measures, but for the possession of them, and as they might be used for any purpose the Act would of course apply to a dispenser as well as anyone else, if he kept a shop.

Mr. ROBBINS said the first question put to him by the inspector was, Are you a professional chemist, because if so, I have nothing to do with you; and the next question was whether the measures used for dispensing were considered to be used in selling, if not, it would be a question whether they would come under the Act.

Mr. FRAZER said he had applied to the officials in Glasgow and found that the corporation, through its proper officer, had applied to the proper quarter in London for a set of proper measures, and as soon as they arrived chemists would be informed of it.

Mr. WOOLLEY said his sympathies were to a considerable extent with Mr. Hampson, although he did not see that the Society could have opposed the passing of the Act in the first instance. He thought before any attempt was made to repeal it, it had better be allowed to get into full work. It was passed in 1878, and was to come into operation on January 1, 1879, but here was March, 1880, and the Act was not yet in operation.

The PRESIDENT reminded Mr. Woolley that a certain portion of the Act, namely, with regard to apothecaries' measures, only came into operation, by an Order in Council, on January 1 in this year.

Mr. WOOLLEY said at any rate there had been a considerable delay, and he thought the Government was finding out that it had got hold of a very difficult subject to manage. The inspector at Manchester did not know how he was going to carry the Act out; his present office was something like a superior smithy; of course he wanted a room like a laboratory with proper appliances for testing these delicate weights and measures. His appliances at present were not at all suitable, and he had not even yet got the standards for apothecaries' weights. He fancied the difficulties in a place like Manchester would be a pretty fair sample of what they would be all over the country, and the trade might very well wait until the Act got into operation before troubling themselves further about it.

Mr. CHURCHILL said it did not seem to be known to the Council that a trader could only be fined for having an unjust weight which was used for the purposes of trade. A case had just been decided in Norfolk, in which some weights and a rusty old platform scale were seized by the inspector, but on the case being tried before the magistrates, they were ordered to be restored to him, as they were not used for the purpose of selling.

Mr. WILLIAMS thought some members seemed to have forgotten the history of the passing of this Weights and Measures Bill. The Council never liked the Bill, and opposed it, but limited the opposition to that portion which it thought affected the interests of chemists and druggists. He considered the rest of the Bill very crude, as it merely re-enacted old legislation without any scientific attempt at rearrangement. By the representations of the Council, however, the Government was induced to agree that apothecaries' weights should be included in the legal weights, whereas in the Bill, as originally passed, it would have been illegal to have, and any chemist would have been subject to penalties for having apothecaries' weights and measures in his possession. The Council obtained that concession from the Government, and apothecaries' weights were now legalized, which they never had been before. The question of the subdivision of measures did not occur to the Committee who waited on the Board of Trade originally, or it might perhaps have obtained all that was required then; but it was an omission which was now to be regretted. The Council did not want its constituents in the trade to be annoyed by inspectors coming to them and summoning them before the magistrates for being in possession of measures which were not stamped. It did not in any way wish to urge on the application of the Act, but rather to check it, and also to make it so plain that the inspectors could have no difficulty in understanding it. Individually, he should be very glad if the way could be seen to getting a repeal of at least a portion of the Bill, and he had heard there was a movement for bringing in an amended Bill during the present session; if so, it would be most proper for the Council to take steps to get clauses inserted which would relieve the trade from all difficulty, but until there was more definite information about this it would be better to wait.

Mr. Shaw said the report stated that the Act had not been adopted in any case, but it certainly had been adopted in Liverpool, Manchester, and other places.

Mr. Symes said it certainly was not adopted in Liverpool.

Mr. Shaw said the authorities in Liverpool had adopted a portion of it, and were supplying themselves with standards as fast as they could. The authorities could not, of course, carry it out until they were in possession of the standards, and those were being supplied as fast as possible.

The President said it was a general Act which applied to the whole kingdom, though the activity with which it was carried out in different districts might vary.

Mr. Shaw said he understood Dr. Paul to state that it was optional with the various authorities.

Mr. Squire said a good deal had been said against this memorial to the Board of Trade and against the Council taking any action in the matter, but it occurred to him it was much better, since the Act was passed and would sooner or later come into force, for the Council to regulate, as far as possible, these standards, and the action taken under the Act, than to leave it to the first poor chemist who happened to be brought up before the magistrates to defend himself single handed.

Mr. Symes said he had said nothing against the memorial as it stood. He understood the Act was permissive, and that magistrates were not compelled to carry it out.

The President said it was not permissive, but compulsory.

Mr. Bottle said the 43rd section showed it was compulsory, but he thought if the Council did not make too much stir in this matter, very likely as far as dispensing weights and measures were concerned the local authorities would not feel the Act compelled them to interfere. The schedule referred to the measures used in the sale of drugs, and he thought probably inspectors and local authorities would not interfere with weights and measures used in dispensing, but would be glad to get rid of their responsibility on that head, which really would involve very serious difficulties in country places. Many inspectors were perfectly competent to inspect ordinary market scales and measures, but utterly incompetent to go into the question of grains and drachms. If the Act were to be carried out fully, the authorities must have a scientific man whose decision would be respected.

The report and recommendations of the Committee were then adopted.

The Annual Meeting.

It was resolved that the annual meeting should take place on Wednesday, the 19th of May, at 12 noon, and that the preparation of the annual report be referred to the Library, Museum and Laboratory Committee.

The Conversazione.

On the subject of the conversazione a long discussion ensued, more especially with regard to the question of providing refreshments. It was ultimately resolved that in the event of the conversazione being held this year at South Kensington or any other public place refreshments should not be provided by the Society. It was also resolved—

> "That a conversazione be held on Wednesday, May 19, and that the President, Vice-President, with Messrs. Hills, Williams, Greenish, Squire and Robbins, be appointed a committee for making the necessary arrangements for holding the same at South Kensington or some other public place."

Local Secretary.

Mr. John Thomas Windle was appointed local secretary at Chesterfield, in place of Mr. Greaves, who had resigned.

General Purposes Committee.

The Council, as usual, went into committee to consider the report of this Committee, which included the usual report of the Solicitor with regard to cases placed in his hands.

On resuming, the report and recommendations were received and adopted, including a recommendation that the Solicitor be instructed to commence proceedings against a person charged with a breach of the Pharmacy Act.

Medical Acts Amendment.

Mr. Shaw said he saw the Parliamentary Committee on the Medical Acts Amendment Bills was reappointed, and suggested that some of the London members be appointed a committee to watch the Bills.

Mr. Greenish said there were several Committees which had to sit during the ensuing month, and he thought they would have more work than the London members could spare time to attend to.

The Secretary said the proceedings in the House of Commons were daily watched, and if anything required attention he should at once communicate with the President.

Mr. Williams suggested that it would be well to have a small Committee nominated, which the President could summon if he thought necessary.

Mr. Robbins said this had practically always been done formerly.

Mr. Williams thought it would be better to have a formal appointment, and accordingly, on the motion of Mr. Shaw, seconded by Mr. Atkins, it was resolved—

> "That the members of Council residing in London be appointed a Committee to watch the progress of the Medical Bills now before Parliament as well as any other question affecting chemists which may arise during the session."

Sale of Patent Medicines.

The President read several communications which had been received on this subject: one from the Chemists and Druggists' Trade Association, enclosing a resolution urging upon the Council to take steps to amend the Pharmacy Act with regard to this matter, another from a meeting at Manchester, another from Rochdale, another from Sunderland, and another from Bolton, all recommending that steps should be taken to restrict the sale of patent medicines containing poisons to properly qualified chemists and druggists. The communication from the Trade Association also included a resolution that the Association was of opinion that the Council of the Pharmaceutical Society ought to take part in the preparation of any future Pharmacopœia.

The PRESIDENT said it was not necessary to pass any resolution with regard to these communications, but the Secretary would no doubt inform the writers that the subject had already been before the Council, and was receiving due consideration.

EXHIBITION OF PHARMACEUTICAL APPARATUS, ETC.

Mr. SYMES then moved the following resolution, of which he had given notice:—

> "That in order to render more interesting the annual meeting, arrangements be made for an exhibition of chemical and pharmaceutical apparatus, and other objects of special interest to pharmacists, in the Society's rooms on the occasion, and that the Library and Museum Committee be requested to consider and report on the best means of carrying out this resolution."

In doing so he said he had the satisfaction of feeling that it would commend itself very largely, if not entirely, to the members present, inasmuch, as it had for its object the promotion of the interest of members and associates in the Society. Most of the members present had no doubt happy recollections of the old conversaziones, which were held in that building, which were of a character somewhat different from what the conversaziones now were, and their success might be gathered from the fact that they became so popular that the building was no longer capable of accommodating those who attended. The conversaziones had now been held at South Kensington for some years, and were no doubt calculated in a certain way to keep up the status of the Society, but it must have occurred to some that with all their glories, it was much like having to play "Hamlet," with more brilliant scenery and more distinguished actors, but with Hamlet himself left out. It was with a view of restoring this vital portion of the conversazione, as it originally existed, that he moved the present resolution. At the annual meeting members came from all parts of London and the country; they often arrived some time before the chair was taken and spent their time in the museum, but though that was no doubt very valuable and useful to students, it was scarcely of the character fitted to attract practical men of business. He had heard such men asking the Curator if there was anything new he could show them, when he would point out some new specimens of bark or something of the kind, which was really of no interest to them. They would probably have liked to see on the table the latest improved pill machine or pill coating machine, different forms of tincture presses, mixing machines, laboratory apparatus and so on; and some of the specimens shown at the evening meetings, when there was very little time to examine them, might also be placed on the table, and the Curator might be there to explain them, since many members were present then who did not attend on any other occasion in the year. He knew no better means of introducing members to each other and keeping up their interest in the Society. He proposed to supplement, not to supersede, the present conversazione. It was now six years since anything of the kind was attempted, and then it was in connection with the Conference, and ten years since it was done in connection with the annual meeting. He believed on the present occasion it would be a success and hoped the motion would be supported.

Mr. RICHARDSON seconded the motion. He had a very vivid recollection of the great success which attended a similar exhibition some years ago. Country chemists did require a certain amount of education with regard to new scientific apparatus used in pharmacy and chemistry, which could only be obtained in the metropolis, and it would probably have the effect of bringing more country members up to the meetings, because although they might not be fond of listening to the long speeches which were often given in the theatre, they might have some interest in coming up to examine new apparatus. He hoped the exhibition might be made annual, and believed it would increase in usefulness every year. The British Medical Association had a similar exhibition at its meetings, and though that began on a somewhat small scale, it was now becoming an important element. He hoped there would be no opposition to this motion, for though it might entail some trouble on the officials, he thought that need not amount to much. The only doubt he felt was whether Mr. Symes was not rather late in bringing the subject forward, and whether there was sufficient time to get many manfacturers to exhibit.

Mr. WILLIAMS asked when it was proposed to open the exhibition.

Mr. SYMES said he proposed it should be open during the day of the annual meeting, from nine to twelve in the morning, and after the meeting closed there would be an opportunity for members to inspect it.

Mr. WILLIAMS thought the whole of the time of the day of the annual meeting was pretty well occupied.

Mr. RICHARDSON saw no objection to allowing the articles to remain for another day or two.

Mr. SHAW said everyone could visit the exhibition at his own convenience.

Mr. ATKINS asked if the Society had any room to hold it in.

The PRESIDENT asked if the last exhibition at the time of the Conference was a success.

The SECRETARY said his impression was that it was a failure.

The PRESIDENT said he had received a letter from Mr. Rimmington saying that he could not attend the Council, but his vote would be decidedly against Mr. Symes's motion for an exhibition, as being useless, troublesome and expensive.

Mr. HAMPSON said on first consideration of this subject he was disposed to give it the cold shoulder, as he felt there was scarcely time to carry it out in a satisfactory manner; but on further consideration he thought the experiment might be made for one year. It would be an advantage to country members, and was certainly worth a trial; but the Committee in carrying it out ought to be careful in its selection, and only receive those things which were of real interest to pharmacists.

Mr. ROBBINS observed that the exhibition at the meeting of the Medical Society was displayed on the night of the conversazione.

Mr. RICHARDSON said that was true, but it remained open the whole week.

Mr. ROBBINS thought if the exhibition were in connection with the conversazione there would be no difficulty in making it a success, but the great drawback would be that there would be nothing to induce exhibitors to send in anything interesting. He did not think there would ever be six people in the room at the same time if it were kept open for two days, and that being so it could hardly be expected that manufacturers would send apparatus with persons to take charge of and explain them, so that if the experiment were tried once he did not think it would be repeated. There was certainly no time on the day of the annual meeting.

Mr. GREENISH said it seemed theoretically very desirable that members should see all new medicines and new apparatus, and no doubt those present at the annual meeting would be very glad of the opportunity afforded them; but it seemed to him a very difficult matter to carry out. Nine-tenths of these things were simply sent in as a means of advertising, and it would be very desirable and necessary for the Committee to keep out that element, and only show those things which would be useful to pharmacists and were known to possess some merit. This would be placing a very great respon sibility on the Committee, and he was very sorry not to be able to vote for the motion.

Mr. ATKINS agreed that such an exhibition was desirable, if practicable, but there appeared to be great difficulties in the way. If the Society had not suitable accommodation there was a fatal objection at the outset; if it had, the next question was, could the exhibition be extended beyond the day of the annual meeting? for if not it would certainly not be worth while to undertake it.

Mr. WILLIAMS said he should like to vote for the motion if he could, but he could not see his way how to do it.

Mr. BOTTLE thought the only way of squeezing in such an exhibition would be to abandon the annual dinner and take it on the day before the annual meeting. It was no use asking exhibitors to send valuable instruments and implements for an indefinite time; they would only send them for a short period when they could send some one to take charge of them, nor could the Council undertake the custody of the articles under any other conditions. If it were held concurrently with the dinner or the conversazione it would certainly detract from the success of one of those meetings, but if the Council thought it well for one year to let such an exhibition have the preference he had no objection.

Mr. WOOLLEY thought Mr. Bottle had placed undue obstacles in the way of manufacturers exhibiting. At Manchester, it was found that manufacturers were willing to send heavy machinery long distances, and he had no doubt that in London a still greater readiness would be shown. As to the exhibition competing with the dinner and the conversazione, he rather thought it would tend to bring a great number of pharmacists up to London.

Mr. CHURCHILL was sorry to see the quantity of cold water thrown on this proposal. If a small exhibition of objects used in pharmacy were held in the museum or some other room at the time of the annual meeting, people could easily look at them before or after the proceedings.

Mr. FRAZER thought the chief difficulty would be to get a small committee told off to take charge of it and get it up. If it could be got up it would be a very good thing and would be more profitable and more appreciated than the debates which took place in the theatre. At all events, it might be tried for one year.

The VICE-PRESIDENT said the only difficulty which occurred to him was the question of space. Some time ago, he urged the idea of a permanent museum of apparatus used in pharmacy, and he received some support, but the unanswerable argument against it was want of space. That would not apply so much to a temporary exhibition of this kind, though of course the advantages would not be so great. He saw great difficulty in having it anywhere except in the laboratory, and although it was true that the arrangements with the head of the laboratory department were now different from those in force a few years ago, he thought Professor Attfield would be very willing to lend every assistance. It might be worth while to request a committee to undertake the matter, for he certainly considered it rather a scandal that pharmacists should have no opportunity in connection with the Society of seeing new apparatus and comparing it with the old. If a man wanted to produce anything new, he could get no assistance whatever in that house. He was not so sanguine as some as to the great advantages which would result, but some benefit would certainly arise, and it ought not to be attended with a large amount of trouble or inconvenience.

Mr. SYMES, in reply, said one of the objections was that the day of the annual meeting was an exceedingly busy day, and no doubt it was to the members of the Council; but he did not propose that they should undertake the duty of bringing apparatus there and exhibiting it, which duty might well be deputed to the Curator. It had also been argued that the Council would not be able to attend; but with all due deference to the Council it was rather a scheme for the benefit of the members at large than for the Council. With regard to space, the table in the museum would hold a considerable amount of apparatus and would perfectly satisfy him as an exhibition, at any rate, for the first occasion. It might be made to hold a great deal of useful and interesting apparatus. He had that morning spoken about it to the Curator, who had said that he believed it would be a great success and told him that people from the country often came and asked him about articles which had been exhibited at the evening meetings as long as twelve months before. The Secretary had doubted the success of the last exhibition, but probably, as had happened to himself, when he had been actively engaged in getting up such an exhibition, he was not quite in a position to form an impartial opinion, and the other people who had been present seemed to think it very successful. It had been also stated that the only object of manufacturers was to advertise their productions, but he thought if they took the trouble to send apparatus they deserved to be advertised.

The motion was then put and carrried.

REPORT OF EXAMINATIONS.

January and February, 1880.

ENGLAND AND WALES.

Feb.	Candidates. Examined.	Passed.	Failed.
Major, (18th)	7	4	3
„ (19th)	7	3	4
„ (25th)	6	2	4
	—20	— 9	—11
Minor, (18th)	22	10	12
„ (19th)	20	9	11
„ (25th)	20	8	12
„ (26th)	27	19	8
	—89	—46	—43
Modified, (25th)	3	1	2
Totals	112	56	56

SCOTLAND.

	Candidates. Examined.	Passed.	Failed.
Minor, 18th	15	9	6

Preliminary Examination.

	Candidates. Examined.	Passed.	Failed.
January 6th	303	132	171

14 certificates received (in Jan. and Feb.) in lieu of the Society's examinations:—

College of Preceptors	5
University of Cambridge	6
University of Edinburgh	1
University of Oxford	1
Royal College of Surgeons of England	1
	14

INTERCHANGE OF VISITS BETWEEN THE BOARDS OF EXAMINERS.

Mr. WILLIAMS moved—

"That a deputation, consisting of the President, Vice-President and Messrs. Benger, Brady and Gale, attend the April meeting of the Board of Examiners in Scotland."

He said that on the general principle he thought some doubt was sometimes expressed as to the benefit to be derived from such a proceeding, but he must give it as his opinion, having watched the examinations both at

London and Edinburgh, that a deputation of this kind was of the greatest benefit, not only tending to making the two Boards uniform in practice, but in bringing about good feeling between them. He was sure the gentlemen named would be very efficient representatives of the London Board, would render assistance to their brethren in the north, and no doubt bring back many valuable hints.

Mr. Frazer seconded the motion, saying he knew these deputations were always welcomed in Scotland.

The motion was carried unanimously.

The Chemists' Ball.

The Secretary read a letter from Mr. Carteighe, thanking the Council for giving the use of its rooms for the Committee meetings of the Chemists' Ball, and stated that he had also received a cheque for thirty guineas to the Benevolent Fund.

The North British Branch.

A draft lease of the Society's premises in Edinburgh for a further term of five years, at a rent of £85 per annum, was submitted and approved.

Honorary Corresponding Members.

The President reminded members that at the next meeting the list of honorary members proposed for election must be submitted.

PHARMACEUTICAL MEETING.

Wednesday, March 3, 1880.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT, IN THE CHAIR.

The minutes of the previous meeting having been read and confirmed,

The Chairman called attention to a large number of specimens on the table, and said that, as there was some very interesting matter to be brought before the meeting in the shape of papers, he thought it would be desirable to postpone any remarks with respect to them. The majority constituted a further grant from the collection formerly in the India Museum.

A paper was then read on—

The Diffusive Properties of Some Preparations of Iron.

BY PROFESSOR REDWOOD.

The paper is printed on p. 709, and gave rise to the following discussion:—

The Chairman said he was sure that the meeting would agree with him in considering the paper to be a very valuable one. He regretted that he could not see present any representatives of the medical profession. The meeting would have been very glad to hear the opinions of medical gentlemen expressed in the discussion which was likely to take place. In the meantime, they could appreciate the elaborate care with which Professor Redwood had pursued his investigations, which had extended over many years.

Mr. Williams said that he must certainly congratulate Professor Redwood upon his very excellent paper. It related to a subject which he (Mr. Williams) had thought a great deal upon, and worked upon in the way of business, and he thought that it cleared up a great deal with respect to which there had been a difficulty hitherto. He gathered from the paper that there was probably a compound of iron containing about 62 per cent. of oxide of iron, which compound was not diffusible. Professor Redwood seemed to have obtained a residue which would no longer diffuse, and in which that was the proportion of ferric oxide. He should like to ask whether Professor Redwood intended to carry on the investigation with a view of ascertaining the exact nature and constitution of this body, and whether, in fact, he had isolated that most peculiar and interesting basic chloride of iron which appeared to be a definite substance. It would be very interesting to know more about it in its isolated state, if it could be so obtained. From the vegetable salts, at any rate, the citrate and the tartrate, Professor Redwood always seemed to get a compound in which the 62 per cent. of iron was the standard and permanent quantity. The curious fact that when the oxide of iron precipitated by water from the dialysed solution was dissolved again in hydrochloric acid, the hydrochloric solution was still not diffusible, was a most important point in the paper, and one which was most unexpected; for he (Mr. Williams) should have supposed that when the oxide was dissolved in the proper quantity of hydrochloric acid it would at once be brought back to the state of the ordinary perchloride. In practice, in dealing with a solution of chloride of iron which by chance had been made basic, it had been usual to attempt to bring it back to its proper condition again by adding hydrochloric acid to the solution. Professor Redwood's experiments, however, would seem to show that that process was a mistake, and that the iron was not really so brought back to its proper condition. After the statement of Professor Redwood it would be necessary perhaps to ascertain by other experiments whether it was right or wrong thus to bolster up a preparation which perhaps had gone wrong. He spoke as a manufacturer, and perhaps he spoke feelingly. The paper altogether involved some most important points, not only practical, but also theoretical and medicinal.

Professor Redwood said it would perhaps be convenient to reply at once to the question which had been raised by Mr. Williams. He had referred to that residue of the diffusion in which somewhere about 62 per cent. of oxide of iron was obtained when the diffusion had appeared to stop. He would first observe that it was rather too much to say that diffusion had absolutely stopped. In all the experiments that were made by Graham, even with such very undiffusible substances as tannin or tannic acid, it was impossible to say that no diffusion would take place. As far as he (Professor Redwood) knew, a slight amount of diffusion would take place even with the most undiffusible substances. When a small quantity of iron went through in the experiment in which a large quantity of hydrochloric acid was added to the oxide, he did not look upon that as a regular case of diffusion. It was just an instance of the minute quantity that would pass through even in the case of the most undiffusible of substances. With regard to the residue, he had made an experiment or two, but he had not carried them to an extent which would have justified him in incorporating them in the paper. He had been very anxious to know what was the condition of the iron in the residue after it had been in the dialyser for twenty-eight days without any practical quantity going through. He had taken some of the residue, and, instead of evaporating it and drying it to estimate the iron, he had added to it a slight amount of alkali—carbonate of potash. When ammonio-citrate of iron in its ordinary condition was taken, the oxide of iron could not be precipitated with ammonia. It could, however, be precipitated with carbonate of potash after long boiling. But this was never easily done, and sometimes there was great difficulty in doing it at all. But in the present case, upon taking the residues and just dropping in a very small quantity of solution of carbonate of potash, the precipitate went down at once. He took the precipitate and redissolved it with the smallest practicable quantity of hydrochloric acid, just as he had done with the iron from the dialysed iron. He then put it into a dialyser, and it diffused perfectly well, and therefore it was clear that the oxide was not in the same state as that in which it existed in dialysed iron, but that there was some difference which remained to be accounted for.

Professor Attfield said that in his young days he was told that if medicine was not nasty, it would do him no good; and although he did not agree with that statement at the time, he was now disposed to think that the advice was wise, for it really would seem that the tongue was a dialyser, and that if medicine did not give a strongish taste, either nasty or nice, as the case might be, it might be concluded that it would not dialyse, and that therefore it would pass through the alimentary canal without getting into the blood. He, however, wanted to ask a question on that point of some one who had a sufficient amount of physiological knowledge to state whether such was or was not the case. In common with most chemists, he had studied the action of dialysis; but he wanted to know whether the action of medicinal and other substances, in passing through the alimentary canal, was, so far as regarded the act of nutrition, dialysis only or whether it was dialysis and something else. Were there not in the alimentary canal pores occurring here and there, through which there would pass particles larger than those which would pass through a septum? If so, it might be that, after all, dialysed iron, so-called, was a useful medicine; for the experiments which they had heard described that night, and those of Personne, really pointed to the proposition that non-diffusible substances were useless as medicine. He thought that a deal more had to be done in the way of experiment before that conclusion could quite be arrived at, though he must say that the experiments which had been described to them went far to support the proposition. The other chief proposition, which seemed to be led up to by Professor Redwood's experiments—both those which he had now referred to, and those that he made some years ago—was that non-crystallizable substances were not always non-diffusing, and he had spoken in support of the scaled compounds, which he described as being totally devoid of crystalline character. So far as chemists knew, perhaps that was so; but he did not think that it followed that because chemists did not know that they could be crystallized, therefore they could not be. In fact, he rather preferred to be led by Graham's great generalization and to consider, at all events for the time being, that if a substance did diffuse it therefore probably was crystalline. Professor Redwood's experiment, in which he got a diffusion of the scaled compound containing a very large proportion of iron, only led him (Professor Attfield) to the conlusion that the basic scaled compounds were, or probably would be found to be the crystalline ones. He should like to hear of some experiments being made in that direction, experiments in which hydrate of iron and citric acid were brought together in such molecular proportions as to give one, two, three or more distinct oxy-compounds; and then experiments could be made with a view of ascertaining whether those compounds would crystallize or not. He should not be surprised if they did. Holding rather tightly to Graham's theory, he must plead guilty to hoping that they would. Besides that, the very fact that such compounds, placed on a dialyser, decomposed, and that there went through a compound different from that which was left behind, seemed to show that the scaled compounds were not distinct, single chemical substances, but were mixtures. It might be that if they could be separated from such a mixture, or, by synthesis, compounds could be produced which together would form such a mixture, one or more of those compounds would be found to be crystalline. The third point in the paper which struck him as being extremely interesting was that in which it was proved that hydrate of iron dissolved in hydrochloric acid had different properties from chloride of iron. Of course, here there was room for speculation as to the cause of that; for after what Professor Redwood had stated such must be accepted to be the fact. He would himself rather not view the action at present as being one in which there was a different condition of iron. He would rather consider that in the case of the non-diffusible preparation there was an oxide of iron, it might be hydrate of iron, and might be oxyhydrate of iron, united with hydrochloric acid; and that in the diffusible preparation there was a true chloride of iron, or, to put it more shortly, that there were two distinct chemical compounds, one a hydrochlorate of oxide of iron and the other a true chloride of iron.

Mr. Martindale said that he did not come forward for the purpose of defending dialysed iron, although at the last meeting, lest it should have gone forth that dialysed iron was useless, he took up a slight defence of that preparation with a little reserve upon the decision to which Professor Redwood seemed inclined to come. Since the last meeting he had asked some of his medical friends what they thought of it, and they were somewhat inclined to agree with Professor Redwood that it was not so active as many other preparations of iron, such as the strong acid preparations, the chlorides and sulphates. At the last meeting he, on Dr. Gowers' authority, defended a corresponding preparation, the basic oxychloride of iron, prepared not by dialysis, but by taking a pasty ferric oxide and dissolving it in perchloride solution, and getting about four molecules of the hydrate to be taken up by one of the ferric chloride. Dr. Gowers, whom he had seen since the last meeting, was, he believed, willing if opportunity occurred, to take up investigations with regard to dialysed iron itself. But with regard to his experiments on chloroxide he (Dr. Gowers) stated in the *Practitioner*, of July, 1878, and also in the *Lancet*, of May 11, 1878, that in one of the two cases there referred to, the increase of the number of the red blood corpuscles went up in one case from 47 per cent. to 102 per cent. from February 20 to May 22. The counting was performed by a special apparatus by the aid of a microscope. Then in the other case, that of an extremely anæmic girl, there was only 26 per cent. of the corpuscles counted at one date, but they increased up to 92 per cent. in a very short period. Further Dr. Gowers stated that when the iron was omitted for a time, the number of corpuscles fell, but it rose again when the iron was resumed. This occurred with the basic oxychloride of iron. He (Mr. Martindale) would not defend dialysed iron at all, for Professor Redwood's experiments tended to show very much against it; but still he was inclined to give the Scotch verdict, that it was "not proven," and that careful clinical observation was required to supply what was wanted further on the subject. If dialysed iron was as useless as Professor Redwood supposed, then an attempt should be made to produce something like that which Dr. Gowers wanted to get for use in a case where the patient was suffering from extreme anæmia and no strong acid preparation of iron could be borne. In that case Dr. Gowers wanted to get a preparation that would not irritate the stomach. The patient was suffering from gastric irritation; and therefore he tried the oxychloride with these good results. If it gave such good results it was a preparation which ought to be used in preference to dialysed iron and the stronger acid preparations, such as the chloride, sulphate, or the ferric chloride, in these cases. It was not for pharmacists "to suggest a theory by which medicinal activity might be reasonably ascribed to a substance having properties which this preparation had been proved to possess." Facts were wanted, not theories, and the search must not be limited to chemical facts, but extend also to therapeutical ones. It was quite true, as Dr. Gowers had particularly pointed out in one part of his researches, that it was only in a case where the patient was anæmic that the preparation was of any help at all. If the patient was not needing iron, no increase of the red blood corpuscles took place. It was only when the patient was needing iron that any improvement took place, and that improvement, as he showed, took place in two ways, an increase of the amount of hæmoglobin, and also, as he clearly showed in the article in the *Practitioner*, by an increase of the number of corpuscles as well as the amount of the hæmoglobin contained in the blood.

Dr. Symes said that as Professor Redwood had mentioned his name in connection with the suggestion of the last experiment which he had made, he might remark that it was made at the suggestion of some medical men connected with the Liverpool School of Medicine, who for a long time had prescribed dialysed iron, assuming that it was the iron that had passed through the dialyser, and not that which remained. However ridiculous that might seem, this mistake was only brought to their notice by a letter which appeared in the *British Medical Journal*, where a London medical man had also discovered the same thing, and he believed that the discovery tended to bring dialysed iron into disrepute. The Liverpool gentlemen came to him, and rather called him to account for not telling them before that it was the other way about. They then suggested that he should determine whether dialysed iron was digested at all. He made the same crude experiment which he had explained to Professor Redwood; but there was just one little difference between Professor Redwood's experiments and his (Dr. Symes's). That difference might account for a little difference in the result. Professor Redwood prepared his peptone much as he (Dr. Symes) prepared his, and digested it for two hours with dialysed iron at 100°, and then Professor Redwood dialysed the preparation for two days. Instead of this he (Dr. Symes) mixed his dialysed iron with the peptone, and dialysed them at once, and maintained them at the temperature of 100° for two hours. He presumed that Professor Redwood's digestion for two days was not done in a dialyser.

Professor REDWOOD: No.

Dr. SYMES said that in his experiment the digestion being done in the dialyser, certainly assumed more of the character of what was likely to occur in the stomach and intestinal canal. He found that iron diffused through, and so decided was the result on testing for iron that he at once came to the conclusion that a certain amount of the iron had digested, and he never even repeated the experiment, but assured the medical gentlemen that at least some of the iron digested. He had that day received a pamphlet, in which it was stated that Dr. Longwood, of Massachussets, had made some experiments of the same physiological kind which Mr. Martindale had mentioned. Dr. Longwood had given the iron to anæmic patients and, by means of a suitable apparatus, a glass slide divided into squares, examined the blood of the patients after giving the iron at different times and under all circumstances. He had photographed the appearances presented in a number of experiments, and he had certainly determined that the number of corpuscles had really increased in the patient after giving dialysed iron when the patient was in a suitable state for receiving it. Dr. Longwood had mentioned an experiment which was interesting to pharmacists. He took 40 parts of dried dialysed iron and digested it for five hours at 100° Fahr., with about 200 grams of an artificial gastric juice. After digesting it for that length of time, he filtered it carefully, and he found that an amount of dialysed iron equal to 40 parts had lost 15 parts of iron, really digested and become soluble in the gastric juice, and passing perfectly clear through the filter. He (Dr. Symes) must say that it struck him that it would have been better if he had tried to dialyse it again. But he gave details which showed that he did succeed in digesting 15 parts of dialysed iron out of 40 parts in the course of five hours.

Mr. POSTANS said that Professor Redwood, in his very valuable paper, had brought out one or two things which appeared as very important offshoots. Professor Redwood had strongly advocated the use of ammonio-citrate of iron. He (Mr. Postans) might be permitted to allude to one thing in connection with the experiments which had been so ably conducted. He noticed that the Pharmacopœia said that ammonio-citrate of iron when incinerated on exposure to air left not less than 27 per cent. of oxide of iron. In the first experiment Professor Redwood had taken a 10 per cent. solution, and he found that the ammonio-citrate of iron contained 32·21 per cent. of peroxide; in the second experiment it contained 30·9 per cent. of the peroxide; in the third it contained 30·65 of peroxide; and in the fourth it contained 25·92 per cent. of peroxide. In these days of standard weights and standard solutions, and standard everything, it appeared important that manufacturers should supply dispensing chemists with preparations of ammonio-citrate of iron in every respect in accordance with the British Pharmacopœia.

Mr. UMNEY, alluding to ammonio-citrate of iron, said that he thought everyone knew that the statement in the Pharmacopœia was incorrect. He was quite assured that Professor Redwood knew that the percentage, at any rate, of ferric oxide as stated in the Pharmacopœia did not represent the ammonio-citrate of pharmacy.

Professor REDWOOD: I do not say so.

Mr. UMNEY said that if an ammonio-citrate was properly prepared, it would contain 30 per cent. of ferric oxide. The Pharmacopœia preparation containing 27 per cent. was not to be met with at the present time in commerce.

Mr. LUFF said that he should like to reply very briefly to a query that emanated from Professor Attfield. He took it that the passage of iron from the alimentary canal into the circulatory system was purely a process of diffusion. There were openings from the walls of the stomach and of the intestines into the interior, such as the peptic glands, the glands of Lieberkühn, and the glands of Brunner; but their function was simply to discharge fluids into the interior, and not to remove fluids from the interior of the stomach or from the intestinal canal. Moreover, supposing that there were actual pores, there were no actual pores into the capillaries of the blood-vessels into which the iron must pass. He took it, therefore, that the passage of the iron must be purely an act of diffusion.

Professor REDWOOD, in reply, referred first to what had been stated by Mr. Umney. He (Professor Redwood) was not prepared to say that the representation given in the Pharmacopœia was by any means an incorrect one. On the contrary, he considered it to be strictly correct. It was stated in the Pharmacopœia that ammonio-citrate of iron should not contain less than 27 per cent. of oxide of iron, and that was a perfectly correct statement. He was quite aware that the article as met with in commerce usually contained more than that proportion, and having had considerable experience in the manufacture of this article he knew that it was impossible to define exactly what the proportion would be. Referring to the commercial samples he had used in his experiments, the proportion of oxide of iron had ranged from 25·9 up to 31 or 32 per cent., and his experiments went to show that the sample with the smallest proportion underwent a better and more sustained diffusion than some of those with a larger proportion. The more generally occurring proportion was certainly 30 per cent. or more, and this arose from the fact that the preparation was more easily scaled when it contained the larger proportion. There might be another reason, but he would not ascribe to manufacturers the motive that by increasing the proportion of oxide they diminished the cost of manufacture, oxide of iron being cheaper than citric acid. With reference to the observation Professor Attfield started with, that a medicine must be nasty if it was to be of any use, he would observe that ammonio-citrate of iron was not a nasty preparation, and it was essentially a preparation in which there was as little of the styptic and inky character about it as there was even in the dialysed iron. This was one of the great recommendations of that and the corresponding preparations of iron. He admitted there was force in Professor Attfield's suggestion that possibly in the process of dialysis or diffusion the salt broke up into two or three compounds, and that a salt which was uncrystallizable in the state in which it would be used, might nevertheless consist of a mixture of salts some of which were crystallizable. And, moreover, although it was not at the present time known that these scaled preparations were capable of crystallization, it might yet turn out that some of them were so. One of the experiments he made some years ago was upon glycerine, which at that time was looked upon as perfectly uncrystallizable. He found that glycerine would diffuse freely, quite as well as cane sugar, and very soon afterwards it was shown that glycerine might be obtained in a crystalline form, although it crystallized with great difficulty. The fact that certain substances had not hitherto been obtained in a crystalline condition would have induced many to look on them as amorphous, and therefore as colloidal, and, if colloidal, as not capable of being absorbed to any very appreciable extent during their passage through the intestinal canal. With reference to what Mr. Martindale had said, he (Professor Redwood) was quite prepared to admit that the oxychloride which he had referred to might have medicinal efficacy, although dialysed iron might not. He did not, however, say that dialysed iron had no medicinal efficacy. He only wanted to see some theory in accordance with which they could reconcile its properties with medicinal activity. Although Mr. Martindale had suggested that he (Professor Redwood) should make the experiment with oxychloride, he did not consider that that would be at all conclusive. It did not bear upon his subject. Oxychloride might be anything. It might be iron in so highly basic a condition that it would not pass through, or there might be in it a large proportion of iron which would pass through. With reference to Dr. Symes's observations, he was much obliged to him for having pointed out what he seemed to consider a defect in his experiment with peptone. He freely admitted that the experiment would have been more satisfactory as made by Dr. Symes.

A cordial vote of thanks was accorded to Professor Redwood for his paper.

In consequence of the lateness of the hour, a paper by Mr. Henry Greenish, entitled a "Note on Cantharides," which will be printed next week, was taken as read, and the meeting was then adjourned until Wednesday, the 7th of April.

EXAMINATIONS IN LONDON.

February 18, 1880.

Present—Mr. Sandford, President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

Dr. Greenhow was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

Seven candidates were examined. *Three* failed. The following *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Bucher, William Henry ....Crediton.
Cherrington, Geo. Widdowson...Newark.
Corlett, Edwin ....Ramsey.
Drew, Henry William............Southwark.

MINOR EXAMINATION.

Twenty-two candidates were examined. *Twelve* failed. The following *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Bainbridge, Arthur ....Birkenhead.
Bartlett, Arthur Henry ....Newport, I. W.
Beech, Joseph ....Birmingham.
Booth, Frank.........................Mansfield.
Carveth, William Uglow.........Plymouth.
Christopherson, Fred ....Ipswich.
Coleman, Edward..................Kidsgrove.
Cooper, Henry Samuel ....Droitwich.
Davidson, Peter ....Insch.
Fry, Samuel ....Bishop's Waltham.

February 19, 1880.

Present—Mr. Sandford, President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

Dr. Greenhow was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

Seven candidates were examined. *Four* failed. The following *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Fryer, Charles Harry ....Leeds.
Park, Charles James ....Devonport.
Tanner, Herbert ....Wendlebury.

MINOR EXAMINATION.

Twenty candidates were examined. *Eleven* failed. The following *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Abington, Leonard Yates ......Newcastle-un.-Lyne.
Elborne, William ....Grantham.
Fazan, Charles Herbert ....Colchester.
Fryer, John ....Stockton-on-Tees.
Gledhill, Robert ....Dewsbury.
Gossling, William Richard ......Wimborne.
Griffiths, William..................Neath.
Harries, David ....St. Clears.
Jenkins, Evan ....Lampeter.

February 25, 1880.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

Dr. Greenhow was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

Six candidates were examined. *Four* failed. The following *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Taylor, James Bennett ....Bedford.
Wise, Joseph Norman ....Carlisle.

MINOR EXAMINATION.

Twenty candidates were examined. *Twelve* failed. The following *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Johns, Henry Benj. Jeffery ...Southampton.
Jones, John Albert ....Liverpool.
Kennett, Edward ....Sandgate.
Killick, Charles R. ....London.
Knights, George Ekins ....Ashby-de-la-Zouch.
Knott, Henry Archer ....Walthamstow.
Newton, George Harry ....Ashby-de-la-Zouch.
Oliver, Henry Charles Hewitt Maidstone.

MODIFIED EXAMINATION.

Three candidates were examined. *Two* failed. The undermentioned passed, and was declared qualified to be registered as a Chemist and Druggist:—

Wright, Walter....... ....London.

February 26, 1880.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

MINOR EXAMINATION.

Twenty-seven candidates were examined. *Eight* failed. The following *nineteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Jones, John James ....Kidderminster.
Mills, Richard Powell ....Weston-super-Mare.
Moore, Henry ....Brighton.
Nelson, Harry ....York.
Palmer, James Spencer ....Penzance.
Parker, William Marris ....Walcot.
Peake, William Alexander......Charlton-in-Dover.
Price, Frederick ....Liverpool.
Robinson, George Duncan R....York.

Slicer, Walter .... Bingley.
Smith, John .... Liverpool.
Sutcliffe, Isaac .... Mossley.
Taylor, Fred..................... Exeter.
Thomas, John .... Crosswell.
Thornley, Frederick..................... Devizes.
Tookey, Edwin James .... Birmingham.
Webb, William Henry .... Hereford.
Webster, George S. Gothard ... Alfreton.
Wolstenholme, Abel Joseph...... Southport.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's Examination:—

Certificates of the University of Cambridge.

Coleman, Thomas..................... Bicester.
Sharpe, William Salisbury ...... Bourne.
Smith, Ernest .... Dudley.
Wilson, Francis Charles .... Rugby.

Certificate of the College of Preceptors.

Chaston, Alfred E. .... Winchester.

Certificate of the Royal College of Surgeons of England.

Fooks, Henry .... London.

EXAMINATION IN EDINBURGH.

February 18, 1880.

Present—Messrs. Ainslie, Borland, Gilmour, Kemp, Kinninmont, Stephenson and Young.

Professor Maclagan was also present on behalf of the Privy Council.

MINOR EXAMINATION.

Fifteen candidates were examined. *Five* failed. The following *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Drummond, John Alexander ... Elgin.
Glanville, George Grantley...... London.
Hutcheon, William .... Montrose.
Jackson, Thomas .... Scorton.
Marsden, William .... Manchester.
Miller, John Hean .... Newburgh.
Noble, Alexander .... Glasgow.
Simpson, Alexander..................... Huntley.
Stewart, William .... Helensburgh.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, Feb. 19. Mr. Warren De La Rue, President, in the chair. The list of officers and council proposed by the Council for the ensuing year was read from the chair:—President, H. E. Roscoe; Vice-Presidents, F. A. Abel, C.B., B. C. Brodie, Warren De La Rue, E. Frankland, J. H. Gladstone, A. W. Hofmann, W. Odling, Lyon Playfair, A. W. Williamson, J. Dewar, J. H. Gilbert, N. S. Maskelyne, V. Harcourt, R. Angus Smith, J. Young; Secretaries, W. H. Perkin and H. E. Armstrong; Foreign Secretary, Hugo Müller; Treasurer, W. J. Russell; other members of Council, M. Carteighe, C. Graham, C. W. Heaton, H. McLeod, E. J. Mills, J. M. Thomson, W. C. Roberts, W. A. Tilden, W. Thorp, T. E. Thorpe, J. L. Thudichum and R. Warington. The following gentlemen were elected auditors:—Messrs. A. J. Greenaway, G. H. Makins and F. J. M. Page, being proposed by Mr. Warington and seconded by Mr. C. G. Neison. The following certificates were read for the first time:—E. C. Copas and H. H. Slater. During the evening the following gentlemen were balloted for and declared duly elected Fellows of the Society:—Messrs. J. C. Evans, W. H. Glazier, J. Hogarth, K. W. Hedges, R. Howell, A. Lloyd, W. Macnab, A. R. Miller, J. McCarthy, G. H. Morris, P. Mathews, W. O. Prosser, H. J. Pasley, W. B. Roberts, G. Salet, A. G. Salamon, T. Terrell, G. Wilcock and W. H. Wood.

During the evening the President mentioned that he has recently seen a crystal prepared by Mr. J. B. Hannay, of Glasgow, which had been examined by Mr. Nevil Story Maskelyne and found to have the angles, lustre, hardness, etc., of the diamond. A similar crystal had been burnt and found to contain 97 per cent. of pure carbon. It was, therefore, to all intents and purposes, a diamond.

The following papers were read:—

On the Production of Ozone during the Combustion of Coal Gas. By R. H. Ridout.—Some years ago the author possessed a Bunsen burner, which always emitted the smell of ozone; by means of an aspirator and a suction-tube it was determined that the greatest production took place at the apex of the flame. The burner, however, was injured, and the author has not been able to get the same action again either with it or with other burners. He noticed subsequently, while working with singing flames, the same smell; in consequence, he made several experiments: a glass tube, $\frac{1}{8}$ inch bore, conveying coal gas, was placed inside another tube $\frac{5}{8}$ inch bore, 15 in. long. A strip of iodized paper was pasted inside the tube throughout its length. The gas burned with a blue flame. After a short interval the paper was discoloured, and on being moistened gave the oxidizing reaction, commencing at a point about half an inch above the flame and decreasing towards the top. The author endeavoured to apply this method of providing ozone to technical purposes, but without success. From several experiments the author concludes that the sulphur in the coal gas is eliminated as sulphuric acid under the above circumstances. Various experiments were now made to determine the nature of the body which gave the blue reaction with starch. It was not absorbed by passing it through caustic potash or water, which would remove all oxides of nitrogen, whilst no oxidizing action was observed in a bichromate of potash solution, indicating the absence of peroxide of hydrogen. The author concludes, therefore, that the substance formed was ozone. Ether and alcohol burned from wicks of capillary glass tubes gave similar results. Ozone was also produced by the flame of a minute glass Herapath blow-pipe, as long as the cone was perfect and of a violet colour; but as soon as the inner bright green cone was exposed the production of ozone ceased. The same violet colour attends the formation, whilst a green tint indicates the destruction, of ozone in the electric discharge.

Mr. Warington rather doubted whether all the oxides of nitrogen would be retained by the absorbing apparatus described.

Dr. Armstrong mentioned that this production of ozone by gas flames under certain conditions had been patented some time since.

Mr. Riley had noticed the smell of ozone round the tuyeres of blast-furnaces which were not working properly.

Mr. Kingzett insisted on the great difficulty in removeing traces of ozone from a comparatively large quantity of air. A very long tube and a current of low velocity were essential. He did not think that the experiment just related proved the formation of ozone.

Dr. Wright confirmed the statements made by Messrs. Warington and Kingzett. Carbonic acid would pass through caustic potash, and hydrochloric acid through silver nitrate solution unless special precautions were taken.

The President said he had used a washing vessel with spiral divisions with great success, a large amount, 20–30 ft., of washing surface being thus obtained in a moderate compass.

The author having briefly replied, Dr. Russell took the chair and called on Professor McLeod to make some remarks upon the production of ozone by the passage of moist air over phosphorus. At the last meeting Mr. Kingzett pointed out an error in some calculations which the author had recently brought before the Society; the correctness of this criticism the author frankly admitted, but did not think that the necessary alteration in the results invalidated his arguments (*Chem. Soc. J.*, Feb., 1880) as to the formation of ozone during the slow oxidation of phosphorus. In his opinion the evidence was quite conclusive without the quantitative experiments. He had investigated the reaction simply to satisfy himself as to its nature, and at the commencement thought that hydroxyl was probably formed, but the results of about a hundred experiments had convinced him that the substance formed was ozone. He had not observed any evidence of the formation of hydroxyl. Thus phosphorus was placed in a cylinder with sulphuric acid and bichromate of potash. After some time the liquid and the phosphorus were removed and the gas shaken up with water; the liquid did not affect potassium iodide and starch whilst the gas instantly turned the mixture blue. He was glad to hear that Mr. Kingzett was continuing his researches on the subject, and would be pleased to learn that the substance was peroxide of hydrogen and still more gratified if it turned out to be ozone.

Mr. Kingzett in reply said that he believed Andrews had shown that the active substance in air, in which phosphorus had been allowed to oxidize slowly, was removed by prolonged agitation with water, and that a French chemist had recently observed that the water gave the reactions of ozone, but went on to show that this reaction was due to phosphorous acid. He did not think that the presence of ozone had been thoroughly established.

Mr. R. H. Ridout then gave an account of some new and improved laboratory appliances which were exhibited. A test-tube brush, a piece of red or black indiarubber tubing about 3 inches long and ¼ inch bore has seven longitudinal and parallel slits made to within ¼ inch of each end. One end is then inverted and turned back until it is over the other end, the tube is finally secured to a wooden handle with twine.—A blow-pipe for spirit lamp or gas.—A hydrogen sulphide apparatus: Two Winchester quarts are fitted up like wash bottles, the long tubes being connected together by a short piece of indiarubber tubing. The short tube of one bottle is open, the other has a piece of indiarubber tubing and a pinch cock. This tube is connected with a sulphuretted hydrogen apparatus and the pinch-cock opened; the gas drives the oil, with which the Winchester quart is filled, over into the other bottle which is empty, when the first bottle is filled with SH_2 the apparatus is ready for use. The liquid to be treated is placed in a flask having an indiarubber cork and tube; when the liquid is boiling the latter is connected with the above apparatus and the steam allowed to condense; the SH_2 is rapidly absorbed by the liquid. The liquid is again boiled to drive back the superfluous gas into the bottle. No smell is perceptible during the operation.—Filter funnel: The author has had funnels made with stem 0·5 mm. inside, and sides ground to an angle of 60°; no platinum cone is necessary. He has also contrived an apparatus for delivering the liquid and precipitate into the centre of the filter paper.—Continuous aspirator: This consisted of a piece of ⅝ inch lead tubing bent into a circle with a hole $\frac{1}{10}$ inch in the centre of the concave part of the bend. A suction tube is soldered into this hole. As the velocity of a current of water passing round the bend is greatest on the outside a relative vacuum is caused on the inside.—Filter pump: A vacuum is obtained by filling a flask with steam and condensing it.—Apparatus for taking the gravity of liquids in terms of water at the same or other temperature: Two graduated U tubes are connected by a T tube provided with a pinch-cock, the liquids are placed one in each U tube; air is then blown in by the T tube and the pinch-cock closed. The liquids are displaced inversely as their gravities. One U tube, B, is kept filled with pure distilled water, consequently

$$\frac{\text{displacement in B}}{\text{displacement in A}} = \text{Sp. gr. of A.}$$

Messrs. Wooley of Manchester make the filter funnel. Messrs. Townson and Mercer supply the other apparatus.

Dr. Armstrong then made some remarks on—

Some Recent Researches on the so-called Unsaturated Compounds.—Results recently obtained by several perfectly independent investigators have thrown doubt on the theory usually held as to the constitution of the above substances, and reopen the question of the presence of dyad carbon in these compounds. Menschutkin has pointed out (*Berl. Ber.*, xiii., 163), from his experiments on the etherification of hydrosorbic and sorbic acids that the former is a primary and the latter a tertiary acid, *i.e.*, that the former contains the group CH_2COOH and the latter the group C,COOH. Fittig has shown that hydrosorbic acid is either $C_3H_7CH=CHCOOH$ or $CH_3CH=CHCH_2CH_2COOH$, the latter appearing to be the more probable. Menschutkin's observations would seem to point in the same direction. But, from an acid having this formula, it is not possible to derive an acid containing the group C,COOH unless it be assumed that two atoms of hydrogen are withdrawn from the carbon atom with which the COOH group is associated, and consequently, that sorbic acid contains a dyad carbon atom. Reference was then made to Fittig's suggestion of the formula CH_3CH (COOH), C,COOH for either citra or mesaconic acid. The determination of the rate of etherification of the three pyrocitric acids by Menschutkin's method would seem to promise interesting results, although as it is to be expected that the phenomena will be complicated by the occurrence of isomeric change, the method is not so likely to furnish any very conclusive evidence in this case. Lastly, Dr. Armstrong drew attention to the recent important paper by Brühl (*Liebig's Annalen*, 200), and especially to the remarkable conclusions arrived at by him with reference to bodies of the acetylene type.

After a few remarks by Mr. Williams and Dr. Wright, the Society adjourned to March 4, when a lecture will be delivered by Prof. T. E. Thorpe, "On the Relation between the Molecular Weight of a Body and its Specific Gravity when in the Liquid State."

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of this Association was held on Wednesday evening, February 25, Mr. Branson in the chair, when a paper was read by Mr. I. R. James, on "New Remedies."

The author proceeded to describe some of the most used new remedies of the present time, such as caffeine, ethylic, ether, menthol, chaulmoogra oil, duboisine, picrotoxin, hammamelis, *Fucus vesicatoria*, iodoform, etc.

The paper was illustrated by some excellent specimens, and at its close an interesting discussion followed, in which several members took part.

A vote of thanks to Mr. James, proposed by Mr. Robinson, and seconded by Mr. Tharle, brought the proceedings to a close.

Correspondence.

Royal Naval Reserve.—A correspondent asks for information whether in all ports where the Royal Naval Reserve musters for drill, the medicines with which the men are supplied are as a rule dispensed by the medical men who prescribe them.

W. J. R.—The Acts of Parliament and Orders of the Board of Inland Revenue that relate to the keeping and sale of methylated spirit will be found in the Calendar of the Pharmaceutical Society for the present year.

Communications, Letters, etc., have been received from Messrs. Flückiger, Greenish, Abraham, Haydon, Mackay, Gehe and Co., Learoyd, Woodland, Jackson, Druce, Secretary of Chemists' Assistants' Association, A. A. P., G. C. R. O., J. R Y., J. W., E. T. G., X. Y. Z., W. J. R., Embryo, Ball, Junior, Mathetes.

NOTE ON CANTHARIDES.*

BY HENRY G. GREENISH.

In the autumn of last year, a sample of cantharides was handed to Professor Dragendorff, of the Pharmaceutical Institute, by a chemist of this town, with the remark that he had not succeeded in preparing an active Drouott's plaster from the flies, and doubted, therefore, their good quality.

I willingly acceded to Professor Dragendorff's request to determine quantitatively the amount of cantharides in the sample, and, in doing so, followed the method indicated by him in 'Die chemische Werthbestimmung einiger starkwirkender Droguen,'† which is briefly as follows:—

25 to 30 grains of the powdered flies are freed from oil by treatment with petroleum ether. Cantharidin being not insoluble in petroleum ether, a correction must be made in the amount of cantharidin found to compensate for the loss incurred by treatment with this solvent. This loss has been determined by Dragendorff to be for 100 c.c. petroleum ether 0·0108 gram cantharidin.

The flies freed from oil are now thoroughly moistened with solution of soda, and the mass thus produced dried in a porcelain dish on the water-bath. By this treatment, during which quantities of ammonia gas are evolved, a soluble cantharidate of soda is formed, which is subsequently decomposed by hydrochloric acid. It must be borne in mind that not all the cantharidin in the flies is present in the free state. Dragendorff has already shown‡ that cantharides containing about 0·3 per cent. cantharidin yielded only half that quantity to boiling water, the remainder being extracted by solution of potash. Among the combinations of cantharidin insoluble in water occur probably salts of lime and magnesia; among the soluble, cantharidic acid, possibly cantharidate of ammonia, etc. (the ammonia being derived from the albuminous substances by their decomposition during the drying of the flies).

The dried mass (containing now cantharidate of soda) is removed from the dish and finely powdered. It is then transferred to a flask, 25—30 grams of chloroform added, and the whole rendered strongly acid by the addition of dilute hydrochloric acid. This is then well shaken with from 25—30 grams of pure ether, the ether-chloroform solution separated and shaken with distilled water. The shaking with ether is repeated until cantharidin ceases to pass into solution. The major part of the ether can be recovered by distillation, the residue being allowed to evaporate to dryness in a flat bottomed glass dish. This residue is then transferred with the aid of a small quantity of absolute alcohol to a tared filter, and washed first with alcohol and then with two or three cubic centimetres of water. Should traces of oil still adhere to the cantharidin they may be removed by washing with petroleum ether. The quantities of these liquids used must be noted, since a slight correction has to be made, viz., for 10 c.c. alcohol 0·0077 gram, for 1 c.c. water 0·0005 gram. The washed cantharidin is dried at 100° C., weighed, and the corrections for petroleum ether, alcohol and water added to the figure so found.

Proceeding in this way 31·1405 grams of the flies in question yielded me 0·2022 gram of nearly white cantharidin. The corrections for petroleum ether, alcohol, and water amounted to 0·0303 gram, total cantharidin 0·2325 gram, equivalent to 0·746 per cent. This is largely in excess of the amount of cantharidin found by Dragendorff in good samples of Spanish flies, viz., 0·351 to 0·5 per cent., and serves to illustrate in a striking manner the remarks on cantharides by that chemist published in the *Pharmacist.**

"Apothecaries frequently complain that some cantharides do not furnish an active blistering plaster; that the same furnish, even when treated with acetic ether, an extract so poor in cantharidin, that with its aid no good Drouott's blistering tissue can be produced. In most cases the opinion is expressed that the flies contain too small a percentage of cantharidin. My experience teaches me to discredit the latter opinion. It is possible to obtain good preparations even from such apparently poor cantharides, it being only necessary to thoroughly extract the cantharidin they contain. . . . . I would say that by the aid of soda or potassa the entire amount of cantharidin contained in the flies may be rendered active. The finely powdered flies are mixed to a paste with diluted alkaline lye of about 1·1 sp. gr., heated in the water-bath for twenty-five to thirty minutes, when sufficient muriatic acid is added to have a trifling surplus of the same, and the whole mass is dried rapidly in the water-bath. The residue, which we may call prepared cantharides, is powdered anew, and employed for the preparation of the plaster, or for the extract with acetic ether for use upon tissue."

Had the Spanish flies examined been subjected to this treatment with solution of soda and hydrochloric acid, they would have yielded a blistering plaster of the activity of which there would have been no doubt.

I am able to give a further proof of the very imperfect nature of the exhaustion of the flies by ether in the estimation of cantharidin in the residue after treatment with that menstruum. Forty pounds of such residues were sent to Professor Dragendorff by a house in St. Petersburg engaged in the manufacture of large quantities of Drouott's plaster. The treatment of a kilogram had yielded such an unexpectedly large quantity of cantharidin as to offer an inducement to estimate the same more exactly.

29·297 grams of the exhausted flies, finely powdered, yielded me 0·2218 gram of nearly pure cantharidin; correction for alcohol and water 0·0192 (the flies having been previously exhausted with ether no correction for petroleum ether was necessary); total amount 0·2410 gram, equivalent to 0·822 per cent. of cantharidin.

The average quantity of oil removed by ether being about 12 per cent., we may reckon the amount of cantharidin in the original flies not extracted by ether to be 0·723 per cent., and assuming the cantharides to have been equally rich in cantharidin with the first sample the amount of that principle extracted by ether would amount to only 0·023 per cent.

Manufacturing druggists would do well, therefore, to turn their attention to their cantharides residues, especially such as have been extracted with simple solvents (ether, alcohol, etc.), in which salts of cantharidin are insoluble. The marc, for instance, from tinct. cantharidis still contains a considerable pro-

* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, March 3, 1880.

† St. Petersburg, 1874.

‡ *Pharmacist*, v. 78; *Pharm. Journ.* [3], ii. 1029.

* *Loc. cit.*, p. 79.

portion of cantharidin. The only English price list at my disposal, that of Messrs. Southall Brothers, quotes cantharidin at 1*s.* per grain, and leaves no doubt of the profitability of working up residues containing $\frac{3}{4}$ per cent. of that principle.

That other species of *Cantharis* may excel *Cantharis vesicatoria* with regard to the amount of cantharidin contained in them, is shown by the estimation of a sample of *Cantharis adspersa* presented to the Museum of the Pharmaceutical Institute, by Professor Arata, of Buenos Ayres. Although the flies arrived mouldy and in bad condition I succeeded in obtaining from 12·3195 grams of dry insects 0·2917 of very nearly pure white cantharidin; correction 0·0256; together 0·3173 gram; equivalent to the very large amount of 2·573 per cent. Noticeable in this sample and in the first sample of *Cantharis vesicatoria* is the comparatively small quantity of fixed oil. While Dragendorff finds as an average in good cantharides 12 per cent., I have obtained from *Cantharis vesicatoria* (approximately) 7·7 per cent., and *Cantharis adspersa* only 2·6 per cent. Possibly the weather prevalent during the life of the insect, the age of the same, etc., may have an influence on the amount of oil and cantharidin.

Dorpat, Russia.

ORIGIN OF THE CALISAYA LEDGERIANA OF COMMERCE.

BY JOHN ELIOT HOWARD, F.R.S.

I have been induced to review the question of the origin of the now celebrated bark above named; and am able to publish for the first time details which, at the request of Mr. Ledger, I withheld in 1876, when I gave extracts from his letters in my 'Quinology of the East Indian Plantations.'

We are indebted not to systematic botanists, but to the experience and practical sagacity of an Indian, for our knowledge of the best kinds of calisaya bark; whilst to Mr. C. Ledger belongs the whole credit of the enterprise of obtaining the precious seed to which the hope of future success attaches in Java and perhaps in other parts of the East Indies.

I have pleasure in *now* recording the name of the above-mentioned Indian servant of Mr. Ledger—Manuel Incra Mamani—to whom was entrusted in 1861 the commission of obtaining the seed of the best calisaya. At page 48 of my (unfortunately) little accessible 'Quinology of the East Indian Plantations' will be found many details, but I now quote more fully from Mr. Ledger's original letters. Under date December 22, 1874, I find the following:—

"Manuel Incra Mamani delivered the seed he had collected in June, 1865. He then told me that the best bark trees had not produced ripe seed for four years previously. When the trees were full of flower and most promising a frost (*helada)* in April destroyed it all. The inferior sorts had not suffered. He had been cutting bark with his sons and patiently waited for opportunity for complying with my orders, obtaining only the best sort.

"He assured me, too, he had seen several parties collecting seed for gentlemen in La Paz; that they did not obtain a single good seed till 1865; and this assertion seems now to be corroborated by result of Schuhkraft's remittances in those years. (See further.)

"After paying him well, he returned to his home in Bolivia, having engaged with me before leaving to obtain more seeds of the Rojo, the Morada, the Naranjada, the calisaya of Moco-moco."

The sequel is a sad one. After relating the particulars of the murder of another servant (Cabrera), Mr. Ledger says—

"Poor Manuel is dead also; he was put in prison by the Corregidor of Coroico, beaten so as to make him confess who the seed found on him was for; after being confined in prison for some twenty days, beaten and half starved, he was set at liberty, robbed of his donkeys, blankets and everything he had, dying very soon after."

The first portion of the above seed passed into the hands of the Dutch Government. In my work the reader will find particulars about its reception in Java. Owing to Mr. Ledger's good drying and care, the seed arrived in such condition that it had not lost its germinative power. I inspected the remainder at the request of the British purchasers, and found it apparently of the best quality and condition. The capsules reminded me of those of "*Cinchona Calisaya*, var. *microcarpa*, Wedd.," published by Dr. Weddell in the 'Annales des Sciences Naturelles,' 1870. This I recognize as the source of the Zamba sort, of which I have magnificent specimens. Dr. Weddell says: "Les cascarilleros du pays me l'ont signalée comme donnant une écorce supérieure en qualité a celles des autres variétés croissant dans les mêmes lieux, et j'avoue que j'ai été heureux de voîr cette appréciation de l'homme des bois confirmée par M. Howard."

In fact it is only in this description that Dr. Weddell approached the best sorts, the *Calisaya vera* being by no means equal in produce.

In his second journey Dr. Weddell obtained specimens of the Zambita, Verde and Morada varieties of calisaya, of which he obligingly gave me specimens, which are now before me. The bark of these sorts, especially the Zambita and the Morada, resembles considerably that of the Ledgeriana.

I do not assert entire identity. The seed producing the Ledgeriana was gathered, according to Manuel, from about fifty trees, chiefly of the Rojo sort. These different forms of the best calisaya are distinguished by the cascarilleros by the colour of the leaves; and Ledger thinks my plate of the *Calisaya Anglica* resembles in the colour of the leaf that of the Rojo. Elsewhere he gives me, as descriptive of the same, that of *sangre de toro*, or bull's blood. The variation in the colour and form of the leaves does not seem to have any connection with the value of the bark.

I have said that Dr. Weddell published the Zamba or Zambita sort as the var. *microcarpa*; but not having seen the flowers, his description leaves much to be desired. The *Calisaya Ledgeriana* of Java is, as I have shown, the legitimate produce of the seed of the fifty trees above mentioned. I should think that no botanist has been within some hundred miles of the almost inaccessible banks of the Mamore, where these were met with, or of the Beni, where Pedro Rada collected from trees (as he told me), from 120 to 150 feet in height, some of the finest calisaya bark ever brought into the English market; conveying his precious cargo by the long and perilous navigation of the Rio Madeira, as I described in Seemann's *Journal of Botany* in 1869. This sort was called Morada; and if the coloured drawing given there is compared with my plate V. in 'Quinology of the East Indian Plantations,' it will be found closely to resemble.

We have then no means of further botanical description, except from Java; and from thence I have been supplied with forty-four excellent specimens, comprising all the barks cultivated. These I fully described in the work above named, and from these published the first description of the sort as "*Cinchona calisaya*, var. *Ledgeriana*, How." The Ledgeriana has a peculiar character, to be recognized in the seedlings at a very early stage, but variable as to form and colour in the after-growth. It must be admitted that the most striking characteristic of the Ledgeriana is the bark, which is at once recognizable by a person familiar with these observations; but scarcely capable of being made the basis of botanical definition. The flowers are also described as small, white and "nutantes;" but I am not certain that this is capable of being asserted without some slight modification. I hope to succeed in flowering my own specimens, which I would then describe more perfectly. On the whole I have found it best to present to the reader of my book three forms of the plants, relatively (according to the analysis of the flower) the *male*, *female* and *neuter* forms—that is those in which the above elements preponderate, or are in even balance. The male (*macho*) plants in the cinchonæ are always the most highly coloured.

The male, or *macho* form (plate IV.), is the most coloured (and should be more of the *bull's blood* colour). The contents of this bark, as given from the tree itself by Moens are (per cent.):—

Quinine	9·06
Cinchonine	0·10
Amorphous Alkaloid	1·40
Total	10·56

The female form (*hembra*), plate V., has leaves of a green colour, and gave to the same chemist:—

Quinine	9·90
Amorphous Alkaloid	2·09
Total	11·99

(Of this I have given a fine plant to one of our Ceylon cultivators, who is about sending it out to India).

The third form, plate VI., gave:—

Quinine	9·97
Amorphous Alkaloid	1·70
Total	11·67

Compare these with the "*Calisaya Javanica*," of Hasskarl, which gave (in average of eighteen samples, 1879, Moens):—

Quinine	0·70
Cinchonidine	0·50
Quinidine	0·30
Cinchonine	1·20
Amorphous Alkaloid	0·30
Total	3·00

and the "*Calisaya Javanica*," of Schuhkraft (average of sixteen samples, 1879, Moens):—

Quinine	0·50
Cinchonidine	0·30
Quinidine	0·20
Cinchonine	1·20
Amorphous Alkaloid	0·20
Total	2·40

It must be well understood that none of these sorts originated in Java, but were and are well distinguished as "best" and "inferior" in their native country.

The idea of any of them originating by *crossing* in the Java plantations is therefore perfectly illusory.

If asked how they originated in their native forests, the answer must be, that of this we are entirely ignorant. We approach the question so well investigated by Alexis Jordan as to the varied forms of European flowers. Although I have described the *Ledgeriana* as a *variety* of the *Calisaya vera*, it is only as conforming to the present state of botanical science that I use the word. It is as consistent with common sense to believe that by fusing together a half-crown and a penny, one could produce a sovereign, as to believe that by blending inferior varieties one could educe the *Calisaya Ledgeriana*, the best, by far, of all. I do not at all deny that hybridization takes place in the plantations in India, nor that in some cases good results may follow. The only practical inquiry into this question was carried on by McIvor; who thought he had attained a great success in a *pubescent* hybrid, from which he sent me some good bark; but when afterwards, with much pains and care, he was good enough to send me a section of the tree, it was quite different, and a correspondent of mine in the Wynaad informs me that as sent to him it is altogether a failure. Specimens both of the good bark and of the tree may be found in the Museum.

If my readers will take a map of South America they will find the distance from Coroico (Calisaya district) to Huanuco (grey bark) is 680 miles; from Huanuco to Loxa (crown bark) is 500 miles; from Loxa to Riobamba (red bark) is 180 miles; from Coroico (Calisaya) to Pasto (Pitayo bark) is 1400 miles; and from Coroico to the Lancifolia and Cordifolia district is 1500 miles. We need not then suspect any interference of the pollen at these distances. In fact, all that we can recognize is the existence of permanent allied forms; and the difficulties are insuperable, even in imagination, in conceiving how they could have diverged from one centre. It is like the attempt to find a common centre for several intersecting circles.

It is no doubt very inconvenient to the systematic botanist to admit this; but to distort facts and suppress all that we have already gained in knowledge of *nature* for the sake of *system* is simply absurd.

The *Calisaya Ledgeriana* is then the legitimate descendant of the finest sort (or sorts) of the Bolivian forests; subsisting even there under different forms, especially distinguished by the colour of the leaves; but agreeing in the production of a large amount of very pure quinine. The flowers appear in South America to be very sensitive to frost; but they are abundantly fertile under favourable circumstances; 20,000 plants were raised by Van Gorkom and 60,000 by McIvor from the one bag above described. The climate at Ootacamund did not suit. Nevertheless, some of the trees, though stunted and mostly perishing, have produced excellent bark. The reason why it is not more largely sent into Europe is, I understand, that in Java they are wisely thinning out the inferior trees and allowing the best to develop themselves. In British India on the contrary, I am afraid many of the best "succirubra" and "officinalis" trees are being cut down. I thus send for the information of your readers a few facts which may be of interest, and in conclusion must express my regret that those who have toiled and suffered in introducing these valuable trees into India should have been so ill rewarded. Ledger lost his time and his servants, and yet both the British and Dutch governments refuse him the slightest compensation for his losses.

EXTRACTION OF PERFUMES WITH CHLORIDE OF METHYL.

BY PROFESSOR CAMILLE VINCENT, ECOLE DES ARTS ET METIERS.*

Some months ago a manufacturing perfumer, M. Massignon, came to consult me respecting the employment of chloride of methyl (which has the property of dissolving fats, resins and essential oils) in the extraction of the odorous principles of scent-producing plants. I expressed my belief that it might be so employed, but told him that I had no *data* in point at my command.

An experiment subsequently made with scent-woods succeeded, but the product possessed a very unpleasant odour, the commercial chloride of methyl used for industrial purposes retaining a pyrogenous product with a very persistent odour. I therefore turned my attention to the purification of the methyl, which in itself has a sweet ether-like smell; and in this I succeeded perfectly by treating ordinary methyl chloride with concentrated sulphuric acid, which completely absorbed the unpleasant odour. Chloride of methyl liquefied after the above treatment was found to leave no odorous residue on evaporation; it is perfectly suited for the extraction of perfumes, and when subsequently evaporated, leaves them with their limpidity and delicacy wholly unimpaired. My first experiment was made with orange flowers in a glass vessel; and the product thus obtained was pronounced by several experts to be superior to neroli obtained in the ordinary way by distillation with water. Encouraged by the success which had thus far attended my efforts, I had an apparatus constructed of sufficient size to test the practical value of the discovery by operating upon several kilogs. at once of different kinds of flowers. It consisted of the following parts:— 1. A digester, in which the flowers to be extracted were placed; 2. A receiver for the liquefied methyl chloride previously purified with sulphuric acid; 3. An air-tight vessel to receive the methyl chloride after passing through the flowers, in which a vacuum could be produced with the aid of an air-pump; 4. An air-pump to exhaust the last named vessel, and to drive the methylic vapour into a cold coil, whence it returns, in a liquefied state, into receiver 2. The air-pump and coil formed part of an ice-making machine.

The extraction of the perfume, as for example, of roses, is thus performed. The digester 1 is filled with flowers. Upon these is turned, with the aid of a conical stop-cock attached to receiver 2, a portion of the liquid chloride of methyl contained in the latter vessel. A couple of minutes are allowed for digestion, and then the liquid is run off into receiver 3. Another charge of methyl is given, which is filtered through the flowers into vessel 3, like the preceding, and so on until the flowers are supposed to be exhausted. The air-tight receiver 3 is now partly filled with the liquid methyl charged with the odorous principles of the flowers washed by it. Any portions of chloride remaining in the digester can be removed with the air-pump and by passing steam through the residue of the flowers, receiving the watery vapour in a gasometer, the chloride in each case being returned to receiver 2 through the cold coil. The chloride of methyl charged with odorous principles in vessel 3 must now be evaporated *in vacuo*. For this purpose a current of water at 86° F. is passed round the vessel, whilst the air-pump is at work. When the manometer attached indicates an internal pressure of half an atmosphere, the operation may be considered as completed. The air-tight receiver is opened, and the odorous principles are found in the residuum of fatty matter and wax left by the evaporated methyl. Treated with alcohol cold, this residuum yields up the perfume of the flowers in its full potency and delicacy.

In this way may be obtained, not only the perfumes of flowers generally extracted by distillation, but also of others, as the jasmine and violet, which on account of their easy destructibility are prepared chiefly by *enfleurage* or maceration in fat. Specimens of the perfumes extracted with deodorized methyl chloride have been sent to the Société d'Encouragement. The results with all kinds of scent-producing plants, flowers, seeds, barks and roots alike, show that the yield by the methylic process averages 25 per cent more than by ordinary distillation with water.

M. Massignon is erecting an apparatus on the above principle at Cannes, which will be capable of extracting 1000 kilogs. (20 cwt.) of flowers daily, and which he hopes will be in work in the course of the present month. The refrigerator attached to the apparatus manufactures 60 kilogs. of ice per hour.

* *La Nature*, January, 1880.

ESTIMATION OF IODINE IN VAREC.*

BY O. SCHOTT.

The author describes the method finally adopted by him for estimating the iodine value of samples of varec. Exactness is necessary, since the percentage of iodine is usually only from 0·1 to 1·5. Bunsen's method of titration with standard sodium thiosulphate solution was found to yield precise results if the starch solution was carefully prepared and filtered, a deep blue coloration, disappearing at last on the addition of a single drop of decinormal thiosulphate solution and reappearing on addition of a drop of iodine solution; it was therefore considered unnecessary to add excess of thiosulphate and titrate back with iodine solution. From 25 to 50 grams of dried and powdered varec were extracted with warm water several times, and the solution made up to a litre; 100 c.c. of this liquid was mixed with a few drops of sulphuric acid and allowed to stand in a warm place for twenty-four hours to remove the hydrogen sulphide; the liquid, after having been evaporated to about a third its volume, was run through a small filter to remove the sulphur, and the filter was washed with as small a quantity of water as possible. This liquid was then mixed with ferric sulphate or ferric ammonium sulphate and the iodine distilled over into a small quantity of potassium iodide solution contained in a U-tube, kept cool by immersion in cold water, the end of the delivery tube dipping several millimetres below the surface of the iodide solution. Boiling for fifteen minutes will usually distil over all the iodine, but after the residual liquid has cooled it should always be tested by carbon bisulphide or chloroform, since sometimes only long continued boiling completely removes the iodine. The iodine contained in the potassium iodide solution is then titrated with thiosulphate. The author also tried extracting the iodides from the varec by alcohol; this method had the advantage of leaving undissolved most other salts, and especially the sulphides; the cost of the alcohol made it undesirable. A sample of varec, which yielded 0·376 per cent. of iodine by the palladium method, gave by the above process an average percentage of 0·33, and duplicate analyses of two other samples made with great care yielded 1·701 and 1·676 for the one and 1·426 in both analyses of the other sample.

* *Zeits. Anal. Chem.*, 1879, 443—446. Reprinted from the *Journal of the Chemical Society*, December, 1879.

The Pharmaceutical Journal.

SATURDAY, MARCH 13, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE MEDICAL BILLS.

THOUGH the impending dissolution of Parliament will postpone for some time longer any action to be taken in reference to the subject of medical reform, it will not be out of place to give some account of the proposed legislation as affecting unregistered persons. Three Medical Act Amendment Bills are now before the House of Commons—one brought in by Dr. LUSH, Sir TREVOR LAWRENCE and Sir JOSEPH MCKENNA; a second brought in by Mr. ARTHUR MILLS, Mr. CHILDERS and Mr. GOLDNEY, and a third, brought in as the Government Bill, by Lord GEORGE HAMILTON and Sir HENRY SELWYN-IBBETSON. All of these agree in proposing the repeal of so much of the twentieth section of the Apothecaries Act, 1815, as relates to any person acting or practising as an apothecary, and it may hence be inferred there is a tolerably general opinion that it is desirable to do away with any further possible application of that section of the Apothecaries Act with the object of interfering with counter practice by chemists and druggists.

The penal sections of the several Bills present little or no features of difference in the main, being directed entirely against the use of titles by unregistered persons, and only in so far seeking to restrict the practice of medicine or surgery. The penalty for such improper use of titles as would imply that the person using them was registered or entitled to be registered, is fixed at a maximum of twenty pounds. The provisions of the several Bills also extend to the use of the designations physician, surgeon, apothecary or doctor, or that of any medical diploma, or the use of any designation or description used to distinguish registered practitioners of medicine or surgery, and implying qualification to practise medicine or surgery. Any person who does this when practising for gain, or professing to practise, or publishing his name as practising medicine or surgery, or being engaged for gain in or professing to be engaged in, or publishing his name as being engaged in the cure or treatment of diseases or injuries, is also to be liable on summary conviction to a fine not exceeding twenty pounds.

This, we take it, is the extent to which the provisions of this section of the three Bills are intended to apply, but the grammatical construction of the section does not make the intention quite so clear as might be desired.

In the Government Bill and in that distinguished as Bill No. 2, it is provided that persons registered under the Dentists Act, 1878, are to be at liberty to use the designation of dentist or of licentiate in dentistry, or dental surgery, or of certified dentist, notwithstanding the proposed provisions against the use of medical titles. These two Bills also agree in providing that prosecutions for offences under the section relating to unregistered persons shall not be instituted by private persons except with the consent of the General Medical Council, but they may be instituted either by the General Medical Council, by a Branch Medical Council, or by a medical authority if it be thought fit by such Council or authority.

PHARMACY IN VICTORIA.

THE Pharmacy Board of Victoria appointed by the Governor in Council, in pursuance of the Pharmacy Act, 1876, having arrived at the termination of its term of office, has presented a report of its proceedings during that period for the information of the Colonial Government and of the registered pharmaceutical chemists of Victoria. We are often asked for information as to the state of pharmaceutical affairs in the colony, and for this reason a brief *résumé* of the work done by the sister body may be acceptable to our readers.

Since the time when the Board was appointed it has continued to hold a meeting once a fortnight or once a month for the transaction of business. After the appointment of officers and the adoption of a common seal, certificate of registration, etc., examiners in chemistry, materia medica, practical pharmacy and Latin were appointed for the Preliminary and Modified examinations, one of these being Mr. WILLIAM JOHNSON, who was a student at the School of Pharmacy in Bloomsbury Square in 1845, when the laboratory was first opened.

While holding office the Board has held seven Preliminary examinations, at which thirty-six apprentices attended. Of these, thirty passed, and several of the number were above the educational standard demanded. Eleven Modified examinations have been held since the appointment of the Board. These two examinations embraced both written and oral questions in chemistry, materia medica and practical pharmacy, together with the reading of Latin prescriptions, sufficient to test thoroughly the candidates' knowledge of the art of dispensing and of the quality of drugs and chemicals. It is stated that since the commencement of the examinations a marked improvement in the candidates has been observed, and that in some instances considerable ability has been displayed.

Schools of Pharmacy have been established in Victoria, at Ballarat and Sandhurst, in connection with the schools of mines at those places, and it is reported that satisfactory progress is being made by the pupils attending. Up to the present time, however, nothing has been done towards carrying out the suggestion of the Pharmacy Board that lectures and examinations for pharmaceutical students should be established in connection with the University of Melbourne. The number of students already registered for the course of study required for the Major examination is, however, increasing so far that measures will have to be taken for establishing a School of Pharmacy in Melbourne if the Council of the University continues to neglect the subject.

The Pharmaceutical Register has been published annually as directed in the Act, and during the three years there were registered in all six hundred and twenty-seven pharmaceutical chemists and forty-seven apprentices. There have been eight convictions for carrying on business without being registered. The gross receipts during the three years have amounted to £1623 3*s.* 6*d.*, and the expenditure to £1032 17*s.* 6*d.*

The Board refers with pleasure to the satisfactory working of the Act, and expresses the opinion that if it continues to be administered with care and diligence the pharmaceutical chemists of Victoria will be found equal to any in those countries where pharmacy has been fostered for many years under legislative enactments.

ALKALI ACTS AMENDMENT.

A Bill to amend the Alkali Acts, 1863 and 1874, and to provide for the more effectual condensation of noxious and offensive gases in alkali and other works, has been prepared and brought into the House of Commons by the President of the Local Government Board and the Home Secretary. The Alkali Act, 1874, provided that the "best practicable means" should be used in every alkali work to prevent the discharge into the atmosphere of noxious gases under the Act. The present Bill proposes to fix a maximum, and provides that the acid gases evolved in the process of manufacturing sulphuric acid or sulphates in such works shall be so condensed that the total amount of acid gas in each cubic foot of air, smoke or gas escaping into the chimney shall not exceed what is equivalent to four grains of sulphuric anhydride. Sulphuric acid, nitric acid, chemical manure, sulphate and muriate of ammonia, gas liquor and coke works are proposed to be placed under similar restrictions as to sulphur gases, whilst the provision as to using the best practicable means for their condensation is extended to other noxious gases evolved in such works. The Bill also extends the scope of the Alkali Acts to cement, copper, nickel, spelter, lead ore and galvanizing and tinplate works, glass works where sulphate of soda or common salt is used, salt glazing potteries, tar dye and distillery works, and generally to any other works where processes are conducted giving off sulphur, nitrogen or chlorine acids, provision being made that the Local Government Board may from time to time limit by order the amount or proportion of any specified noxious or offensive gas which is to be permitted to escape from any such works. There is also a provision against the deposit of alkali waste where any liquid containing acid may come into contact with it or the drainage from it.

PRICE LIST FOR MANCHESTER AND DISTRICT.

We have received a copy of a new edition of the List of Retail Prices recommended for adoption by the Council of the Manchester Chemists and Druggists' Association. The nearest practicable approach to uniformity in the charges made by chemists and druggists is very desirable, and it is satisfactory to find that the effort of the Manchester Association to secure this uniformity in its district has met with the acceptance indicated by the issue of a third edition. The new "List" contains several additions; but it is compiled on the same lines as the previous editions. It is published by Mr. Silverlock, from whom copies may be obtained, or from Mr. H. Woolley or Mr. F. B. Benger, the Secretaries to the Association.

THE ANNUAL DINNER.

On Wednesday next, at 12 o'clock, a meeting will be held at 17, Bloomsbury Square, to appoint a committee to make the necessary arrangements for the usual Dinner of the Members of the Pharmaceutical Society and their friends, in connection with the Annual Meeting of the Society in May.

THE TRADE IN CHEMICALS.

The trade in chemicals having been referred to by a high authority as an index to the general prosperity of the country it is interesting to find that the latest returns issued by the Board of Trade show that it has been marked by increased activity this year as compared with last. From these returns we learn that the value of the exports of "alkali" from Great Britain and Ireland during the first two months of the present year amounted to £839,355, and that of the "chemical products and preparations" to £331,094. This is an excess of £45,120 on the former and £75,204 on the latter item for the corresponding months of last year. During January and February also the value of "Peruvian" bark imported amounted to £125,136, against £115,788 in 1879, and the value of the exported bark was £134,145.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The next meeting of the above will be held at 32a, George Street, on Wednesday evening next, March 17, when a paper will be read by Mr. S. Hardwick, on "Assimilation in Plants."

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH.

The fourth meeting of the session was held in the rooms of the Society, 119A, George Street, Edinburgh, on the evening of Thursday, February 26. Mr. J. B. Stephenson in the chair. The minutes of the previous meeting were read and confirmed.

The Honorary Secretary announced the following contributions to the library:—The *Canadian Pharmaceutical Journal* for February, from the Ontario College of Pharmacy: the *Pharmacist and Chemist* for February, from the Chicago College of Pharmacy; the *Journal of the Chemical Society*, for January, from Mr. Mackay.

A number of the North American drugs mentioned at the last meeting were exhibited.

A lecture on "What is Matter?" illustrated by experiments, was delivered by Cargill G. Knott, Sc.D. Edin., assistant to the Professor of Natural Philosophy, Edinburgh University. It is intended to publish Dr. Knott's paper in a future number.

Dr. Knott was most successful in his experiments, and on concluding, on the motion of Mr. H. C. Baildon, seconded by Mr. J. R. Young, a hearty vote of thanks was accorded to him for his interesting communication.

Examinations in London.

Erratum.—p. 726, col. 2, line 24 from bottom, *for* Newton, George Harry, Ashby-de-la-Zouch, *read* Newton, George Harry, Ashton-under-Lyne.

Provincial Transactions.

ABERDEEN CHEMISTS AND DRUGGISTS' ANNUAL CONVERSAZIONE.

The fourth annual conversazione of the Aberdeen Society of Chemists and Druggists took place on Wednesday, February, 18, in the Music Hall. There were about two hundred present. Mr. William Giles was in the chair, and was well supported. The proceedings commenced with a concert in the Square Room, which was taken part in by a number of ladies and gentlemen, and the various readings, recitations, songs, etc., were well rendered and appreciatively received.

In a short introductory address which he delivered, the Chairman said—"Before proceeding to the amusement of the evening, I have pleasure in congratulating you upon the success with which our social meetings have been attended hitherto and upon the brilliancy of this assemblage. Our annual conversazione has now attained a high reputation. Such meetings as the present, which lead us away from the cares and anxieties of business are, when properly directed, most enjoyable, and are well calculated to promote social intercourse and the interchange of those friendly relations which happily exist throughout the trade, and which are very essential amongst a class whose interests are so closely bound together. When I see the variety as well as the excellence of our programme, I think it would be out of place for me to occupy your time with anything I could say in the shape of a speech. On occasions such as these, speeches have to give place to the more cheerful occupations of music and song, while they, in their turn, have to give place to dance. At the same time, I ask your indulgence whilst I make a few remarks with regard to the present position of the society. The question how best to provide sufficient means of education for the assistants and apprentices to enable them to pass the examinations of the Pharmaceutical Society has from time to time been under the earnest consideration of this society. As you are aware, those presenting themselves for examination require a knowledge of various subjects in addition to that which is usually acquired at the dispensing counter. In order to supply this knowledge, and at the request of the assistants and apprentices themselves, the classes for instruction in chemistry, materia medica, and pharmacy have been resumed, and are again being gratuitously conducted by Messrs. Gordon and Strachan. The lectures on these subjects are attended with a greater measure of success this session than last, in so far as number of pupils and regularity of attendance are concerned. This is particularly encouraging from the fact that it shows that those for whose benefit the classes are intended are becoming aware of the importance and the advantage of the excellent quality of instruction obtainable, together with a better appreciation of the valuable services of the teachers. Specimens are being collected to form a museum for guiding and assisting the pupils in their studies, and for such of them as may be preparing for the Minor examination this part is of the greatest importance. The great difficulty, however, in connection with the successful conduct and arrangement of these is the want of adequate accommodation, and to remedy this the society are looking out for rooms to lease for themselves where the library could be kept, the classes meet, a museum be formed, and the whole business of the society transacted. The accomplishment of the whole projected scheme at once would, I believe, incur a larger expenditure than the society's exchequer is in the meantime able to meet. But as the benefits to be derived from it are common to all of us in town, I trust the whole of the masters will interest themselves in this matter, and should they do so, I venture to predict that there is a sufficient amount of energy amongst us to overcome any obstacle of that kind, so that we would soon be in a position to proceed with the whole scheme, and to establish a properly equipped laboratory and museum in such a way as will reflect credit upon the society and prove a lasting benefit to the assistants and apprentices."

At the close of the entertainment, a cordial vote of thanks was accorded to the chairman, on the motion of Mr. Ritchie; and, on the motion of Mr. Sinclair, a like compliment was awarded to the ladies and gentlemen who had contributed to their amusement.

Dancing was commenced shortly after ten o'clock in the ball-room, which was splendidly decorated, excellent music being supplied; and supper was served shortly before midnight. During the evening a very enjoyable dramatic performance was given in the West Front Room.

GLASGOW LITERARY AND PHARMACEUTICAL ASSOCIATION.

The first annual festival of the Glasgow Pharmaceutical and Literary Association took place in the Blythswood Academy, on the evening of Thursday, February 19, when there was a large attendance of members and friends. The President, Mr. James Shaw, occupied the chair, and was supported on the platform by Mr. John Arnot, Mr. A. C. Boothman, Mr. A. B. Chalmers, and others. The chairman in the course of a short address quoted statistics showing the marked progress of the Association since its formation towards the close of 1879. The evening's enjoyment was greatly enhanced by the admirable rendering of glees, songs and readings, by ladies and gentlemen who had kindly volunteered their services. An assembly followed.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The fifth meeting of the session was held in Anderson's College, 204, George Street, on Wednesday, March 3, Mr. A. Kinninmont, F.C.S., President, in the chair.

After the minutes of the previous meeting had been read and adopted, the President asked Mr. J. C. Hunter to deliver his short discourse on "Infusorial Animalcules."

Mr. Hunter began his remarks by giving a short description of the invention of the microscope and its importance in the study of those minute organisms, also referring to the first of the now numerous band of searchers in the till then unseen world, viz., Lewenhoeck, and his labours and discoveries with his own microscope of small power. Passing on from that time through the investigations of Ehrenberg, Buffon and others, he touched also upon the two theories of the early part of this century, viz., Biogenesis and Abiogenesis. Mr. Hunter then referred to the invaluable researches of Pasteur and Pouchet in France, and lastly, the experiments of Bastian, Tyndall and Dallinger were briefly described, and the conclusions of the last two experimenters were stated.

After remarks from various members, the President called for a cordial vote of thanks to Mr. Hunter for his well delivered remarks on the "Infusoria." This having been given the meeting closed.

LEEDS CHEMISTS' ASSOCIATION.

The sixth meeting of the session was held in the library of the Chemists' Association, on Wednesday evening, February 18, the President, Mr. Councillor Stead, in the chair, when Mr. E. O. Brown gave a lecture on "Aerated Waters," after which an interesting discussion followed.

A cordial vote of thanks was accorded the lecturer at the close.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The half-yearly meeting of the above Association was held at the rooms, 4, Halford Street, on Tuesday, Feb. 3, 1880. The President, Mr. J. J. Edwards, in the chair. The President having opened the meeting with some appropriate remarks, called upon the Secretary to read the report for the twenty-second session.

The report stated that during the past session an improvement had taken place in the affairs of the Association, and a hope was expressed that, with a determination on the part of the executive to adopt the best mode of carrying on the work of the Association to meet the requirements of pharmaceutical students, together with the active co-operation of the members, the coming session may be one of continued progress and in every respect a thorough success. The laboratory has been rearranged, and by the purchase of apparatus and chemicals, put into working order, so that ordinary chemical experiments may readily be performed. The chemistry prize, given by Mr. Thirlby, has been gained by Mr. F. W. Lewitt.

The adoption of the report having been proposed and seconded, it was carried unanimously.

After the Treasurer's report, showing a balance in hand of £4 10*s*. 10*d*., had been received and adopted, the President called upon anyone who might have any suggestion to make, relative to the affairs of the Association, to address the meeting.

Mr. Brampton then rose, and stated that it has been thought by some of the members, that the time had now arrived when it was desirable to make some change in the mode of carrying on the work of the Association, the principal arguments in favour of a change being—(1st) the altered state of affairs in pharmaceutical education since the Association was originated, and the necessity for meeting these changes in a satisfactory manner; (2nd) the difficulty experienced in conducting the classes so as to benefit to the full extent all the members of the Association; (3rd) the inability of the committee to get suitable teachers; and (4th) the unwillingness of the members to attend regularly two classes a week, besides engaging in the necessary private study. Under these circumstances it was thought advisable that some effort should be made to adapt the machinery of the Association to meet the wants of the members as far as possible. The most feasible plan that presented itself was to discontinue the classes, and in their stead to have papers on subjects of pharmaceutical interest read by members or other gentlemen, on one evening in each week; the rooms also to be open on two other nights in each week, and curators appointed from time to time, who would take charge of the rooms on those occasions and assist in every possible way those members who come to perform chemical experiments, or for private study.

After debating this proposition, it was ultimately resolved that the plan proposed by Mr. Brampton should be tried as an experiment during the forthcoming session, and that Wednesday nights should be reserved for lectures, papers, etc., it being left to the committee to arrange for two other nights on which the rooms should be open for private study.

The meeting then proceeded to elect a committee for the ensuing session, Messrs. Bott and Watchorn being scrutineers. As the result of a ballot, Messrs. Brampton, Burford, W. B. Clark, Edwards, Lewitt, Masters and Thirlby were appointed to serve as a committee. This proceeding brought the half-yearly meeting to a close.

LIVERPOOL CHEMISTS' ASSOCIATION.

The tenth general meeting of the thirty-first session was held at the Royal Institution, on Thursday evening February 26, the President, Dr. Charles Symes, in the chair.

The minutes of the previous meeting were read and confirmed, and the following donations announced:—The current numbers of the *Pharmaceutical Journal*, from the Society; and the *Canadian Pharmaceutical Journal*, from the Editor.

Mr. A. Carson was elected an associate.

Mr. Shaw called attention to the alleged want of uniformity in carrying out the Weights and Measures Act in different parts of the country, some inspectors not recognizing any weights except those bearing their own local stamp. He stated that the Council of the Pharmaceutical Society were in correspondence with Mr. Farrer, of the Board of Trade, as to the stamping of weights, and the verifying and marking of glass measures, and he (Mr. Shaw) trusted that the result would be satisfactory. The inspector of weights and measures in Liverpool had not yet completed his arrangements, but expected to be able shortly to do so.

Mr. T. F. Abraham said that in compliance with a suggestion in the *Pharmaceutical Journal*, and a circular from the Pharmaceutical Society, he, as local secretary, had had some interviews with the chief inspector of weights and measures. That gentleman said that he was only in possession of a small portion of the apparatus required to carry out the provisions of the new Act, and had not received instructions from the corporation to take action under the Act; but that, assuming that in due course such orders would be issued, he had made application for the necessary standards, etc. He had had only one application for the testing of apothecaries' measures, and that was from a wholesale firm. He (Mr. Abraham) would make known through the *Pharmaceutical Journal* when anything further transpired.

The President said he was not aware of any action having been taken in Liverpool, and he believed very little had been taken anywhere else. He thought it unfortunate that standards had been provided, as it was optional with local authorities to adopt them. There had been, in his opinion, far too much agitation on this bit of legislation, and he trusted it would not be continued, otherwise the inspectors would feel that they must do something, and this would lead to undue action on their part, and persecution of the trade in consequence. The President then called attention to a "Simple Perfected Test for Diabetic Sugar," published by Dr. L. S. Oppenheim, in the *Louisville Medical News*. It is a modified form of the ordinary copper test. After pointing out the gradual change which is always going on in Fehling's and other solutions of this kind, Dr. Oppenheim suggests the following:—

Pure sulphate of copper . . .	50 grains.
Pure glycerine	1 fluid ounce.

1 drachm (= $6\frac{1}{4}$ grains of the sulphate) will reduce 1 grain of grape sugar, in the presence of caustic alkali. Double its volume of liq. potassæ is added to the measured quantity of the solution at the time of using. The use of glycerine, the President said, is by no means new, as it is mentioned in Sutton's 'Volumetric Analysis,' published in 1871, page 187, and is ascribed to Löwe, but here it is used instead of the alkaline tartrate. Some such simple means of preserving the copper solution, to avoid the necessity of standardizing each time it is used, he (the President) considered a desideratum.

After some further observations by Messrs. Davies and Watt, the President called upon Mr. Astrup Cariss to read the paper for the evening, entitled "Chemistry in Relation to Sanitation."

The paper gave rise to a lengthened and interesting discussion, in which the President, Messrs. T. F. Abraham, Conroy, Davies, Kehlstadt, Shaw and Watt took part.

On the motion of Mr. Shaw, seconded by Mr. Davies, a hearty vote of thanks was accorded Mr. Cariss for his paper, and the meeting closed.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The usual monthly meeting of this Association was held at Britannia Chambers, Pelham Street, on Tuesday evening, February 24. There was a good attendance of members and associates, and the chair was occupied by the President Mr. R. Fitzhugh, F.C.S.

The Honorary Secretary. Mr. R. Jackson read the minutes of the last meeting, which were confirmed, and then announced that he had received the following donations to the library:—'The Year-Book of Pharmacy,' 'The Calendar of the Pharmaceutical Society,' and 'The *Pharmaceutical Journal*' regularly since last meeting, and a vote of thanks was awarded to the donors.

Two gentlemen were elected associates.

The President then read a letter from the Sub-Committee appointed by the Council to examine the essays in the competition for prizes offered by Mr. J. H. Atherton, F.C.S., and Mr. W. Widdowson; the first prize being awarded to Mr. E. H. Judge and the second to Mr. W. Gill.

Mr. F. H. Spenser then delivered a most interesting and instructive lecture on "Sound," of which the following is a syllabus:—

Sound a physical phenomenon.—Cause of sound.—How the air is affected.—Sound waves.—Law of inverse squares.—Sound not transmitted through a vacuum.—Intensity.—Velocity.—How determined.—Reflection.—Echoes.—Whispering galleries.—Influence of tubes.—Destruction of waves.—Speaking trumpet.—Ear trumpet.—Stethoscope.—Refraction.—Difference between a musical sound and a noise.—Resonance.—Pitch.—Intensity and quality of musical sounds.—Interference.—Beats.—Musical instruments.

The lecture was illustrated by several experiments and was listened to very attentively.

At the close Mr. W. H. Parker proposed a hearty vote of thanks to the lecturer, which was seconded by the chairman and carried unanimously.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION OF GREAT BRITAIN.

A meeting of the Executive Committee was held at the office of the Association, 23, Burlington Chambers, New Street, Birmingham, on Friday, February 27, 1880, at 1 p.m., Mr. Thomas Barclay (Birmingham), President, in the chair; Mr. Robert Hampson (London), Vice-President.

Present — Messrs. Andrews (London), Bell (Hull), Churchill (Birmingham), Cross (Shrewsbury), Holdsworth (Birmingham), Jervis (Sheffield), Kerr (Dundee), Mackenzie (Edinburgh), Shaw (Liverpool), Walker (Coventry), and the Solicitor of the Association.

The minutes of the previous meeting were read and approved.

Reports of Sub-Committees.

The report of the Law and Parliamentary Committee was then read. It stated that the question of endeavouring to obtain the exemption of all registered chemists and druggists from jury service had been fully discussed by the Committee, and although it was admitted that it was a very sore point with the trade, and one which should be dealt with at the earliest opportunity, yet the Solicitor, having advised that no effective steps could be taken until an amended Pharmacy Act or Jury Bill was before the Legislature, the Committee considered it would be mere waste of labour and money to move in the matter at that time. That three cases in which members of the Association had been sued under the Sale of Food and Drugs Act, had been successfully defended by the Association, the summons in each case being dismissed by the magistrates; costs to the amount of three guineas being allowed in one of these cases. That a member had been defended in a prosecution brought against him by the Excise authorities, and another member in two summonses taken out against him under the Weights and Measures Act, and that a mitigated penalty only was inflicted in these cases, and that full reports of all these cases had been forwarded to the trade Journals for publication. That ten cases under the 17th section of the Pharmacy Act had been undertaken by the Secretary for the sale of poison improperly labelled by unregistered persons, a fine having been inflicted in each case.

It was moved by Mr. Bell, seconded by Mr. Jarvis, and unanimously resolved:—"That the report of the Law and Parliamentary Committee be received and entered on the minutes."

After some little discussion as to the advisability of defending members against whom action was taken under the Weights and Measures Act or the Inland Revenue Acts, it was moved by Mr. Bell, seconded by Mr. Mackenzie, and unanimously resolved:—"That it be a suggestion from the Executive Committee to the Law and Parliamentary Committee, that they consider the desirability of appointing a Sub-Committee to deal with urgent cases."

It was moved by the Vice-President, seconded by Mr. Andrews, and unanimously resolved:—"That the report of the Law and Parliamentary Committee be adopted."

A special report from the Law and Parliamentary Committee on the information they had obtained as to the best means of bringing about modifications in the Pharmacy Act, 1868, to restrict the sale of scheduled poisons under cover of the patent medicine stamp to registered chemists and druggists, was then read. It detailed the means employed by the Committee to collect desired information; it stated that numbers of circulars and written communications had been forwarded from the office to influential members of the trade, residing in various parts of the country, asking for information and suggestions on the sale of patent medicines containing scheduled poisons, with a view to aid the Executive in bringing about an amendment in that portion of the 16th section of the Pharmacy Act bearing on patent medicines. The replies to these communications in a condensed form were included in the report. That private conferences of the trade had been held by the Secretary at Hull, Bristol and Sheffield, all of which were well attended, and, at each of which, a resolution was carried to the effect that it was desirable that the Pharmacy Act, 1868, should be so amended as to restrict the sale of scheduled poisons under cover of the patent medicine stamp to chemists and druggists, and that the Association be requested to approach the Pharmaceutical Society with a view to bring about that object.

It was moved by Mr. Holdsworth, seconded by Mr. Andrews, and unanimously resolved:—"That the special report of the Law and Parliamentary Committee on the information they have obtained, as to the best means of bringing about modifications in the Pharmacy Act, 1868, to restrict the sale of scheduled poisons under cover of the patent medicine stamp to registered chemists and druggists, be received, adopted, and entered on the minutes."

Mr. Hampson moved the following resolution:—"That this Executive respectfully urges the Council of the Pharmaceutical Society of Great Britain to take steps to amend the provisions of the Pharmacy Act, 1868, in order to restrict the sale of scheduled poisons under cover of the patent medicine stamp to registered chemists and druggists." He thought that such a resolution, if passed, would show the Pharmaceutical Council that the trade was active in the matter, and would strengthen the hands of that Council, and he was quite sure that it would meet with their proper support and consideration. He was extremely anxious that the two societies should work in harmony, as before long there was little doubt that it would be necessary to approach Parliament, for the purpose of obtaining an amended Pharmacy Act.

Mr. Jervis said he had great pleasure in seconding the resolution.

Mr. Mackenzie said he thought no drugs should be sold except by registered chemists and druggists, and he would move as an amendment, that the words "and such other articles as the Pharmaceutical Council may think desirable," should be inserted in the body of Mr. Hampson's resolution following the word "poison."

This amendment not being seconded, the original resolution was put to the meeting, and carried *nem. con.*

The report of the Finance Committee was then read. It stated that the income of the Association derived from subscriptions and donations, from the last audit up to that date, amounted to £890 14*s.* 6*d.*, and the expenditure during the same period had been £887 12*s.* 3*d.*; 137 chemists had joined the Association since the last audit, and there had been 95 erasures from the register during the same period.

It was moved by Mr. Churchill, seconded by Mr. Cross, and unanimously resolved:—"That the report of the Finance Committee be received, adopted, and entered on the minutes."

Resignation of the Secretary.

The President said the next business on the agenda was to receive the resignation of the Secretary, Mr. Haydon having been appointed to the Secretaryship of the Birmingham Exchange and Chamber of Commerce. While congratulating Mr. Haydon upon the position he had just obtained, the Association would deeply feel the loss of his services. Mr. Haydon had been selected for this appointment out of 275 applicants from all parts of the country, and had been appointed by the unanimous vote of the joint committee, a circumstance which showed that the trust and confidence which the Executive had placed in him was well warranted. He (the President) had no doubt that in his new sphere, their Secretary would serve his new committee as successfully and faithfully as he had served the Executive of the Chemists and Druggists' Trade Association. The Committee were fortunate in that Mr. Haydon would not be leaving Birmingham, and would therefore be at hand to aid them with his advice. The Executive would, of course, accept Mr. Haydon's resignation and do their best to obtain a suitable successor.

After some very complimentary remarks from the members of the Committee as to the manner in which Mr. Haydon had performed his duties,

It was moved by Mr. Hampson, seconded by Mr. Andrews, and unanimously resolved:—"That this Committee expresses its great regret at losing the valuable services of Mr. Haydon, and empowers the Law and Parliamentary Committee to take all steps which they may deem necessary to obtain and to provisionally appoint a Secretary in the place of Mr. Haydon, and to make arrangements with Mr. Haydon for temporarily continuing his charge of the office."

The British Pharmacopœia.

Mr. Hampson said he wished to move the following resolution:—"That this Executive is of opinion that the Pharmaceutical Council, as representing pharmacy, should be legally empowered, in conjunction with the Medical Council, in framing and amending the future edition of the British Pharmacopœia." He had hesitated a considerable time before deciding to bring the resolution before the Executive, for the simple reason that he had endeavoured to pass a similar resolution before the Pharmaceutical Council and failed. It had occurred to him, however, that the Chemists and Druggists' Trade Association was a representative body, and ought to have some weight on such a subject, and he did not therefore feel in any way deterred by the course taken by the Pharmaceutical Council, or that he should be acting improperly or committing any "breach of privilege,"—that was the phrase now in use—in bringing forward the resolution, he regretted to say he was unable to get passed by the Pharmaceutical Council. He felt that a great mistake had been made by that Council in not accepting the resolution, inasmuch as the same expressed the views which generally prevailed on the subject. The Pharmaceutical Council ought to take the lead in pharmaceutical matters, and it ought to be above the average opinion of the country, but he regretted to see that it was much behind the general opinion of pharmacists. Several years since he had endeavoured to pass a similar resolution, and was equally unsuccessful. Now he thought it was for the Chemists and Druggists' Association, an Association consisting essentially of chemists and druggists and of pharmacists, to express an opinion on the subject. He considered it to be the interest and duty of the Executive to pass the resolution unanimously. It would strengthen the hands of the Pharmaceutical Council. Honestly speaking, he felt ashamed to bring the resolution forward before the Executive, believing it to be the duty of the Pharmaceutical Council to ask the Legislature for power to have an equal share in the preparation of the Pharmacopœia. In every other country such was done. In France they were about making a new codex, and, as a matter of course, the pharmacists took an equal position with medical men in framing that codex. By asking for a legal position with their medical friends, he did not feel that they were stepping out of their proper limits. He should say they lacked dignity were they not now to move in the matter. At the present time there were three or four Medical Bills before the House of Commons and he thought it would be a fitting time to ask some member of Parliament, whose name was on the Bills, to introduce a proviso giving them the power required. The question was one that had cost him a great deal of thought, and one that ought to receive the sanction of every pharmacist who respected his calling.

Mr. Mackenzie said he had great pleasure in seconding the resolution. He considered the compounders of medi cine had an equal interest with the prescribers in the preparation of the Pharmacopœia.

The resolution was then put to the meeting, and carried unanimously.

Medical Bills.

The Solicitor said there were three Bills before the House of Commons, the object of which was the amendment of the Medical Act of 1858; one was promoted by the Government, another was in the charge of Dr. Lush and other members, whilst the third was backed by Mr. Arthur Mills and other members. The Government Bill, if similar to that presented last session, would provide for the repeal, amongst others, of the penal section of the Apothecaries Act, 1815, and each of the other Bills contained a similar provision.

After some little discussion, it was moved by Mr. Shaw, seconded by Mr. Bell, and unanimously resolved:—"That the Law and Parliamentary Committee be directed to watch the proceedings of the Select Committee appointed by the House of Commons to consider the Medical Bills, and to take such action as they may deem necessary."

Annual General Meeting,

It was moved by Mr. Walker, seconded by Mr. Bell, and unanimously resolved:—"That the Fourth Annual General Meeting of the members of the Association be held in London, on the day preceding the Annual General Meeting of the Pharmaceutical Society."

Election of General Committee.

It was moved by Mr. Bell, seconded by Mr. Shaw, and unanimously resolved:—"That the second election of the General Committee be conducted on the same lines as before, and that the official auditors of the Association be engaged to superintend the same."

Several communications from the secretaries of local chemists' associations, and from members of the Association, were read, and instructions given to the Secretary as to the manner in which he should deal with the same.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on March 4. Mr. Warren De La Rue, President, in the chair. The list of officers as announced at the last meeting was read from the chair. The following certificates were read for the first time:—A. E. Black, C. H. Gimingham, W. Regester, W. Robinson, H. C. Stephens.

The President then called upon Professor Thorpe to deliver his lecture—

On the Relation between the Molecular Weights of Substances and their Specific Gravities when in the Liquid State.—The lecturer said that he proposed to give the substance of the results of some work with which he had been engaged for the last four or five years, it consisted of a critical and experimental examination of Kopp's laws relating to specific volume. Many attempts had been made to trace a relation between the specific gravity and molecular weight of a liquid, but no definite conclusions were arrived at until Kopp published his well known memoirs, the principal reason of failure being that the previous observers did not compare the liquids under comparable conditions. Kopp was the first observer who, by dividing the specific gravities of liquids, taken at the temperatures at which their vapour tensions are equal to the standard atmospheric pressure, *i.e.*, at their ordinary boiling points, into their molecular weights, obtained certain comparable values which are known as specific volumes. If the specific gravities are referred to water at 4° C., these values represent the number of c.c. occupied by the relative molecular weights of the liquids expressed in grams at their respective boiling points under normal pressure. Thus the specific volume of water is 18·8, *i.e.*, 18 grams water at 100° occupy 18·8 c.c. The numbers so obtained were first shown by Kopp to exhibit certain definite relations which may be briefly indicated as follows:—1. In many instances differences in specific volume are proportional to differences in corresponding chemical formulæ. Thus a difference of CH_2 in a homologous series corresponds to a difference of about 22 in the specific volume. 2. Isomeric and metameric liquids have, as a rule, the same specific volume, exceptions occuring in certain sulphur and oxygen compounds. 3. The substitution of an atom of carbon for two of hydrogen makes no alteration in the specific volume of members of certain groups of organic liquids. It would seem to follow from Kopp's observations that the specific volume of a liquid formed by the union of two other liquids is equal to the sum of the specific volumes of its components. Another conclusion which Kopp states with caution is that members of the same family of elements possess identical specific volumes. Thus the common value for Si, Ti and Sn seems to be about 35, for P, As and Sb about 27. On the basis of these conclusions Kopp was able to calculate certain fundamental values which are, as a rule, constant for each element. Thus carbon has always the value 11, hydrogen 5·5. Certain exceptions, however, occur with oxygen and sulphur. Thus the specific volume of water being 18·8 and of hydrogen 11, we get as specific volumes of O 7·8. In aldehyde, C_2H_4O, we have (C)22 + (H)22 = 44; its specific volume is 56·2; thus the value for oxygen is 56·2 − 44 = 12·2, and so on for other substances. It appears that when oxygen is united to an element by both its affinities its specific volume is 12·2, when attached by only one it is 7·8. Sulphur has similarly two values, 28·6 and 22·6. Thus the constitutions of such bodies as phosphoryl trichloride may be elucidated. If P is trivalent the constitution of this substance would be

$$\begin{array}{c} Cl \\ | \\ P-O-Cl \\ | \\ Cl \end{array}$$

If pentavalent—

$$\begin{array}{c} Cl \\ | \\ Cl-P=O \\ | \\ Cl \end{array}$$

From determinations of the specific volume of $POCl_3$ it seems that the phosphorus is trivalent. The specific volume of nitrogen also seems to be variable from Kopp's researches; it has a value in the amines of 2·3, in cyanogen and certain nitro-compounds of 17, and from recent researches of Ramsay its value seems to vary in different amines, and, moreover, has a distinct value in the pyridine series. Buff suggested, as the atomic value of an element is variable its specific volume might be a function of that value; the evidence adduced is not, however, conclusive. There is no known reason why O, S and N should alone possess variable specific volumes. Recently much interest has accrued to the question from the relations which have been shown to exist between the atomic weight and the chemical and physical characters of an element; probably the specific volume is a periodic function of the atomic weight. On reviewing the question the following problems seemed to the author well worthy of solution. 1. Has an element in combination an invariable specific volume? or may not the volume be modified by the number of the atoms of that element in the molecule? Is it quite independent of the general complexity of the molecule, or may not the specific volume of the molecule be a function of its weight? 2. Do the various members of a given family of elements possess identical specific volumes, or may not the volume be a function of the atomic weight? 3. Would a re-examination of the cases of the variable atomic values show that the specific volume of an element is a function of that value, as Buff supposes? 4. The hypotheses of Mendelejeff and Meyer indicate the need for additional and more exact determinations of the values for the specific volumes of the element. 5. To multiply examples of the aid afforded by a knowledge of the specific volume of a compound in elucidating its constitution. The author then drew up a scheme of work involving the determination of the specific volumes of fifty-two liquids, inorganic and organic, those liquids being preferred which boiled below 200°, and which could without great difficulty be obtained pure and in large quantity. The results of the observations determine the specific volumes of the following seventeen elements:—

H; F,Cl,Br,I; O, S,Cr,N,P,V,As,Sb; C,Si,Ti,Sn.

The author then gave a short account of the methods used to prepare some of the liquids, and the care taken to ensure and ascertain their purity. Great reliance was placed on vapour density determinations; a modified form of Hofmann's apparatus was employed. The vapour required to heat the liquids was introduced from below and the vapour density tube has no etched scale, to prevent risk of cracking, only one mark being made on the tube, readings being taken by a separate moveable brass scale divided into millimetres. The whole mass of mercury within the tube is uniformly heated to a known temperature. 300 c.c. of mercury and 150 c.c. of liquid (for the boiler) are required to work the apparatus. To determine the specific volumes the author has adopted the principle used by Kopp:—1. To determine the specific gravity of the liquid at some convenient temperature. 2. To ascertain its boiling point with the utmost exactitude. 3. To determine with great care its rate of expansion, say, between 0° and the boiling point. In this way, at all events, a number of accurate and important physical data would be put on record, even if the main object of the investigation was not attained. The author then described the apparatus and methods used in these three determinations. Two sets of thermometers were used: one of three by Casella, from −9 to 160°, graduated into tenths, each tenth being about 1 mm.; the second set was by Geissler, and also consisted of three, with a range from −14 to 170°, graduated into tenths, each degree being about 6 mm. These were carefully compared with Kew standards and calibrated. Careful determinations of the fixed points of the thermometers were made, and their variations plotted in curves. The dilatometers were constructed of flint glass; the stem of each instrument was about 50 centimetres long, graduated into millimetres; the bulbs contained 2 to 4 c.c. Each bulb was heated and cooled several hundred times before being used; no important change of capacity was observed during the determinations. The dilatometers were calibrated by the introduction or removal of known weights of mercury. Air was removed by exhaustion with a Sprengel pump, and subsequent introduction of pure warm mercury by a capillary tube which reached to the bulb. Nine dilatometers were used. As the thermometers used were long, great care was taken in obtaining a correct expression for the correction due to the portion of the stem not surrounded by vapour. In the formula $\delta\ (t-t')n$, the author has taken for δ (apparent expansion of glass for 1°), a mean value of 0·000163, and gives a table of corrections calculated on this value. The specific gravity bottles used held 4 to 20 c.c., and were fitted with ground glass stoppers. All weighings were made by the method of vibrations, and all reduced to a vacuum. The author then described the arrangement adopted for filling the dilatometers with the liquids, originally devised specially for liquids altered by exposure to air, but found so convenient that it was adopted in all cases. The method used in determining the expansion was then given. Two forms of apparatus were employed, one for temperatures below 65°, filled with water, heated by steam, the other filled with oil, heated by a lamp; the capacity of each bath was over 20 litres. Up to 25° the temperature could be obtained absolutely constant; but above, two series of readings were taken, one with the temperature rising very slowly, the other with the temperature falling. In reducing the observations, the author largely availed himself of the arithmometer of Thomas (de Colmar), without which the labour of the calculations would have been insuperable. Some experiments proved that Matthiessen's objection to the dilatometrical method, viz., that it gave uniformly low rates of expansion, was unfounded. The author arrived at the following conclusions:—1. That a difference of CH_2 in a homologous series does correspond to a difference of about 22 in the specific volume. That carbon has a constant specific volume of 11 and hydrogen of 5·5; there is no valid reason for accepting Buff's hypothesis that the specific volume is a function of the atomic value of an element. As far as sulphur and oxygen are concerned, the author has obtained results identical with those of Kopp. The inference of Kopp that members of the same family have the same specific volume does not appear to be well founded. Lastly, it seems that the specific volume is a periodic function of the atomic weight.

The President then proposed a vote of thanks to Professor Thorpe for his lecture, and the able way in which he had explained the results of his elaborate investigations.

Dr. Wright asked if any experiments had been made with chloric or perchloric acid, in order to determine the quantivalence of chlorine in these bodies.

Dr. Armstrong commented on the difficulties in accepting the view of the triad nature of P in $POCl_3$, when the reactions of the body were taken into consideration, especially as Professor Thorpe had himself prepared a pentafluoride.

Dr. Japp pointed out the danger of using the specific volume as an evidence of the atomicity of an element too freely; thus, for instance, according to the evidence derived from a determination of specific volume, the two atoms of S in CS_2 had different values, one 28·6, the other 22·6.

Dr. Gladstone asked if Professor Thorpe had compared the specific volume in any way with the refractive energy.

Professor Thorpe, in reply, said that he had no intention of experimenting with chloric or perchloric acid until he had finished all the observations he wished to make with his apparatus. He admitted that there were difficulties in assuming that phosphorus was a triad in $POCl_3$, but thought that there was evidence to support that view; also, that there was some physical evidence that the two atoms of sulphur were not identical in carbon disulphide. He had not compared the specific volume with the refractive index.

The thanks of the meeting were given to Professor Thorpe for his lecture.

The apparatus for determining the vapour density and the arithmometer were exhibited.

The Society then adjourned to March 18, when Professor Tidy will read a paper on "River Water."

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, February 26, Mr. R. H. Parker, Vice-President, in the chair. A paper was read by Mr. E. A. Reilly on "Butter Analysis."

After a historical sketch, the author described the old methods of butter analysis and then described the process of Angell and Hehner for the estimation of foreign fats in butter. The following is a brief abstract of the paper:—

All natural fats are mixtures of different triglycerides, and, with the exception of butter, the group of animal fats consists of tri-stearin, tri-palmitin and tri-olein. The equivalent of these glycerides and of the acids they furnish on decomposition being very high and but little differing from each other, theory predicted that they would yield, on saponification and decomposition of the soap with dilute mineral acid, nearly equal amounts of fatty acid.

This, then, was the foundation stone, so to speak, of Messrs. Angell and Hehner's investigations.

The author finds that the following is the best way to work the process accurately :—

The butter fat has first of all to be obtained in a state fit for analysis by removing the curd, salt and water respectively. About 3 grams of the fat are to be saponified in a small porcelain basin with caustic potash and about 30 c.c. alcohol (free from resin). After complete saponification dilute and decompose the butter soap with dilute hydrochloric acid. Collect the fatty acids (after fusing them in the liquid) on a weighed filter and thoroughly wash with boiling distilled water. Drain and dry them in a small weighed beaker. The fatty acids of all animal fats (except butter) being on an average 95·5, and butter fat being 87·5, it will at once be apparent how a calculation has to be made in order to arrive at the proportion of foreign fat in a sample of butter.

This paper was discussed at length by Dr. Senier, Messrs. Hutchinson, Parker, Branson, Jewson and the Secretary.

A report on Organic Chemistry was made by the Secretary, which included the following note on—

The Conversion of the Acids of the Fatty Series into the Acids of the Lactic Series.

BY WYNDHAM R. DUNSTAN, F.C.S.,

Assistant Demonstrator of Chemistry in the Laboratories of the Pharmaceutical Society.

The acids of the fatty or acetic series and the acids of the lactic series are both obtainable from alcohols by the substitution of one atom of oxygen for two atoms of hydrogen. The acids of the fatty series are formed by the oxidation of the alcohols of the C_nH_{2n+1} series. Methyl alcohol is the first member of this series, and by substituting one atom of oxygen for two of hydrogen we obtain the first member of the fatty series of acids—formic acid.

$$\underset{\text{Methyl alcohol.}}{\left\{\begin{matrix} H \\ CH_2OH \end{matrix}\right.} \qquad \underset{\text{Formic acid.}}{\left\{\begin{matrix} H \\ COOH \end{matrix}\right.}$$

Ths other members of this series are formed from the alcohols in a similar manner.

$$\text{Ethyl alcohol} \left\{\begin{matrix} CH_3 \\ CH_2OH \end{matrix}\right. \text{yielding acetic acid} \left\{\begin{matrix} CH_3 \\ COOH \end{matrix}\right.$$

$$\text{Propyl alcohol} \left\{\begin{matrix} C_2H_5 \\ CH_2OH \end{matrix}\right. \text{,, propionic acid} \left\{\begin{matrix} C_2H_5 \\ COOH \end{matrix}\right.$$

$$\text{Butyl alcohol} \left\{\begin{matrix} C_3H_7 \\ CH_2OH \end{matrix}\right. \text{,, butyric acid} \left\{\begin{matrix} C_3H_7 \\ COOH \end{matrix}\right.$$

and so on. In considering the relations of these acids to each other, the first member, formic acid, may be taken as a type, the other acids being formed by the substitution of the monad radicals of the C_nH_{2n+1} series for the hydrogen in the non-carboxylic portion of this acid.

The acids of the lactic series are formed by the oxidation of the alcohols of the C_nH_{2n} series, or glycols, one atom of oxygen being substituted for two atoms of hydrogen. The first member of this series of alcohols is not known, and therefore the first member of the lactic series of acids cannot be obtained by the usual method. If it existed its formula would be $CH_2(OH)_2$ and the acid obtainable from it would have the same empirical formula as carbonic acid.

$$\underset{\text{Methylene glycol.}}{\left\{\begin{matrix} OH \\ CH_2OH \end{matrix}\right.} \qquad \underset{\text{Carbonic acid.}}{\left\{\begin{matrix} OH \\ COOH. \end{matrix}\right.}$$

The other acids are formed by oxidation from the following known glycols:—

$$\begin{matrix}\text{Ethylene} \\ \text{Glycol.}\end{matrix} \left\{\begin{matrix} CH_2OH \\ CH_2OH \end{matrix}\right. \text{yielding glycollic acid} \left\{\begin{matrix} CH_2OH \\ COOH \end{matrix}\right.$$

$$\begin{matrix}\text{Propylene} \\ \text{Glycol.}\end{matrix} \left\{\begin{matrix} CH_3CHOH \\ CH_2OH \end{matrix}\right. \text{yielding lactic acid} \left\{\begin{matrix} CH_3CHOH \\ COOH \end{matrix}\right.$$

$$\begin{matrix}\text{Butylene} \\ \text{Glycol.}\end{matrix} \left\{\begin{matrix} C_2H_5CHOH \\ CH_2OH \end{matrix}\right. \text{yielded oxybutyric acid} \left\{\begin{matrix} C_2H_5CHOH \\ COOH \end{matrix}\right.$$

We have now to consider the relations of the acids of the fatty series to the acids of the lactic series. The latter acids can be obtained from the former by the replacement of one atom of hydrogen in the non-carboxylic portion of the acid by hydroxyl; thus formic acid, the first member of the fatty series, would yield an acid having the same formula as carbonic acid.

$$\underset{\text{Formic acid.}}{\left\{\begin{matrix} H \\ COOH \end{matrix}\right.} \qquad \underset{\text{Carbonic acid.}}{\left\{\begin{matrix} OH \\ COOH \end{matrix}\right.}$$

$$\underset{\text{Acetic acid.}}{\left\{\begin{matrix} CH_3 \\ COOH \end{matrix}\right.} \qquad \underset{\text{Glycollic acid.}}{\left\{\begin{matrix} CH_2OH \\ COOH \end{matrix}\right.}$$

$$\underset{\text{Propionic acid.}}{\left\{\begin{matrix} C_2H_5 \\ COOH \end{matrix}\right.} \qquad \underset{\text{Lactic acid.}}{\left\{\begin{matrix} C_2H_4OH \\ COOH \end{matrix}\right.}$$

$$\underset{\text{Butyric acid.}}{\left\{\begin{matrix} C_3H_7 \\ COOH \end{matrix}\right.} \qquad \underset{\text{Oxybutyric acid.}}{\left\{\begin{matrix} C_3H_6OH \\ COOH \end{matrix}\right.}$$

The usual method of effecting this conversion is first to treat the fatty acid with chlorine, forming a chloro-fatty acid and then to decompose this with potassium hydrate. On treating formic acid, however, with chlorine we get the molecular structure broken down and thus by this method obtain no experimental clue as to its representative in the lactic series. This is not the case with the higher homologue, acetic acid; by treating this with chlorine we obtain monochloracetic acid, thus—

$$\left\{\begin{matrix} CH_3 \\ COOH \end{matrix}\right. + Cl_2 = \left\{\begin{matrix} CH_2Cl \\ COOH \end{matrix}\right. + HCl$$

Treating this with potassium hydrate we obtain glycollic acid—

$$\left\{\begin{matrix} CH_2Cl \\ COOH \end{matrix}\right. + KOH = \left\{\begin{matrix} CH_2OH \\ COOH \end{matrix}\right. + KCl$$

When the other acids of the fatty series are treated in this manner we obtain the corresponding acids of the lactic series, proponic acid yielding lactic acid, butyric acid yielding oxybutyric acid, etc. It has long been known that many organic bodies are capable of reducing cupric salts, cuprous oxide being formed and the organic substance oxidized. It has been shown more recently that cupric formate when heated in sealed tubes with water is decomposed, carbonic acid being formed and metallic copper deposited—

$$\left\{\begin{matrix} H \\ COO\diagdown \\ COO\diagup \\ H \end{matrix}\right. Cu'' + H_2O = \left\{\begin{matrix} OH \\ COOH \end{matrix}\right. + Cu + \left\{\begin{matrix} H \\ COOH \end{matrix}\right.$$

Lately P. Cazeneuve* has shown that if cupric acetate be treated in the same manner it is converted into glycollic acid, some acetic acid remains and cuprous oxide is deposited in crystals visible to the naked eye.

The method of procedure is as follows:—10 grams of cupric acetate in powder are mixed with 25 grams of water and the mixture heated in a sealed tube to 200° C., being kept at this temperature for one hour. The tube contain crystals of cuprous oxide and the liquid is of a greenish blue colour. When the tube is opened a little carbonic acid is disengaged. This is probably due to a further decomposition of the cupric acetate and is accompanied by the production of propionic acid; but this reaction is variable and of secondary importance; it is probably represented by the following equation:—

$$2\left\{\begin{matrix} CH_3 \\ COO\diagdown \\ COO\diagup \\ CH_3 \end{matrix}\right. Cu'' + H_2O = CO_2 + \left\{\begin{matrix} C_2H_5 \\ COOH \end{matrix}\right. + Cu_2O + 2\left\{\begin{matrix} CH_3 \\ COOH \end{matrix}\right.$$

* *Compt. Rend.*, No. 11, 525; *Bull. Chem. Soc. Par.*, No. 2, 1879.

The solution after filtration and evaporation at a temperature which does not exceed 50° C., or *in vacuo*, yields minute crystals, which are insoluble in cold water, and consist of glycollate of copper. After evaporation to dryness and treatment with cold water, glycollic acid and free acetic acid are dissolved out.

It is not yet known whether by heating cupric propionate we should obtain lactic acid, or by heating cupric butyrate oxybutyric acid. I have found, however, that on heating cupric butyrate with water to a temperature of 200° C., decomposition takes place, crystalline cuprous oxide being deposited; but have not as yet determined the composition of the liquid. If it be found that all the other acids of the fatty series are by this method transformed into their representatives in the lactic series, we have experimental evidence for regarding carbonic acid as the first member of the lactic series of acids as theory indicates. I have not here discussed the other evidence for so regarding carbonic acid as an organic acid, but only so far as it is concerned in the present reaction.

Parliamentary and Law Proceedings.

Offence against the Pharmacy Act.

On December the 16th a person was summoned at the Liverpool County Court, charged with carrying on business as a chemist and druggist without being registered as required by law.

The defendant had been trading in partnership with a registered person.

The local secretary, at the request of the Pharmaceutical Society of Great Britain, had obtained the necessary evidence, and Messrs. Stone and Fletcher, for Messrs. Flux, Slade and Co., represented the Society.

Defendant paid into court £5, the penalty sued for, but as the payment was on the day before that appointed for the trial application for costs was made, and the Court ordered payment accordingly.

The penalty of £5 and costs, £4 14*s.* 6*d.*—together £9 14*s.* 6*d.*—has since been paid.

Prosecution under the Pharmacy Act.

On Thursday, February 26, an important case under the Pharmacy Acts of 1852 and 1868 was disposed of in the Ayr Court before Sheriff Orr Paterson. The complaint was at the instance of the Pharmaceutical Society of Great Britain against George Bardo, shipmaster, Troon, and libelled two contraventions of the Acts named against respondent—the first being that not being a duly registered pharmaceutical chemist, or a chemist and druggist, or a legally-qualified medical practitioner within the meaning of the said Acts, he did, within "the medical hall," West Portland Street, Troon, keep an open shop for retailing, dispensing, or compounding poisons, and on 20th February sold a certain quantity of laudanum, being poison under the said Acts; and second, that he sold the poison without the bottle in which it was contained being labelled with his name and address as seller thereof. Bardo pleaded not guilty. A lengthened proof was entered into, the lines of defence taken up by the respondent being that the business was carried on in the said "medical hall" by the late Dr. Reid, of Troon, and subsequently by a Mr. Bell, to whom Bardo alleged that he had sold the business on the 16th inst. It appeared, however, from the evidence that Bardo had leased the shop some years ago, and still continued lessee; that the rent was paid by him, and his name appeared on the valuation roll as tenant; that the drawings of the shop were regularly paid over during Dr. Reid's and Bell's occupancy to Bardo's sister-in-law, apparently for behoof of the family; and that, after the 16th instant, when the sale of the business was alleged to have taken place, Bell continued paying over the drawings as formerly. It was pleaded that Bell, being a registered chemist and druggist under the Act, was the seller of the drugs, and that the respondent neither sold the drugs nor kept the open shop for the sale of them; and also that Bardo did not carry on the business.

The Sheriff held that Bardo was proved to be lessee of the shop and proprietor of the business, and under the Act was keeping open shop, and also that he had sold the poison in question without having a label with his name attached. His lordship therefore held both contraventions proved, and imposed a penalty of 10*s.* for each contravention, with £6 18*s.* 6*d.* of expenses. Mr. D. Dougall, solicitor, appeared on behalf of the Pharmaceutical Society, and Mr. C. B. Rowan, solicitor, for Bardo.

Mercurial Ointment.—Prosecution under the Sale of Food and Drugs Act.

At the Droxford Petty Sessions, on February 19, 1880, before George Atherley, Esq. (Chairman), Walter J. Long, Esq., Admiral Rice and Admiral Phillamore, Mr. John Howard Richardson, chemist and druggist, of Bishop's Waltham, was charged on two summonses for having sold (1) mercury ointment which was not of the nature, substance and quality of the article demanded by the purchaser, that is to say, was not genuine mercury ointment, but was a mixture of mercury, fat and moisture; (2) mercury ointment which, to his knowledge, was mixed with certain ingredients, to wit, fat and moisture, so as to affect injuriously the quality and potency of such drug.

Mr. Godwin, solicitor, of Winchester, conducted the prosecution for the local authorities, and Mr. Henry Glaisyer, solicitor, of Birmingham, instructed by the Chemists and Druggists' Trade Association of Great Britain, appeared for the defence. It was agreed that the summonses should be taken together.

Mr. Godwin said that on December 18, in last year, Sergeant Groves went to the defendant's shop at Bishop's Waltham, and asked for three ounces of mercury ointment or mercurial ointment. He paid the person who supplied him with the article purchased, and in accordance with the provisions of the statute he divided the sample into three parts, one of which he gave to the seller, one he forwarded to the county analyst, and a third portion he retained. On January 22, last, the case was first called on, and on the application of Mr. Ford, who, on that occasion, represented the defendant, the bench requested the magistrates' clerk to forward the third sample remaining in the hands of Sergeant Groves to Somerset House, for analysis. The portion that had been sent to Mr. Angell, the county analyst, was analysed by him, and he had fowarded his certificate to the effect that said sample contained

19 per cent. of mercury
81 ,, of fat and moisture, and added the observation that genuine mercury ointment should contain 48 per cent. of mercury. The ointment sold therefore came under the provisions of the 4th and 6th sections of the statute. The 4th being as follows:—"No person shall, except for the purpose of compounding as hereinafter described, mix, colour, stain, or powder, or order or permit any other person to mix, colour, stain, or powder, any drug, with any ingredient or material, so as to affect injuriously the quality or potency of such drug, with intent that the same may be sold in that state, and no person shall sell any drug so mixed, coloured, stained, or powdered, under the same penalty in each case respectively as in the preceding section for a first and subsequent offence." And then the 6th section says:—"No person shall sell to the prejudice of the purchaser any article of food, or any drug, which is not of the nature, substance and quality of the article demanded by such purchaser, under a penalty not exceeding £20; provided, that an offence shall not be deemed to be committed under this section in the following cases,"

and then follow the exemptions. It was quite clear that if a drug ought to contain 48 per cent. of mercury and only contained 19 per cent., it could not have the potency it ought to have, and could not have the same effect.

Sergeant Groves, called to prove the sale, said he asked for three ounces of mercury ointment, for which he paid 9*d.*, 3*d.* per ounce. The box containing the ointment was labelled after it was supplied to him, the label having the words "Mild Mercurial Ointment. Poison." He asked for mercurial ointment and how it was sold. The assistant did not say 3*d.* per ounce the mild; there was no such word used.

Mr. Angell called, sworn and examined by Mr. Godwin, said he was the analyst appointed by the authorities of the county. He received from Sergeant Groves a sample of mercurial ointment to analyse, which he analysed, and gave the certificate that had been handed in. Mercurial ointment should contain 48 per cent. of mercury, the sample sent did not contain more than 19 per cent., and it would require about two and a half times as much of such an ointment to effect the purpose of the purchaser as would be required if the genuine ointment containing 48 per cent. of mercury had been sold, mercury being the only active ingredient.

Cross examined by Mr. Glaisyer.

You have given us a long list of your qualifications, but nothing whatever as to your knowledge of drugs or pharmacy?—I have no knowledge of pharmacy, I have never attended a pharmaceutical school.

You have never had any training in pharmacy?—No.

You know nothing of drugs as drugs?—Yes, I do.

Where did you gather that knowledge?—As a pupil of Dr. Hassall.

How long have you been studying chemical analysis?—Many years.

As applied to drugs?—For more than eight years.

You say you received this mercurial ointment and analysed it, and that your certificate is generally correct. I want you to be a little more precise than that. You say you found 19 per cent. of mercury. How did you arrive at that result?—A weighed quantity was taken, the fat was separated with ether, until the residue in the main ran together in metallic globules. I noticed that slight oxidization had taken place and I knew that this might cause a slight over-estimation of the quantity of mercury present.

Then it was the residue extracted from the fatty matter that you weighed and found to be in the proportion of 19 per cent. of the whole?—That is so.

You say that might be an over estimation. What was there besides mercury?—Oxide of mercury.

Anything else?—Perhaps a slight trace of sulphide.

You are required, I take it, to find out what was actually present in the sample of ointment you analysed, and you only state in your certificate that it contained 19 per cent. of mercury; but what did it contain besides mercury?—I can tell you how much mercury there was in it, because I have since made another analysis by another process and I find, by what is called the sulphide method, that the ointment contained 15·8 per cent. of mercury.

You say you found 81 per cent. of fat and moisture. You do not allege, I suppose, that the moisture present is an adulteration?—Certainly not.

Then you remark at the bottom of your certificate, "genuine mercury ointment should contain 48 per cent. of mercury." Do you adhere to that statement?—I obtained that information by reading the British Pharmacopœia.

Then the word "genuine" is put in by you advisedly?—It is.

What is the date of the Pharmacopœia to which you refer?—1867, with additions to 1874.

Is that the first Pharmacopœia in which mercurial ointment appears?—Oh, no.

Have you referred to others?—To several.

Can you give me the formula for mercurial ointment appearing in each?—In the 1836 Pharmacopœia there is a mild form of ointment ordered.

What do you find ordered in the 1836 Pharmacopœia?—I cannot remember the proportions.

Will you give us the formula appearing there (book handed to witness) under the head of mild mercurial ointment?—No, I cannot give it from this. Mine was an English translation; this is pharmaceutical Latin.

That is the original Pharmacopœia of 1836?—There are symbols there I do not understand.

You have not brought your English translation with you?—No.

You know the contents of the certificate received from Somerset House; do you agree with it?—I perfectly agree with that certificate.

Does this same Pharmacopœia of 1836 order another preparation of mercurial ointment?—I do not know.

If I tell you it does will you contradict me?—I will not.

And if I tell you that that strong mercurial ointment contains 50 per cent. of mercury, are you prepared to admit the fact?—I shall not contradict you.

You recollect the mild is about 16 per cent.?—Yes.

Admiral Phillamore: What Pharmacopœia have you referred to?—To one or two, but I cannot recollect the dates.

Mr. Glaisyer: You know perfectly well, as a fact, that both mild and strong mercurial ointments are still articles of commerce?—I do.

Then you say there are these two articles still in use, the mild containing about 16 per cent. of mercury and the strong about 49 or 50 per cent.?—Yes.

Is the preparation which contains 16 per cent. mentioned in any other Pharmacopœia?—I do not know.

What about the different hospitals in London?—They use both kinds.

Do they use any other than the mild, containing 16 per cent.?—I will not say; I do not know.

Do you know anything about the pharmacopœias of the London hospitals?—I have seen them, but I have not referred to them in this case.

Re-examined by Mr. Godwin.

You have been asked about the Pharmacopœia of 1836. I suppose that was superseded by the Pharmacopœia of 1867?—It was.

And that we go with the Pharmacopœia as we do with all books of authority, by the last published edition?—Quite so.

And that the Pharmacopœia printed in 1867 is the only standard authority?—Yes; the only one I should refer to.

Then the one of 1836 is obsolete?—It is a curiosity.

You have been asked as to mild mercurial ointment?—If this had been sent to me as mild mercurial ointment I should not have given this certificate.

But as an analyst and a chemist you know no acknowledged mild mercurial ointment?—I know there is such an article sold.

As a chemist and an analyst, is there such an article known as mild mercurial ointment?—It is a curious question you have put to me. You ask me to answer it from a scientific point of view, and mild mercurial ointment is not a scientific product.

You say chemists sell an article that they call mild mercurial ointment?—Yes.

That is not genuine mercurial ointment, you say?—In my opinion it is not.

The genuine mercurial ointment ought to be of Pharmacopœia standard?—Quite so.

Admiral Phillamore: As a matter of fact, which is most in use, the strong or the mild?—I should think the mild.

Admiral Phillamore: About the value of these two articles, which is the proper price at which they should be sold?—I have no knowledge whatever.

Mr. Glaisyer: I shall prove that, sir.

Mr. Godwin: Then I put in the certificate from Somerset House.

Magistrates' Clerk: Read the following certificate:—

"The sample of mercurial ointment referred to in the annexed letter, and marked "bottle No. 5," was received here on the 27th ultimo. The sample was securely sealed. We hereby certify that we have analysed the ointment, and declare the results of our analysis as follows:—

Mercury	15·28 per cent.
Fat and moisture . . .	84·72 „
	100 „

"The above results agree with what is known in the retail drug trade as "mild mercurial ointment," and for the preparation of which a formula was given in the London Pharmacopœia, 1836.

"As witness our hands this 16th day of February, 1880.

"(Signed) J. BELL. R. BANNISTER. G. LEWIN."

Mr. Godwin: That is my case.

Mr. Glaisyer, having sketched the nature of the defence he proposed to offer, called

Samuel Fry, an assistant to Mr. Richardson, the defendant, and manager of his business at Bishop's Waltham, who said: I recollect the sergeant coming into the shop. He asked for mercurial ointment, he likewise asked how it was sold. I said 3*d.* per oz. the mild; he said he would have three ounces, with which I supplied him. We had some conversation. He said it was rather an unpleasant duty he had to perform. He said the ointment was for analysis. He divided the sample into three parts, giving one to me.

What label did you put on the article sold?—It was labelled "mild mercurial ointment, poison," and Mr. Richardson's name and address.

What did you charge him for it?—Ninepence for the three ounces.

Was it labelled before he divided the sample?—Yes.

Was it labelled before he paid for it?—It was.

Did you sell this to him distinctly as mild mercurial ointment?—I did; that is the preparation we usually sell.

You charged him 3*d.* per oz.?—Yes.

Do you keep the strong mercurial ointment in stock?—Yes.

What's your price for that?—Sixpence per ounce.

Do you sell much of the strong ointment?—I never sold any in my life.

What sale have you for the other?—We mix about two pounds at a time, which might last three months.

What experience have you had of the trade?—I have been in the trade seven years.

And the result of that experience with regard to the strong ointment?—I have never sold it or seen it sold.

Cross-examined by Mr. Godwin.

Have you any qualification, Mr. Fry?—I am a properly qualified chemist and druggist.

You have never seen the strong ointment sold?—No; the strong ointment would contain about 50 per cent. of mercury.

That's about the Pharmacopœia strength?—It is.

Have you seen the British Pharmacopœia now in use?—Certainly.

The ordinary mercurial ointment in the British Pharmacopœia contains about 48 per cent. of mercury?—Yes.

And the British Pharmacopœia is the recognized authority for drugs?—Not in every case.

Do you mean to say that every country chemist can set up his own authority?—No.

You recognize this Pharmacopœia as an authority?—Yes, as one authority.

When did you obtain your qualification as a chemist and druggist?—Yesterday.

You say that Sergeant Groves came into your shop, and asked for mercurial ointment, and how it was sold, and you said 3*d.* per ounce the mild, and that he then said he would have three ounces?—Yes; that is so.

You have heard what Sergeant Groves has sworn with regard to the use of the word "mild" on that occasion?—I have heard what he said. The word was used by me, but not by him.

You adhere to that statement in spite of what Sergeant Groves says?—In spite of what anyone may say.

Suppose a person came into your shop and asked for mercurial ointment, would you ask whether they required the mild or the strong?—If they came without a prescription or authority I should supply the mild.

Do not you know that by doing that you would supply them with a drug not of its proper potency?—By doing that I may perhaps save their lives.

That has nothing to do with it.—If I labelled the ointment sold mild mercurial ointment I sell it as such.

Re-examined by Mr. Glaisyer.

You say that you should not supply the strong unless it was ordered by a medical man?—Certainly not.

You regard this British Pharmacopœia, I take it, as a guide for medical men?—Exactly.

Supposing you have a drug asked for that does not appear in that book?—Then we must go to the last authority that does contain it.

Chairman of the Bench: Do you often get prescriptions ordering the strong ointment?—I have never seen a prescription containing mercurial ointment.

If a prescription came to you containing mercurial ointment, what would you use?—It would depend upon the date of the prescription. If the prescription was dated subsequent to the issue of the British Pharmacopœia I should use the British Pharmacopœia preparation containing 48 per cent. of mercury.

As a matter of fact you never have supplied either kind of ointment in a prescription?—I have not, sir.

Mr. J. H. Richardson called, sworn and examined by Mr. Glaisyer.

Your name is John Howard Richardson, and you are a registered chemist and druggist, carrying on business at Alresford and Bishop's Waltham?—Yes.

The last witness is your assistant at your Bishop's Waltham establishment?—He is.

Supposing you had a prescription sent to you ordering mercurial ointment, what would you supply?—I should supply the ointment of the British Pharmacopœia if the prescription was dated after 1867.

How many years' experience have you had in the drug trade?—Between seventeen and eighteen. I have been at Havant, Portsea, Southsea, Bishop's Waltham and Alresford.

And what has been your experience with regard to the sale of this ointment?—I have never supplied the strong ointment, except on the written authority of a physician or surgeon.

Professor Attfield called, sworn and examined.

You are Professor of Practical Chemistry to the Pharmaceutical Society of Great Britain, a Fellow and Member of the Council of the Institute of Chemistry, and a Fellow and until lately a Member of the Council of the Chemical Society, author of a Manual on Chemistry?—Yes.

You are also an analyst?—Yes, of from twenty-five to twenty-six years' standing.

Are you well acquainted with the nature and quality of drugs?—Yes.

What is mercurial ointment?—Mercurial ointment is a mixture of mercury and fat. The proportions vary considerably. The lowest proportion that I know is $12\frac{1}{2}$ per cent. of mercury. Ointment of that strength is now used at the Hospital for Diseases of the Skin and at King's College Hospital. In the present Pharmacopœia of the London Hospital the strength is $16\frac{1}{2}$ per cent.; Middlesex Hospital $16\frac{1}{2}$ per cent. The British Pharmacopœia strength is about 49 per cent. as has already been stated.

When was the preparation known as mercurial ointment first ordered?—It was first ordered in the London Pharmacopœia of 1721, a copy of which I now hold in my hand. It is written in Latin. There is only one form for the ointment in this Pharmacopœia. This is the first or "blue" mercurial ointment, and it contained between 19 and 20 per cent. of mercury. The next authority was the London Pharmacopœia of 1746. Two varieties of the ointment are therein mentioned. Mercurial ointment, mild,—the word is *mitius*,—containing about 20 per cent., and strong, *fortius*, containing about 33 per cent. of mercury. The next authorized preparation is that of the London Pharmacopœia, 1836, the mild 16 to 17 per cent. of mercury, the strong 50 per cent. of mercury. The British Pharmacopœia, which is stated in the preface to have for its object, "not so much the selection as the definition of substances which the physician prescribes, and which are required to be kept at one safe and uniform standard of strength and composition," orders a preparation containing about 48 or 49 per cent. of mercury.

Do you know the custom of chemists and druggists throughout the country?—The custom is to keep two kinds of ointment, the mild and the strong.

Can you give us the proportions of mercury they contain?—The strong contains nearly half its weight, and the mild about 16 per cent. I can say of my own knowledge that the mild is the article as a rule sold to the public. The strong is the article put into medicines prescribed by physicians after the date of the British Pharmacopœia.

Admiral Phillamore: But a person asking for mercurial ointment; an ordinary customer?—The common practice is to sell the mild.

Mr. Glaisyer: Have you received an official sample in this case?—Yes, on January 22, and I analysed it and found it to contain about 16 per cent. of mercury.

Admiral Rice: That you say is the ordinary article of trade?—Yes.

Admiral Phillamore: And the price paid 3*d.* per ounce, that is a fair value for the mild preparation?—Yes.

Mr. Glaisyer: What is your opinion of the ointment you have analysed in this case?—I consider it to be a genuine mercurial ointment. The proportion of mercury I found there is in accordance with the proper practice and custom of the trade. It is the only "Trooper's" ointment. Further than that the strength of the preparation is founded on official directions. The use of the mild preparation also harmonizes with hospital pharmacy, as indicated in certain hospital pharmacopœias, which I consider to be good authorities.

Cross-examined by Mr. Godwin.

You talk about the British Pharmacopœia, and you have gone back to 1721 and 1746, but is not this British Pharmacopœia, printed in 1877, the Pharmacopœia in general use at the present time?—For certain purposes.

For all the drugs of the country?—No, certainly not.

Then what is the authority for drugs at the present time?—There are many authorities and I have quoted several.

Do you mean to say that the recent edition of the Pharmacopœia does not supersede the former editions?—So far as its object is stated, and that object I have referred to in the paragraph I have read from the preface.

You have, no doubt, read the Act of Parliament under which these proceedings are taken, the word "drugs" is mentioned there; to what drugs do you suppose it is intended to apply?—I consider the word applies to all drugs.

Does not the word apply to drugs as authorized by the British Pharmacopœia at present in use?—Most certainly not to these alone.

Take the Pharmacopœia of the present time; it is a revised edition—I think the preface says it is revised?—The prefatory pages state that the Pharmacopœia of 1867 has had some additions made to it.

Is not the object of publishing one edition after another of such a book as this, to add new things that are useful?—Yes.

To be the authority on all drugs in use in the country?—Most certainly not.

Why the second paragraph of the preface of the British Pharmacopœia states, "And by a subsequent Act, the 25 and 26 Vic., cap. 91, which recites, amongst other things, that different Pharmacopœias have hitherto been in use in England, Scotland and Ireland, and that the Pharmacopœia to be published by the General Council is intended to supersede the above-mentioned Pharmacopœias, it is enacted that the British Pharmacopœia, when published, shall for all purposes be deemed to be substituted throughout Great Britain and Ireland for the several above-mentioned Pharmacopœias; and any Act of Parliament, Order in Council or custom relating to any such last-mentioned Pharmacopœias shall be deemed, after the publication of the British Pharmacopœia, to refer to such Pharmacopœia."—All that refers to the drugs of physicians' prescriptions and not to drugs generally.

Then you mean to say that this book is not the authority?—I say that book is an authority for physicians' prescriptions and for the drugs therein named, as noticed in the paragraph from the preface which I have read.

Re-examined by Mr. Glaisyer.

You have been asked a number of questions about the drugs which could properly be considered as drugs within the meaning of the Sale of Food and Drugs Act?—Yes.

And my friend has endeavoured to get out of you that no drugs are so included except those mentioned in the British Pharmacopœia, but there are many drugs that have come into use since that Pharmacopœia has been published?—Oh yes.

And those drugs if adulterated would properly come within the four corners of this Act?—Certainly.

Now are there old drugs which are commonly asked for by the public, which do not appear in the present Pharmacopœia?—Yes, many.

Therefore the deduction, if the Sale of Food and Drugs Act applies only to drugs mentioned in the British Pharmacopœia, many adulterated drugs might be sold for which offences no prosecution could be brought?—Clearly so.

Admiral Phillamore: This substance has long been sold?—This article containing 16 per cent. of mercury has been sold for nearly half a century without let or hindrance, and the public would be put to much inconvenience were the sale stopped now.

Mr. Glaisyer: Might not great danger attend the use of strong mercurial ointment in certain cases if supplied promiscuously?—It is within my knowledge that strong mercurial ointment has seriously injured health.

The magistrates then retired and after an absence of about a quarter of an hour the Chairman of the Bench said, The magistrates have had this case under their careful consideration for some little time, and under all the circumstances of the case they dismiss it.

Mr. Glaisyer: With costs, sir? We have been brought here to defend this case at very considerable cost.

Mr. Godwin: I cannot agree with my friend's suggestion. It seems to me that it has been a very proper inquiry. It was carried out by the authorities of this district; it was not a malicious prosecution or an improper one, and I submit to the bench that it is not a case in which this court ought to accord costs of any description, much less heavy costs.

The bench again retired and ultimately decided to allow three guineas as costs.

Prosecutions under the Weights and Measures Act.

At the East Dereham Petty Sessions, on February 20, 1880, before R. C. Brown, Esq. (Chairman), and H. E. Hyde, Esq., John Cock, pharmaceutical chemist, of

Shipdham, was charged on two summonses—(1st) that on the 22nd day of January last, at the parish of Shipdham, he unlawfully had in his possession for use for trade, four weights not stamped as required by law; (2nd) that on the 22nd day of January last, at Shipdham, he had in his possession one weighing machine, which was there found by the inspector to be unjust.

Mr. Glaisyer appeared for the defendant, instructed by the Secretary of the Chemists and Druggists' Trade Association of Great Britain.

On the first summons being taken, Edward Symonds was sworn, and said he was a Superintendent of the Police and Inspector under the Weights and Measures Act for the Mitford and Launditch divisions of the county of Norfolk. On the 22nd of January last he visited the defendant's shop at Shipdham and tested the weights there and he found a 4 lb. weight unstamped. He afterwards went into the gig shed, which was used as a warehouse as well, and there found three weights, two 4 lb. weights and a 2 lb. weight, none of which were stamped. On testing them he found one of the 4 lb. weights found in the warehouse one drachm light, and the other 4lb. weight half a drachm light.

Mr. Glaisyer for the defence, said he was not prepared to contend that the weight found in the shop was stamped in accordance with the provisions of the Act, but his answer, as far as that weight was concerned, was that at the time appointed by the officer for the rectification and marking of weights in October last, the defendant sent the bulk of his weights for the purpose of having them verified and stamped. He could not dispense with the whole of his weights at one time, so he sent a portion. This one weight in question was kept with one or two others for the purpose of conducting his business, whilst the remainder of his weights were being inspected by Mr. Symonds, and he had not subsequently had an opportunity of sending them for verification. The question of stamping was a trivial matter, because it was not alleged on the part of the prosecution that this particular weight was short weight or that it was in any way inaccurate as to its weight. The simple charge was that it was not stamped as required by law. With regard to the other weights that were found in the gig shed, the inspector had admitted that he was told by the defendant that these pieces of iron were used for making a sheep dip, that is to say for roughly weighing out different proportions of different ingredients for manufacturing a sheep dipping composition. They were used by the defendant not as standard weights by which to sell his goods, but as rough guides in mixing heavy materials in the manufacture of sheep dip.

Chairman of the Bench: All the weights found on the premises not stamped may be forfeited, I believe.

Magistrates' Clerk: They are liable to be forfeited, but the Act does not say they shall be forfeited.

Chairman of the Bench: We inflict a low penalty of 5*s*., and the one weight found in the shop will be forfeited.

Mr. Glaisyer: Then, sir, you convict only on the one unstamped weight found in the shop, which has not been proved to be of short weight.

Chairman of the Bench: Yes, and the other weights found in the warehouse must be returned to Mr. Cock.

With respect to the second summons, Inspector Symonds said on the 22nd of January last, he visited the defendant's premises and went into his gig house, and with three of the weights mentioned in the last summons and others, he found a weighing machine with weights standing by it. He tested the machine and found it very nearly 3½oz. deficient against the purchaser. It was a platform machine and not a hanging beam scale.

Mr. Glaisyer said the defence to this summons was simply a repetition of his previous remarks as applied to the pieces of iron that were found with this machine. This machine and the pieces of iron were used purely and simply for roughly weighing out different proportions of ingredients for mixing into a sheep dipping composition, and he could prove that all articles kept in that warehouse were taken into the shop to be weighed previous to being sold.

Evidence to this effect having been given by two witnesses, the case was dismissed and the machine ordered to be returned to Mr. Cock.

Poisoning by Godfrey's Cordial.

An inquest on Percy Edwin and Margaret Ethel Makin, twin children, who had been poisoned by an overdose of Godfrey's cordial, was held on Thursday, February 12, at Hindsford, Atherton, before J. B. Edge, Esq., coroner.

Lydia Makin, the mother of the children, said that in consequence of having been kept awake by them at night, she sent a young woman, named Sarah Jane Newton, for a pennyworth of Godfrey's cordial, from a woman named Betsy Molyneux, who manufactured it. Newton took a two ounce bottle. (The bottle was produced by Sergeant Kelly, who said Dr. Trail had taken a portion of the contents.) She told Newton to ask what quantity she was to give a child six weeks old, and word was returned that it must be a teaspoonful. About 12 o'clock on Saturday night, she gave each of the children a teaspoonful, and she then went to bed. Both the deceased seemed soothed directly and fell asleep. About 6 o'clock on Sunday morning, the children were still asleep. About 7 o'clock she became alarmed at the condition of the children. They kept opening their eyes and shutting them. She tried to rouse them, but they kept dosing off. About 9 o'clock she sent her husband for Dr. Trail, and while he was away and before the doctor came the boy died. This would be about 9.20 a.m. The doctor ordered the girl to be warmed, and her head to be bathed in cold water. She died at 8.30 on Sunday night. Dr. Trail came again before she died. She never had a drop of the kind in the house before. She was quite sure she only administered a teaspoonful.

Sarah Jane Newton deposed: The last witness sent me for a pennyworth of godfrey on Saturday night. Mrs. Molyneux gave it to me herself. I asked her what a child six weeks old should take, and she said "If it is not a very strong one you can give it a teaspoonful." I told her the child was not so strong, and she said "Then it must not have more than a teaspoonful." I saw Mrs. Makin give the children the cordial, which I got at 8.30. It would be midnight when she administered it as directed. I slept with Mrs. Makin, who awoke me a little after 6 o'clock and said she could not get the children to wake. They simply opened their eyes and shut them again.

By the jury: I am sure they had only one spoonful each. It was said it should be given when the children went to bed.

Betsy Molyneux, wife of Richard Molyneux, Lord Street, Atherton; said: I remember the last witness coming for the godfrey. My daughter supplied it, but I was present. She is in her nineteenth year. The woman Newton did not tell me what sort of a child she wanted the medicine for. Had she done so I should not have given it her, because I should have thought twins would not stand as much. Twins are not reckoned as strong as others.

The Coroner: Did she tell you the child was only six weeks old?—Yes.

And that it was not very strong?—No, she said it was very cross, and they could not get any rest.

Did she ask how she should give it?—Yes, I said a small teaspoonful, but not knowing it was a twin. She said they had had no rest with it for four nights. I told her everybody knew whether their children were strong or weak, and would know what quantity to give.

Did you say "If the child isn't a strong one give it a teaspoonful?"—I cannot say. I don't want to say what's false. I didn't think about twins. I have made cordial for two years.

What is it made of?—I first put half a drachm of opium in a quart of water and boil it to three gills or rather less and then I add two tablespoonfuls of treacle and one of sugar. When it is gone cold I put an ounce of paregoric in. Mr. Wallwork, druggist, weighs the opium of which I always get half drachm at a time. I get the paregoric at the same time in quantities of an ounce. I measure the water before I put the treacle in. I make no other kind of medicine. My mother sold this cordial for near on forty years. This is the first case of the kind.

The Coroner: I advise you not to sell it.

Witness: I will sell no more.

The Coroner: I think it is contrary to law. I would advise you to give it up. If another case of this kind occurred it might be serious for you.

A Juryman: Do you get rid of much of it?

Witness: A great deal, mostly to old people with bad coughs. We have given over selling it twice, but were pressed to start again.

Another Juryman: You have sold it for children all along?

Witness: Yes.

Mr. Mather: You don't prohibit the sale to old people?

The Coroner: I don't prohibit anything, but I say it is contrary to the law for her to vend such drugs. This paregoric is dangerous, unless they know who they are administering it to.

Alexander Forbes Trail, surgeon, said: I was called in to see the children on Sunday morning, arriving about ten o'clock. I found the boy dead, and the girl seemed to be suffering from some narcotic. Before I got there the father told me what they had been giving the children. I saw the bottle, and took a portion of the contents. I have heard Mrs. Molyneux's description of what it contained, and I believe she has told the truth. In a teaspoonful there would be about three-tenths of a grain of opium, and there would be about two grains of the paregoric.

In your opinion these children died from the administration of this godfrey?—That is my opinion.

Do you think narcotics are given in large quantities in this neighbourhood?—Yes, I believe so.

The Coroner said he asked that because the Home Secretary had inquired of him if there were many deaths from narcotics. He had suspected its extensive use.—The witness, continuing, said the parents of many children were occupied during the day, and they liked to have their children sleeping in the night. They went to the medical men to ask for medicine to make the children sleep, and were invariably refused. They were rather advised to regulate the children by means of their food, in nursing, etc. Unable to get what they wanted from the medical practitioners they were more successful with outsiders, and there were few houses where they would not find a bottle of this nature. It was sold by various people in the town and district.

The Coroner supposed there were few instances in which death was so sudden.

Dr. Trail had no doubt many deaths indirectly proceeded from it. This dose he considered excessive.

The foreman asked if a *post-mortem* would throw any light upon the case.

The Coroner did not think it would. It would show in all probability that the deceased died from opium poisoning, and that they were pretty clear about already. A *post-mortem* might show that Mrs. Makin had given a larger dose than was alleged. He, however, believed her; she seemed a very respectable woman.

Dr. Trail said, judging from the quantity of the cordial he took, and that left, he did not think more than one dose was administered.

The Coroner, in answer to the jury, said the parents were anxious no doubt to get the children asleep for the night, and delayed giving the cordial until they went to bed. The danger of these cordials was that they were in the hands of persons comparatively ignorant alike of the strength of the medicine and of the children about to take it. People got into the way of selling it, and did not inquire into the particulars as they might do. He could not help thinking that the constitutions of many children were gradually sapped away, their deaths being attributed to wasting away; the fact being that such stuff as this prevented digestion. The law applicable to this matter was this: Persons dealing in drugs must use reasonable care and skill in their administration. If they did not, and death ensued, they were liable; but in this case the drug was not administered directly by Mrs. Molyneux, but by the mother, and though that would not excuse Mrs. Molyneux entirely, yet it made a great difference in considering whether she had been guilty of such gross carelessness as would render her responsible. He did not think she had been guilty of that carelessness which the law called reckless to such a degree that it amounted to manslaughter. It was within the province of the jury to find a verdict of manslaughter, but he did not think it would result in a conviction, for many circumstances might be urged in mitigation.

The jury at once returned a verdict that the deceased children died from accidental poisoning from an overdose of godfrey.—*Leigh Journal.*

Alleged Poisoning by Oxide of Zinc.

On February 25, at Birkenhead, a cabdriver was found lying in an unconscious condition in an eating-house in that town. It appeared that shortly before that time he purchased of Mr. Fore, chemist, an ounce of oxide of zinc, stating that it was for his horse. He then went into the eating-house, where he ordered a cup of tea. The attendant who supplied it saw him empty some stuff out of a paper into the tea, and asked him what he was doing, to which he replied "I'm going to finish myself." He then swallowed the contents of the cup, and immediately fell down insensible. He was at once conveyed to the Borough Hospital.—*Liverpool Daily Post.*

Poisoning by Oleum Phosphoratum.

An inquest has been held before Mr. Hawkes (borough coroner), at the Angel Inn, Sparkbrook, on the body of Catherine Forrest, thirty-two years of age, single woman, who resided at No. 117, Stratford Road. The deceased was the daughter of Alexander Forrest, accountant, residing at the address given above. For some time past she had been suffering from heart desease, and died on the 18th instant. She was attended by Mr. W. Taylor, surgeon, who prescribed phosphorized cod liver oil, which she obtained from Mr. Thompson, chemist, Stratford Road. When a second supply was sent for, Mr. Ball, the chemist's assistant, went to Messrs. Southall, Son, and Barclay, but he received from one of their assistants, named Withers, phosphorized oil instead of phosphorized cod liver oil. The bottle was labelled correctly by Withers "oleum phosphoratum," but subsequently a capsule label "pure cod liver oil" was attached by Ball. Deceased died after taking three doses from the poisonous mixture.

The coroner, in summing up, remarked that there had been gross carelessness, but he reminded the jury that any verdict of a criminal character arrived at by a coroner's jury would encounter elsewhere violent hostility, and he would not be a party to induce a jury to find such a verdict when he could by any means satisfy himself that justice would be met by a verdict of death from misadventure.

The jury rturned a verdict to this effect, the coroner also, at the request of the jury, censured the two assistants for carelessness.—*Birmingham Gazette.*

BOOKS, PAMPHLETS, ETC., RECEIVED.

PHARMACOLOGY AND THERAPEUTICS, or Medicine Past and Present. By T. LAUDER BRUNTON, M.D., F.R.C.P., F.R.S., etc. London: Macmillan and Co. 1880.

A NOTE BOOK OF SOLUBILITIES, arranged chiefly for the Use of Prescribers and Dispensers. By JOHN EAGLE. London: H. K. Lewis. 1880.

JAHRESBERICHT ÜBER DIE FORTSCHRITTE DER PHARMACOGNOSIE, PHARMACIE, UND TOXICOLOGIE, herausgegeben von Dr. G. DRAGENDORFF. 13 Jahrgang. 1878. Gottingen: Vandenhoeck and Ruprecht. 1879.

REPORT ON THE REVISION OF THE U.S. PHARMACOPŒIA, preliminary to the Convention of 1880. Being a Rough Draft of the General Principles, Titles, and Working Formulæ proposed for the Next Pharmacopœia. Prepared and Compiled by CHARLES RICE, Chairman of the Committee. New York. 1880.

WATER ANALYSIS FOR SANITARY PURPOSES With Hints for the Interpretation of Results. By E. FRANKLAND, Ph.D., D.C.L., F.R.S., etc. London: J. Van Voorst, 1880. From the Author.

Notes and Queries.

[650]. RED DRENCH.—*Agathos* would be obliged by a form for red drench for cattle, horses, sheep, etc., small in quantity, but active.

COSTER'S PASTE. — In answer to a correspondent's inquiry as to the formula of Coster's paste, Mr. James Startin replies in the *British Medical Journal* (Jan. 17):—

"The usual formula, I believed, used is:—

℞ Iodine Pigment . . . . ʒij.
Huile de Cade or Oil of Juniper Tar . ℥j.
Misce. Fiat embrocatio.

"I find the following formula most effectual:—

℞ Pigmenti Iodi . . . . . ʒiii. vel ℥iv.
Creasoti Puri . . . . ℥ss.
Huile de Cade . . . . ℥ss.
Misce.

"In cases of early ringworm, it is an effectual remedy if well brushed into the roots of the hair. The addition of a quantity of iodine makes the preparation more valuable."

Correspondence.

SALE OF POISONS AND PATENT MEDICINES.

Sir,—From the correspondence which has appeared in the daily papers it is evident that this subject is attracting the attention of the public generally as well as the medical profession; and it is to be hoped that the Pharmaceutical Council will take immediate steps to bring before Parliament an amended Pharmacy Act, both for the benefit of the pharmacist and the general good. It appears to me that as the law at present exists that there is nothing to prevent a tailor or any other tradesman or licensed hawker who takes a five shilling licence from selling the so-called patent medicines, however poisonous or injurious they may be, under the protection of a three-halfpenny stamp. A large proportion of these patent medicines are prepared by charlatans, who not unfrequently affix some letters to their names, such as M.B., etc., thereby increasing the gullibility of the ignorant. Now I would ask, Is it fair to a large and educated body of men who have spent years in qualifying themselves for a highly responsible position, and I venture to say are the worst remunerated of any profession, that the chemists of this country should have the responsibility and very doubtful privilege of selling poisons under stringent regulations, and from which they gain little profit and much trouble, when any ignorant person may sell the same if protected by law under a paltry stamp duty? How many hundreds or thousands of children die annually from the effects of soothing syrups and narcotics now legally sold? The medical men can form the best opinion.

It would be well if the formulæ for all patent medicines or preparations had to be submitted to authorized medical inspection, and in case of any being poisonous or of such a nature as to be injurious to the public health that the sale should be prohibited.

The time has now arrived when the retail sale of drugs, medicines and chemical preparations ought to be exclusively in the hands of qualified men. It must be a great injustice to gentlemen who have to pass examinations and spend many years of their lives in order to gain their certificates that they should be at the mercy of any tradesman who can sell drugs with impunity as long as he keeps clear of those poisons enumerated in the schedules.

I must now appeal to country chemists, on whose behalf as well as my own I am prompted to write this letter, and urge them most strongly one and all to unite and try to improve our status and condition, by putting pressure on the Pharmaceutical Council and not being afraid of overdoing it, as all large bodies are proverbially hard to move. The provincial chemists have a great deal in their power if they will only act in unison, and I would call their attention to those gentlemen who now compose the Council, nearly the whole of whom are from the large towns, eight being from London, and out of the twenty-one I can only find two, whose address is Diss and Salisbury, who are likely to know the grievances of a town of some twenty thousand inhabitants where the medical men dispense their own medicines and patent medicines are exchanged for their cost wholesale.

The Birmingham Association is doing good work and acting energetically, but it is the Pharmaceutical Council who must bring forward new legislative measures and get the Act amended, without which being done there will be many who will find their occupation gone. Apologizing for the length of this letter. W. A. BAGNALL.

PATENT MEDICINES AND DISPENSING LEGISLATION.

Sir,—Mr. Symons's letter which appeared in a recent *Pharmaceutical Journal* is thoroughly practical, and represents the true opinion of country chemists in general. Without doubt it is now time for the Council to take in hand the reckless sale of patent medicines containing scheduled poisons by unregistered persons; it is called for by the public, as shown by the press, also the recent verdict of the St. Pancras jury confirms the same. A step further might be judiciously ventured, namely, the dispensing of all prescriptions should be reserved to the duly qualified medical practitioners and chemists and druggists. This, I believe, is the case in Ireland, and why should not the Legislature in England restrict the compounding of all medicines, whether containing scheduled poisons or not, to those who are properly qualified to dispense the same? This would be hailed with satisfaction by the public as additional means for their safety. MAJOR.

J. J. Jackson.—We do not agree with your opinion as to the papers in question, the value of which has been repeatedly vouched for by authorities in this country and on the continent. As to your assumption, it is an incorrect one, and does injustice to the author, as the service has been a voluntary one and has been supplemented by the presentation of a valuable series of illustrative specimens of the drugs mentioned to the Museum, where they have been already found very useful for reference and comparison.

"Delta."—See before, p. 439.

C. Jones.—A permanent gloss can be imparted to leather by coating the surface, freed from grease, with varnish made from a drying oil, after the manner in which "patent" leather is prepared.

J.—By exposing them to the influence of an odorous substance in an enclosed space.

J. A. Wright.—The metallic cyanides are included in the poison schedule. If your preparation comes within the provision of the Pharmacy Act we must decline to suggest any way of evading it.

A. P. S.—Associates not in business are not entitled to vote in the elections of Members of Council. In the election of annuitants on the Benevolent Fund they have each one vote.

Student.—Bentley's 'Manual of Botany.'

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Macaulay, Tupholme, Ellis, Flückiger, Mackay, Kent, C. C. B., Justitia, M. P. S., Judex.

THE EFFECT OF INTENSE COLD ON CHERRY-LAUREL.

BY PROFESSOR FLÜCKIGER.

In January, 1879, I submitted cherry-laurel leaves, which were covered with ice, to distillation with water, and ascertained that they nevertheless yielded a small amount both of essential oil and hydrocyanic acid. This experiment is recorded in the new edition of the 'Pharmacographia,' page 256, yet it should be added that the leaves, although frozen, were still green and were not killed by the frost, the temperature being not below $-10°$ C. (14° F.). In the month of December, 1879, as well as in the beginning of the present year, however, we noticed repeatedly, at Strassburg, temperatures of $-25°$ C. ($-13°$ F.), and then the cherry-laurel leaves turned brownish, lost their leathery texture and were in fact killed. Some of them, distilled with water, yielded an aromatic aqueous product which proved devoid of hydrocyanic acid. On repeating this experiment with one pound of the frozen leaves the same negative result was obtained, and the same again when two pounds of leaves were submitted to distillation. In each case the first portions of the distilled liquid were tried for hydrocyanic acid with the usual tests, viz., sulphate of copper and guaiac, the production of sulphocyanate and that of Prussian blue. No trace of hydrocyanic acid was proved to be present by these means. Another distillation, like the former, also performed by using the leaves minutely cut, was carried on for an hour or two, so as to afford a large quantity of water, say about 1½ gallon. It had nearly the usual odour of cherry-laurel water, yet no essential oil made its appearance. The whole quantity of the distilled water was now repeatedly shaken with ether; from the ethereal layers afterwards the ether was cautiously distilled off and the residue exposed to spontaneous evaporation at a temperature not exceeding 20° C. (68° F.). It afforded about 1½ gram of an oily liquid reminding, not exactly of cherry-laurel oil, but a little suggestive of acetic or similar compound ethers, and displaying at the same time a certain pungency; it was of a decidedly acid reaction. Supposing it to be (impure) cherry-laurel oil, I thought it quite in accordance that small crystals began to be formed on the sides of the phial. To investigate the nature of the essential oil I shook it with a saturated solution of bisulphite of potassium, SO_3KH, after having ascertained that this solution immediately combined with true benzylic aldehyde, *i.e.*, essential oil of laurocerasus, yielding crystallized scales of the compound $C_6H_5.COH,SO_3KH$. But such was by no means the case with the oily liquid which had been extracted from the water. And as to the small crystals, which had separated from the same oily liquid, they proved not to be benzoic acid inasmuch as they readily melted at about 60° C. (140° F.). Nor was it possible to ascertain the cause of the acid reaction of the oily liquid; it was due neither to formic acid nor to any other acid of the fatty series. The aqueous residue in the still was duly concentrated and found to be very rich in mucilage and uncrystallizable sugar.

These experiments, which were for the most part performed by Mr. Fels, a pupil of mine, show that the source of hydrocyanic acid and benzylic aldehyde in the laurel leaves is destroyed by intense cold. A minute quantity of an essential oil is still afforded

by the leaves, but it does not agree with the oil as yielded by the living plant. Dried leaves are sometimes said likewise to yield no longer any hydrocyanic acid; I am not able to confirm this statement, having ascertained that fresh cherry-laurel leaves, which I dried for several days at the temperature of the water-bath, on distilling them with water afforded a small amount of the said acid.

I am informed that in December and January past *Prunus Laurocerasus* has been injured throughout northern Italy as far as Bologna and Florence in the same way as with us. It would be interesting to know a little more exactly the area of this action of cold on the shrub, which is so widely spread also in the south of the British Isles.

CONTRIBUTIONS TO THE CHEMISTRY OF SEVERAL VARIETIES OF WAX.

BY EDUARD HIRSCHSOHN, MAG. PHARM.

The reactions I obtained with the different resins, etc., described in the *Archiv der Pharmacie*, can be made use of as a good means not only of distinguishing the various resins, gum resins, and balsams from one another, but also of recognizing the more important commercial varieties of the same by means of chemical reactions. It did not, therefore, appear without interest to subject the varieties of wax more commonly met with in the market to a similar examination.

For this purpose I made use of the samples in the collection of the Pharmaceutical Institute of this town, kindly placed at my disposal by Professor Dragendorff, to whom I take this opportunity of expressing my sincere thanks. The experiments with the same described in the following lines were carried out, with but few exceptions, in precisely the same way and with the same reagents as in my previous investigations.

I was able to avail myself of the following samples:—

(1) *Cera flava*; from a chemist in Dorpat; fine pure sample.

(2) *Cera flava*; produced in 1877 in Rappin in Livonia. Also a very fine sample.

(3) *Cera alba*; in the collection of the Pharmaceutical Institute; fine white pieces.

(4) *Cera alba*; from a chemist in Dorpat; good sample.

(5) *Cera alba*; from the Martiny collection; similar to No. 4.

(6) *Cera africana*; also from the Martiny collection; very similar to European beeswax, but softer and of a greyish yellow.

(7) *Cera mexicana*; from the Martiny collection; is a white beeswax.

(8) *Cera de Orizaba*; also from the Martiny collection, where the following note is appended to it:—

"Received from Schaffner, with the remark that it was in this state offered for sale by the Indians. I have not investigated it more closely, but after a superficial examination I take it for a vegetable wax."

The examination shows it to be a Myrica wax.

(9) *Cera japonica*; in the collection of the Pharmaceutical Institute; usual commercial variety.

(10) *Cera japonica*; from the Martiny collection; similar to No. 9.

(11) *Cera from Myrica quercifolia*; also from the Martiny collection; a pale green mass, tolerably hard and easily powdered.

(12) *Cera from Myrica cerifera*; from the Martiny collection; somewhat darker and more brittle than the foregoing sample.

(13) *Cera from Myrica?* (species not named); from the Martiny collection; similar to No. 12. May be distinguished from No. 11 only by its darker green colour.

(14) *Cera de Bahia*; also from the Martiny collection; very hard grey mass, the freshly fractured surface greenish.

(15) *Cera Brasiliensis*; from the Martiny collection; light yellowish mass, brittle and easily powdered.

(16) *Cera e Lac in baculis*; also from the Martiny collection; chocolate-brown brittle mass, easily powdered.

(17) *Carnauba wax*; obtained in 1878 from Gehe and Co. in Dresden; similar to No. 15.

Alcohol (95 *per cent.*), in the proportion of 1 part of wax to 10 of alcohol, dissolved only a small portion of the samples under examination. On warming to the boiling point, sample No. 8 and 11—13, were completely dissolved, whilst with samples 1—7 and 9 and 10* the greater part of the wax melted, and collected in the form of an oil at the bottom of the test tube. With No. 14—17 on the other hand the undissolved portion remained as a powder. Part of the dissolved wax separated out of the hot solutions on cooling, colourless.

Alcoholic solution of acetate of lead gave with the above cooled alcoholic solutions of samples No. 1—13 and 16 a cloudiness which on heating to boiling completely disappeared in Nos. 1, 2 and 6—13, in Nos. 3—5 and 16 partially only. In Nos. 14, 15 and 17 no change was caused by the addition of the acetate of lead solution.

Solution of ferric chloride (1 part in 10 of 95 per cent. alcohol) added to the alcoholic solution of the wax coloured No. 13 black, with the others it produced either no alteration or a brownish or greenish tint. In No. 11 a cloudiness was produced, insoluble on warming.

Solution of ammonia (sp. gr. 0·96 gave with the alcoholic solutions a more or less opalescent mixture.

Ether, at the ordinary temperature, dissolved Nos. 8 and 11—13 completely, the remainder partially only. Of these Nos. 1—7 and 9, 10 were completely dissolved on boiling and, as with the hot alcoholic solutions, the greater part separated out on cooling, colourless. The addition of an equal volume of 95 per cent. alcohol to the ethereal solutions, obtained at the usual temperature, produced no alteration in Nos. 8, 11—14 and 16, whilst in Nos. 1—7, 9, 10, 15 and 17 a cloudiness appeared.

Chloroform dissolved, at the ordinary temperature, samples No. 1—13 to a perfectly clear solution; Nos. 14—17 were only partially dissolved, but on heating dissolved completely, the greater part separating out colourless on cooling.

Petroleum spirit at the ordinary temperature effected only a partial solution which on boiling became complete. On cooling the wax separated out colourless.

Alcoholic solution of caustic potash (1 part caustic potash in 10 parts 95 per cent. alcohol) on only slightly warming dissolved the Japanese and Myrica wax (Nos. 8—13) completely, and the remainder (Nos. 1—7, 14—17) required to be boiled for some time before solution could be effected. On heating the cooled soap solutions with about 100 parts of water, the soaps from Japanese and Myrica wax dissolved completely, the other soaps only partially.

* Japanese wax dissolved completely on boiling with a larger quantity of alcohol.

Quantitative experiments also were made with some of the samples as follows:—The wax was brought to the finest possible powder with powdered glass and treated with alcohol or petroleum spirit at the ordinary temperature, as long as anything was removed by the solvent. From the solutions thus obtained, the alcohol or petroleum spirit was recovered by distillation, and the residue dried at 110° C.

The following figures were obtained:

	Alcohol 95 per cent.	Petroleum spirit.
Cera Africana . . .	3·50	49·28
Cera de Orizaba . .	10·22	—
Cera Japonica . . .	14·00	69·80
Cera Myrica Quercifolia	16·16	53·62
Cera Myrica Cerifera .	7·16	41·62
Cera Myrica ? .	19·88	68·70
Cera Bahia*	9·70	3·32
Cera Brasiliensis . .	3·25	5·04

The quantitative experiments show that, with the exception of Bahia wax, the solubility in petroleum spirit is much greater than in alcohol.

From the quantitative results it is evident that the behaviour of the samples of wax under examination with chloroform renders admission into two groups possible, viz., such as are completely soluble in that medium, as the Myrica and beeswax, and such as are only partially dissolved by it, as Brazilian and Bahiawax. Further their comportment to ether allows of a similar division, and here the Myrica wax alone is completely dissolved, beeswax and Bahia-wax on the other hand only partially. The effect produced by the addition of acetate of lead solution to the alcoholic solutions can also be made use of, as a means of distinguishing the various varieties of wax, since Brazilian and Bahia-wax are not rendered turbid, whilst the contrary is the case with all the other samples, in some of which the cloudiness disappears on warming, in others it does not.

These peculiarities allow of the several varieties of wax being well distinguished from one another, and the following scheme will, I think, be found to answer that purpose.

A sample of the wax to be examined is heated with ten times as much chloroform to boiling, and, when completely dissolved, cooled in cold water.

I. The chloroformic solution remains clear after cooling.

A. Ether dissolves completely.

(*a*) Alcoholic solution of ferric chloride gives with the alcoholic solution of the wax a precipitate insoluble on heating.

Wax from Myrica quercifolia.

(*b*) Ferric chloride colours the alcoholic solution black.

Wax from an undetermined species of Myrica.

(*c*) Ferric chloride colours brownish but gives no precipitate.

Wax from Myrica cerifera.
Wax from Orizaba.

B. Ether dissolves only a part—

A sample is boiled with ten times the quantity of alcoholic potash solution till saponified and the soap heated with 100 volumes of water.

* Ether dissolved 10·52 per cent. of this sample.

(*a*) The soap is completely soluble.

Japanese wax.

(*b*) The soap is partially soluble.

Beeswax; African beeswax.

II. The chloroformic solution becomes cloudy on cooling.

A. Alcoholic solution of acetate of lead gives with the alcoholic solution of the wax, after a few minutes' standing, a cloudiness.

Wax from stick-lac.

B. Alcoholic solution of acetate of lead gives no cloudiness.

(*a*) The ethereal solution of the wax becomes cloudy on the addition of an equal volume of alcohol.

Brazilian and Carnauba wax.

(*b*) The ethereal solution remains clear.

Bahia wax.

Dorpat, Russia.

THE CLASS OF TROPEINES AND THE ISOMERISM OF ATROPINE AND HYOSCYAMINE.

BY A. LADENBURG.

The success of the author in preparing atropine artificially by treating a tropate of tropine with dilute hydrochloric acid induced him to believe that other similar bases might perhaps be obtained by treating other tropine salts in the same way. This expectation has been fulfilled, and it has been found possible to prepare a whole class of alkaloids, derived as atropine was from tropine, and to them he has given the name of tropeines. Three of these bodies have been described by the author.*

Salicyltropein is prepared by treating salicylate of tropine for some time with dilute hydrochloric acid on a water-bath, and precipitating the solution with potassium carbonate. The oil that separates solidifies after a time in handsome lamellæ, which are filtered, pressed and dissolved in a little alcohol. Upon adding water to this solution an oil separates that quickly crystallizes. The salicyltropeine is thus obtained in white lamellæ, having a silky lustre, melting between 57° and 60° C., difficultly soluble in water, but very freely in alcohol. It is a strong base, and is easily soluble in dilute acids. Analysis gave figures corresponding to the formula $C_{15}H_{19}NO_3$, and it is therefore probably formed similarly to atropine, according to the equation:—

$$C_8H_{15}NO + C_7H_6O_3 = C_{15}H_{19}NO_3 + H_2O.$$

The hydrochlorate of this base crystallizes from water in fine shining needles. An aqueous solution of this salt gives with platinum chloride a precipitate of microscopic needles, difficultly soluble in hot water; with gold chloride a yellow crystalline double salt; with picric acid an amorphous precipitate; with iodide of mercury and potassium a white caseous precipitate, and with tannic acid in neutral solution a white precipitate readily soluble in hydrochloric acid. Iodine in iodide of potassium causes a separation of a brown oil.

Salicyltropeine is a weak poison, but herbivorous animals appear to be little affected by it. It has no action on the pupil of the eye.

Oxytoluyltropeine or Homatropine is readily obtained by a similar treatment of amygdalate of tropine. Upon treatment of the hydrochloric solution with potassium carbonate an oil separates that does not solidify; this is removed with chloroform, and remains fluid after distillation of the solvent. It is further purified by dissolving in dilute hydrochloric acid, and precipitating it as a gold double salt or picrate, both of which compounds can be obtained perfectly pure by recrystallization from hot water. The gold salt, $C_{16}H_{21}NO_3,HCl,AuCl_3$, usually separates as an oil, but quickly crystallizes, and is obtained after recrystallization from hot water in difficultly soluble handsome prisms. It yields the pure hydrochlorate of homatropine upon treating it with sulphuretted hydrogen. The picrate is precipitated in an oily or resinous condition, but soon crystallizes. It dissolves readily in hot water, from which it is obtained in yellow shining lamellæ, having the composition $C_{16}H_{21}NO_3,C_6H_2(NO_2)_3OH$. From the picrate the base is obtained by treating a saturated cold aqueous solution with potassium carbonate in excess, and shaking with chloroform; the chloroform solution is again agitated with solution of potassium carbonate to remove traces of picrate, then dried over potassium carbonate and distilled. The homatropine is always left as an oil, and has not yet been obtained in a crystalline form.

The following are the reactions of homatropine. The acid solution of the hydrochlorate gives with tannic acid no precipitate, with iodide of mercury and potassium a white caseous precipitate, with mercuric chloride a white oil. When treated with solution of iodine in iodide of potassium yellow crystals are formed and a black oil. In a concentrated solution platinum chloride produces an amorphous precipitate, and from the filtrate handsome needles are obtained upon evaporation.

Homatropine has the property of dilating the pupil of the human eye almost as energetically as atropine, and as a series of clinical ophthalmological experiments are said to have demonstrated that in many cases it is to be preferred to atropine, it may possibly attain some therapeutic importance.

Phthalyltropeine has been similarly prepared from phthallic acid, tropine and hydrochloric acid, but only in small quantity, and has been only imperfectly examined. The base, when pure, occurs in white felted needles, having a silky lustre, melting at 70° C., very difficultly soluble in water, but freely soluble in alcohol. Analysis gave results corresponding with the formula $C_{24}H_{32}N_2O_4$. Its reactions resemble those of atropine, from which, however, it differs in being more insoluble and in its platinum double salt crystallizing in beautiful needles.

The existence of the class of tropeines, some of which, like atropine, exercise an energetic mydriatic action, suggested the idea that the other natural alkaloids having a mydriatic action might also belong to them. The hypothesis was tested by a closer investigation of hyoscyamine.

Hyoscyamine in the pure state, according to the author, has not hitherto been known, although Merck of Darmstadt sends a nearly pure product into commerce. The author's experiments were made chiefly with a preparation obtained by himself from hyoscyamus and one obtained from Trommsdorff. All, however, contain the same body. The impure preparation was purified by conversion into a gold salt, recrystallizing from hot water, decomposing with sulphuretted hydrogen, and precipitating a hydrochloric acid solution with a strong solution of potassium carbonate. The separated base was dissolved in a little alcohol and again precipitated by the addition of water. This was repeated until the melting point of the product remained constant.

Hyoscyamine so purified is isomeric with atropine, as shown by the analyses of the base and of the gold salt.

	Calculated for $C_{17}H_{23}NO_3$.	Found.	Calculated for $C_{17}H_{23}NO_3$, $HCl,AuCl_3$.	Found.
C	70·59	70·47	32·48	32·68
H	7·95	8·24	3·82	4·09
N	4·84	4·96	—	—
Au	—	—	31·23	30·89

But that hyoscyamine and atropine are not identical would appear from the following observations made by the author: hyoscyamine forms smaller and less perfect crystals than atropine; it melts at 108·5° C., atropine at 113·5. The gold salt of hyoscyamine when first precipitated is usually oily, but solidifies much more readily than that of atropine, and crystallizes from water in

* *Berichte d. deutsche chemische Gesellschaft*, xiii., 106.

handsome lamellæ that after drying show a beautiful golden lustre, which is not the case with the atropine gold salt. The latter melts at 135° C., whilst the hyoscyamine gold salt commences to melt at 159° C.

The investigation of this subject was then extended to the decomposition products, and the results have been published in a second paper.* Hyoscyamine was heated to 60° C. with an aqueous solution of crystallized baryta, in which way complete decomposition was very quickly effected. The resulting solution was freed from baryta by means of carbonic anhydride, then acidulated with hydrochloric acid and shaken with ether. The acid obtained from this ethereal solution had a great similarity to tropic acid, of which it also possessed the composition, and the following facts favour the identity of the two acids.

Hyoscinic acid melts at 116°—117° C.; the purest tropic acid at 117°—118° C.; both crystallize from water by slow evaporation in tables. Aqueous solution of hyoscinic acid is not attacked in the cold by a 5 per cent. solution of potassium permanganate, but when warmed a distinct odour of bitter almonds is at once given off. The oxidizing solution was added until this smell had disappeared and the colour of the permanganate remained constant on warming; the liquid was then filtered and the filtrate treated with sulphurous acid. The resulting turbid liquid was shaken with ether and the ethereal solution evaporated, when there was left a colourless crystalline acid, which when recrystallized from water melted at 120° and was benzoic acid. Tropic acid behaved similarly. Further 1 gram of hyoscinic acid was boiled during seven hours with 2 grams of barium hydrate in a concentrated aqueous solution, and then precipitated with hydrochloric acid. A well crystallized acid separated, which when recrystallized from dilute alcohol melted at 105°—106° C. and had entirely the appearance of atropic acid. The analysis also corresponded to the formula of atropic acid, $C_9H_8O_2$.

	Found.	Calculated.
C	73·01	72·97
H	5·54	5·41

In the same way Fittig has converted tropic acid into atropic acid, the melting point of which is given by Kraut as 106·5° C.

Notwithstanding this correspondence Herr Ladenburg does not hold that the identity of tropic acid with hyoscinic acid has yet been proved beyond doubt, although very probable. Hyoscine, the base obtained from hyoscyamine by decomposition with baryta, also stands very near to tropine. To prepare the hyoscine the residue after the removal of the hyoscinic acid was evaporated, supersaturated with potash, warmed and then again shaken with ether. The ethereal solution was dried by means of potassium carbonate and the ether distilled off. There remained an oil very quickly solidifying to crystallization. The yield from 12 grams of hyoscyamine,—about 3 grams,—was submitted to distillation; it passed over constant at 229° C., that is at the temperature at which tropine boils. The distilled oil solidified again pretty readily, and was obtained by crystallization from ether in colourless tables, which in the air gradually become slightly yellow coloured. The analysis of this substance gave figures corresponding to a hydrated tropine, perhaps to the formula $C_8H_{15}NO,\frac{1}{2}H_2O$, resembling those previously found by Kraut†. The melting point of this substance, however, is essentially lower than that of pure tropine, namely, 47°—50° C.; anhydrous tropine, according to Kraut, melting at 61·5°. But the author states that he has repeatedly found a melting point of 50° C. in a distilled tropine prepared from atropine, whilst in other preparations he has found a melting point 10° or 12° higher. Probably, he thinks, this lowering of the melting point is dependent upon the amount of hydration, and experiments are being made with a view of clearing up this point. At any rate the melting point of tropine is not a sufficiently defined and characteristic property which can be used in the comparison with other similar bases.

That hyoscine possesses the same composition as tropine, and has not, as stated by Hohn and Reichardt, the formula $C_6H_{15}N$, the author considers to be shown by the analysis of the double platinum salt, which is tolerably easily soluble in water, and can be obtained from it in large orange-yellow prisms.

	Found	Calculated for $(C_8H_{15}NOHCl)_2PtCl_4$
C	27·65	27·67
H	4·78	4·61
Pt	28·00	28·36

The platinum double salt shows also in its other properties very great similarity to the alike constituted tropine compound. Of the latter Kraut says that it forms regular crystals, sometimes, however, monoclinic, when the tropine has been derived from atropine by decomposition with hydrochloric acid, whilst according to Lossen the crystals belong to the rhombic, probably also to the klinorhombic, system. The measurement of the tropine and hyoscine platinochlorides is in progress and the results will be published. It only remains to add that the picrate and the gold salts of hyoscine are obtained and appear exactly like the corresponding tropine salts, so that at present no essential difference has been established between these two bases.

So far as the facts are at present known, there are three possibilities by which the difference between atropine and hyoscyamine, undoubtedly, in the author's opinion, proved to exist, can be explained:—

(1) That hyoscinic acid is different from tropic acid.

(2) That hyoscine is different from tropine.

(3) That the decomposition products of atropine and hyoscyamine are identical, but that the components in the two alkaloids are differently combined, so that their isomerism would be comparable to that between oil of gaultheria and methylsalicylic acid.

At present, however, the author looks upon all three hypotheses as equally improbable, and he expresses his gratification at having discovered a method by which he expects to definitely settle this question. Meanwhile the isomeric relations between atropine and hyoscyamine appear to be the more interesting from the fact that it is claimed that in another investigation the identity of duboisine and daturine with hyoscyamine has been demonstrated.

* *Berichte d. deutschen chemischen Gesellschaft*, xiii., page 254.

† *Annalen d. Chemie und d. Pharmacie*, cxxxiii.

FATTY MIXTURES.*

BY R. ROTHER.

Emulsions.—In a former paper (*Pharmacist*, February, 1872)† the writer proposed a method for the preparation of emulsions, and advanced certain views of their formation. Subsequently a more extended experience of the process, and a closer observation of the principle involved, did not lead to any material change in its execution or modification of the views. It appears that the underlying principle was correctly conceived, enunciated and applied. On this occasion the writer will, therefore, simply supplement the operation with a few auxiliary suggestions, and further extend and elucidate the theoretical view. An ample flat-bottomed mortar and corresponding pestle should always be used. After a long and successful experience, the writer has adopted the use of powdered gum arabic in all cases where mucilage is designated, employing it in the proper quantity indicated, and abandoning the use of mucilage as a definite preparation ready made: the proneness of mucilage to decompose in the absence of otherwise objectionable preservatives,

* From the *Pharmacist*, January, 1880.

† *Pharm. Journ.* [3] ii. 901.

and the various advantages of powdered gum when properly used, having led to the change. In its application the powdered gum is mixed with from once to twice its weight of water, according to the nature of the oil; if this is thick and viscid, the mucilage must in a measure correspond; the converse is necessary where the oil is thin and mobile. Beyond a certain density, that is with a mucilage which is too thin, no emulsification can be effected. As a general rule, a viscid oil is more easily emulsified than another of an opposite nature; hence, when both a viscid and a mobile oil are compounded in the same mixture the operation is best performed by mixing them previous to their emulsification. However, beyond a certain degree of viscidity, approaching the solid state, emulsification is rendered more difficult. The incipient point of an emulsion is the most difficult stage to attain, and for this reason a dense ready formed emulsion is the most prompt and efficient, and, within certain indefinite limits, constant emulsifier. For this reason the yelk of eggs, with a needless addition of glycerin under the name of glyconine, has of late achieved considerable popularity as an effective emulsifacient. The main point, therefore, consists in getting a perfect emulsion formed at some particular place, and then reaching out from this as a centre, and bringing all of the oil, added by degrees, gradually within the converting vortex. During this operation it is necessary to add small amounts of water from time to time, in order to maintain a certain uniformity, not only in the required viscidity, but also in the relative proportion of the water to the oil. If the mortar is sufficiently large and broad bottomed much oil may be poured in at once, and even partially mixed by several wide sweeps of the pestle, to considerable advantage, providing the central motion of the pestle be immediately resumed. But if the amount of oil added at one time is unduly in excess of the conditions above noted, or if the wide sweep of the pestle be too long continued, the mixture at once assumes a characteristic broken appearance, from which precarious state the emulsion may often be retrieved by the addition of a little water and confining the trituration to a narrow range. However, if the disarrangement has so far progressed that this manipulation fails to recover the normal form, this is promptly secured by adding the whole of the oil to the disintegrated emulsion, mixing all, pouring the mixture back into the graduated measure, and then again adding it as before to a small quantity of new mucilage, and finishing the process in the usual manner. Great facility and speed in the manipulation, as also greater certainty in the result, may be had by slowly revolving the mortar with the left hand towards the movement of the pestle from the right. When sugar or alkalies are prescribed in an emulsion they must not be introduced before the emulsion is finished, since their presence either retards or entirely vitiates the proper result. Strongly alcoholic mixtures interfere with or destroy the emulsion by precipitating the gum. Alcohol, however, does not interrupt or prevent emulsification if diluted so as not to precipitate the gum. Weak alcohol may, therefore, replace water as an adjuvant in the process. Hence, when a strong alcoholic liquid is prescribed in an emulsion it must first be mixed with the aqueous components, and if such are not ordered in sufficient proportion no emulsion can be made.

The fundamental principle of emulsification consists in an extreme mechanical subdivision of the oil akin to pulverization. An emulsified oil bears the same relation to oil in mass as spray, or, more properly, foam does to water. The distinct globules or bubbles are kept asunder by an envelope or superstratum of water. In order to effect this condition, the first requisite consists in rolling the oil out, as it were, in excessively thin sheets and dashing these into shreds, which then coil into perhaps hollow globules with a coating of water. The next requirement is that the watery envelope should contain sufficient tenacity to maintain its form as it adheres to the oily fragments. As the pestle traverses the viscid mucilage the floating oil is drawn into the temporary gap, and immediately after, surrounded on all sides by a wall of tenacious fluid, it causes the oily sheet to be rolled up, broken and folded within itself, still environed by the mucilage. The next stroke of the pestle repeats the operation, and this may be continued as long as the required tenacity endures. Since a dense emulsion permits the more rapid motion of the oil sheet, consequently it facilitates and lessens the process.

Ointments.—Lard is, perhaps, one of the most variable and alterable substances handled by the pharmacist. Variable because of its lack of uniformity of composition as found in the market, probably greatly dependent upon the part of the animal from which it is derived and the manner of obtaining it; alterable because of its great tendency to change, not only in form, through the varying temperature of the seasons, but also in composition from fermentation and oxidation. White wax and spermaceti are also in a measure variable, being always more or less of a rancid character. The various fixed oils used in pharmacy are also of an inconstant and changeable nature. The oil of mustard seed, which was once so good, has of late years become most execrable, doubtless owing to a lack of care exercised in its production, since the oil is mainly consumed in illumination.

During the hot summer months lard becomes more and more granular, then separates into distinct masses suspended in an oily medium, and eventually disintegrates into a slimy sediment of rounded granules of palmitin and an oily superstratum of olein holding palmitin in solution. Ointments prepared solely from lard without hardening additions fare mostly in a similar manner. In order to obviate this very annoying circumstance, the writer deems it advisable that, for summer consumption at least, such lard or ointment should be mixed with from one-sixth to one-eighth their weight of white of yellow wax, or a somewhat larger proportion of spermaceti, and, if necessary, treated with a proper quantity of benzoic acid or tincture of benzoin.

Ointment of potassium iodide almost invariably turns yellow, or even brownish, shortly after being made, from liberation of iodine, caused probably by the presence of oxyoleic acid. The German Pharmacopœia obviates this undesirable change by the incorporation of sodium thiosulphate equal in weight to one-twentieth of the iodide used. The officinal ointment of potassium iodide could therefore be properly prepared by dissolving one troy ounce of potassium iodide and thirty grains of sodium thiosulphate (formerly called sodium hyposulphite) in one fluid ounce of water, and gradually adding the solution to six troy ounces of lard (or lard and hardening as above), with constant stirring until the whole is thoroughly mixed. In all cases where a considerable proportion of some liquid is to be incorporated with a fat the liquid should be added to the fat by degrees and well mixed in before making the next addition. In cases where such mixtures are performed with a fused fat this should first be cooled to the point just short of congelation before the liquid is added.

Ointment of red and yellow mercuric oxide is rapidly discoloured, doubtless by the active agency of the previous ointment. Many remedies have been proposed to counteract this, but the writer has found none so useful as sodium thiosulphate, added in proportion of five grains to one ounce of ointment. It takes a long time for ointment so protected to change, and the alteration is readily traced from the top downward, showing that the absorption of oxygen goes as a cause hand in hand with the decomposition.

In a previous article (*Pharmacist*, August, 1872), the writer, in treating of ointments, dealt emphatically with the fact that glycerin, first thoroughly mixed weight for weight, added half at a time to certain pulverulent substances, compounded in various ointments, gives them the desirable smoothness not otherwise obtained. Since then the writer has, however, found that simply lard, used in the same manner and relative amount as glycerin, yields precisely the same result. It appears that if the dry powder is first well rubbed, even where it cakes somewhat, and then thoroughly triturated in a spacious broad-bottomed mortar with half its weight of lard, a tenacious mass is formed, which latter acts very similarly to the mucilage upon oils, in rendering the powder particles individually invisible and imparting that desirable homogeneity or smoothness. Since in these cases the preliminary mixture is very tenacious, and therefore somewhat difficult to work, it having nearly the consistency of a soft pill mass, more than three or four ounces cannot be handled to advantage. Therefore, in such instances, the whole material, according to the amount, is divided into several batches. Then, when the preparatory mixture has been effected, the remaining lard or mixture is fused and gradually added to and mixed with the first product.

Ointment of zinc oxide is made by triturating two troy ounces of oxide of zinc to a uniform powder, then adding one troy ounce of lard, rubbing the mixture thoroughly, and finally adding by degrees eleven troy ounces of lard (or hardened mixture) previously fused, and then thoroughly incorporating the whole, stirring afterward occasionally, if required, until the ointment stiffens. Tincture of benzoin may also be added if desired.

Ointment of veratria, when made according to the officinal direction, by first dissolving the veratria in alcohol, is difficult to prepare, because veratria, instead of dissolving promptly, agglutinates into masses that firmly adhere to mortar and pestle, and become more and more troublesome to manipulate as the alcohol evaporates. By the above proposed general process for ointments of powdered substances the annoying features of the officinal process are obviated, and an elegant uniform mixture is most easily attained.

Cerate of cantharides has been the fertile cause of much comment as to what process of preparing it is the most advantageous in securing invariably an efficient product. On several occasions within recent years the writer pointed out the result, as a final conclusion, that a comparatively high heat is the prime requisite for the preparation of an invariably active cerate. A water-bath heat, as the Pharmacopœia directs, is wholly inefficient, so much so that an otherwise most active cantharides will frequently not yield a reliable product. The writer has formed the conclusion, after many trials, that a cerate, in order to answer the requirements, must be prepared by subjecting the mixture to a much higher temperature than that of boiling water, and for a longer period. There is apparently no danger of damaging the product, unless a scorching heat is applied, but even in such a contingency no harm to the preparation would result. Every cerate which the writer has prepared at high temperatures has invariably bristled the second day after its preparation with brilliant cantharidin needles, the surest sign of activity next to a practical test.

Suppositories.—In a former article (*Pharmacist*, October, 1872), the writer stated that for making suppositories pure oil of theobroma is not near so good a menstruum as a mixture composed only two-thirds of the oil and one-third spermaceti. This mixture has the property of contracting more, and, whilst preserving a low fusion point, congealing more rapidly. But in that connection the writer pointed out the important fact that for the purpose of compounding soft extracts properly in suppositories the addition of a certain proportion of some dry powder, preferably starch, is almost imperative. Numerous occasions since have invariably borne out this fact and further shown its great advantages. The chilling of the moulds is also considered important. But if these are first dusted, also preferably with starch, so low a temperature will not be needed, and less loss of time incurred.

THE PREPARATION OF GALLIC ACID.*

BY PAUL WEBER, PH.G.

According to the U. S. Pharmacopœia, 36 troy ounces of Aleppo galls, in fine powder, are mixed with a sufficient quantity of water, and allowed to stand for a month, until all tannic acid has been converted into gallic acid through the absorption of oxygen and escape of carbonic acid gas, as the U. S. Pharmacopœia says.

The wording in the formula is very emphatic: "let stand for a month," but the quantity of the product is very variable. Who can determine, whether the conversion from tannic into gallic acid has been completed within a month's time or not? Why not give a mode of preparation which will insure the highest attainable quantity of gallic acid? Or, if a limited amount of time is prescribed, why not note a certain degree of temperature at which fermentation is to go on? Different samples of the same lot of nutgalls will give variable amounts of gallic acid when subjected to different temperatures for the same length of time. To prove this I powdered 25 ounces of nutgall, and divided this into four equal parts, prepared them as the Pharmacopœia directs, and placed them aside, occasionally stirring, for one month.

Sample 1.—6 oz. 2 dr.; temperature constant, 60—64° F.; time one month. Amount gallic acid, 6 dr. 24 grains.

Sample 2.—6 oz. 2 dr.; temperature 72—82° F.; time one month. Amount gallic acid, 8 dr. 15½ grains.

Sample 3.—6 oz. 2 dr.; temperature 96—100° F.; time one month. Amount gallic acid, 9 dr. 84 grains.

Sample 4.—6 oz. 2 dr.; temperature 110—114° F.; time one month. Amount gallic acid, 11 dr. 14 grains.

Of these same galls I powdered again 25 ounces. The first portion, 12 oz. 4 dr., I prepared according to the Pharmacopœia, and set it aside at a temperature of 85—90° F. At the expiration of three weeks, I took a filtered portion, and added to it a solution of Russian isinglass, and obtained a voluminous precipitate, showing that the conversion had not fully set in. After a lapse of four weeks I added again a solution of isinglass, when there was still a copious precipitate, but not quite as dense as the first. After thirty-five days, the precipitation became somewhat transparent in appearance. At the termination of the forty-first day, there was still a turbidity after the addition of a solution of isinglass, so light, however, that I considered the conversion practically completed. I now passed on to the second stage of the process, expressing, boiling the residue with water, and filtering through animal charcoal.

Sample 5.—12 oz. 4 dr.; temperature 85—90° F.; time 41 days. Amount gallic acid, 3 oz. 38 grains.

The second 12 oz. 4 dr. of galls I used for the preparation of tannic acid, and obtained 4 oz. 54 grains. If we now calculate from the amount of tannic acid actually obtained the obtainable amount of gallic acid, we will see that the actual yield of gallic acid very nearly corresponds with the theoretical amount; tannic acid being a glucoside, it will, by the aid of the ferment contained in the galls, and in the presence of water, split up into gallic acid and sugar. The sugar is ultimately converted into grape sugar, and thence into carbonic acid and alcohol.

Now if we calculate the amount of gallic acid obtainable from 4 ℥ 54 grains (or 1974 grains) of tannic acid, the result is 3 oz. 54 grains.

It will be seen from this that the amount of gallic acid obtainable from any given quantity of nutgalls, according to the U. S. process, is very indefinite. The formula for gallic acid should read: Take of nutgalls, in fine powder, 36 troy oz., purified animal charcoal, distilled water, each a sufficient quantity. Mix the nutgalls with sufficient water to form a thin paste, and set aside in a shallow porcelain vessel in a warm place. Stir occasionally, adding a little water from time to time, sufficient to

* Abstract of a thesis presented to the College of Pharmacy of the City of New York. Reprinted from *New Remedies*, February, 1880.

preserve the semi-fluid consistence. Try a small filtered portion, from time to time, with a solution of Russian isinglass. If no precipitate is formed, or only a slight turbidity, then the process is completed. Strain and follow further directions as laid down in the U. S. Pharmacopœia.

CASEIN AND THE ACTION OF RENNET.*

BY O. HAMMARSTEN.

Pure casein may be prepared by precipitating with acetic acid, care being taken to avoid excess of acid, dissolving the washed precipitate in alkali, so that the solution remains slightly acid, filtering from separated fats, reprecipitating several times by acetic acid, and washing with alcohol and ether. The casein thus prepared appears to be a weak acid, dissolving calcium and barium carbonates, and calcium phosphate. Salts appear to keep casein in solution, and this accounts for the fact that, in the precipitation of casein by acids, the amount obtained is not equivalent to the acid employed. Rennet, when it precipitates casein, appears to break it up into two albuminoids: one which is greatest in quantity is combined with calcium phosphate, and appears as cheese; the other (a peptone) remaining dissolved in the whey. For complete precipitation, the presence of calcium phosphate is necessary, and this accounts for the fact that dilute milk cannot be coagulated. The presence of calcium chloride also partly aids curdling, and one part of rennet ferment is capable of curdling 800,000 parts of casein.

THE INFLUENCE OF ELECTRIC LIGHT UPON VEGETATION AND ON CERTAIN PHYSICAL PRINCIPLES INVOLVED.†

BY C. WILLIAM SIEMENS, D.C.L., F.R.S.

The vast development of vegetation proves that dissociation is accomplished freely within the leaf-cells of plants, in which both water and carbonic acid are broken up in order that chlorophyll, starch and cellulose may be formed. It is well known that this reaction depends upon solar radiation; but the question may fairly be asked whether it is confined to that agency, or whether other sources of light and heat, which, in common with the sun, exceed the temperature of dissociation, may not be called into requisition, in order to continue the action of growth, when that great luminary has set or is hidden behind clouds?

About two years ago I mentioned to Sir Joseph Hooker, then President of the Royal Society, that I thought the electric arc might be found sufficiently powerful to promote vegetation, and that I should be willing to undertake some experiments on the subject if he could give me any hope of confirmative results. Sir Joseph Hooker gave me sufficient encouragement to induce me to follow up the subject, and I have since that time gradually matured a plan for conducting the experiment.

The apparatus which has been put up at Sherwood consists—(1) Of a vertical Siemens dynamo-machine, weighing 50 kilos, with a wire resistance of 0·717 unit on the electro-magnets. This machine makes 1000 revolutions a minute, it takes two-horse-power to drive it, and develops a current of 25 to 27 webers of an intensity of 70 volts. (2) A regulator or lamp, constructed for continuous currents, with two carbon electrodes of 12 millims. and 10 millims. diameter respectively. The light produced is equal to 1400 candles measured photometrically. (3) A motor, which at present is a three-horse-power Otto gas-engine, but which it is intended to supersede by a turbine to be worked by a natural supply of water, at a distance of about half a mile from the house.

My object in making these experiments was to ascertain whether electric light exercised any decided effect upon the growth of plants. For this purpose I placed the regulator in a lamp with a metallic reflector, in the open air, about two metres above the glass of a sunk melon house. A considerable number of pots were provided, sown and planted with quick-growing seeds and plants, such as mustard, carrots, swedes, beans, cucumbers and melons. The plants could then be brought at suitable intervals under the influence of daylight and electric light, without moving them, both falling upon them approximately at the same angle. The pots were divided into four groups.

1. One pot of each group was kept entirely in the dark.
2. One was exposed to the influence of the electric light only.
3. One was exposed to the influence of daylight only.
4. One was exposed successively to both day and electric light.

The electric light was supplied for six hours, from 5 to 11 each evening, all the plants being left in darkness during the remainder of the night.

In all cases the differences of effect were unmistakable. The plants kept in the dark were pale yellow, thin in the stalk, and soon died. Those exposed to electric light only showed a light green leaf, and had sufficient vigour to survive. Those exposed to daylight only were of a darker green and greater vigour. Those exposed to both sources of light showed a decided superiority in vigour over all the others, and the green of the leaf was of a dark rich hue.

It must be remembered that, in this contest of electric against solar light, the time of exposure was in favour of the latter in the proportion of nearly two to one, but all allowance made, daylight appeared to be about twice as effective as electric light. It was evident, however, that the electric light was not well placed for giving out its power advantageously. The nights being cold, and the plants under experiment for the most part of a character to require a hot moist atmosphere, the glass was covered very thickly with moisture, which greatly obstructed the action of the light, besides which, the electric light had to pass through the glass of its own lamp.* Notwithstanding these drawbacks, electric light was clearly sufficiently powerful to form chlorophyll and its derivatives in the plants.

These preliminary trials go to prove that electric light can be utilized in aid of solar light by placing it over greenhouses, but the loss of effect in such cases must be considerable. I, therefore, directed my observations, in the next place, to the effect of electric light upon plants, when both were placed in the same apartment. The plants under experiment were divided into three groups; one group was exposed to daylight alone, a second similar group was exposed to electric light during eleven hours of the night, and were kept in the dark chamber during the daytime, and the third similar group was exposed to eleven hours' day and eleven hours' electric light. These experiments were continued during four days and nights consecutively, and the results observed are of a very striking and decisive character, as regards the behaviour of such quick-growing plants as mustard, carrots, etc. The plants that had been exposed to daylight alone (comprising a fair proportion of sunlight) presented their usually healthy green appearance; those exposed to electric light alone were, in most instances, of a somewhat lighter, but, in one instance, of a somewhat darker hue than those exposed to daylight, and all the plants that had the double benefit of day and electric light far surpassed the others in darkness of green and vigorous appearance generally. A pot of tulip buds was placed in this electric stove, and the flowers were observed to open completely after two hours' exposure.

* From *Bied. Centr.*, 1879, 147. Reprinted from the *Journal of the Chemical Society*, March, 1880.

† Abstract of a paper read before the Royal Society on March 4. Reprinted from *Nature* for March 11, 1880.

* Professor Stokes has shown, in 1857, that the electric arc is particularly rich in highly refrangible invisible rays, a circumstance which seems to point to a great loss on passing those rays through glass.

Although the access of stove heat was virtually stopped the temperature of the house was maintained throughout the night at 72° F., proving that the electric lamp furnished not only a supply of effective light, but of stove heat also. No hurtful effect was, moreover, observed on the plants from the want of ventilation, and it would appear probably that the supply of pure carbonic acid resulting from the complete combustion of the carbonic electrodes at high temperature, and under the influence of an excess of oxygen, sufficed to sustain their vital functions. If the nitrogenous compounds which Professor Dewar has shown to be developed in the electric arc were produced in large quantities, injurious effects upon the plants must undoubtedly ensue, but it can be shown that in a well-conditioned electric lamp, with a free circulation of air round the carbon electrodes, the amount of these products is exceedingly small, and of a different nature than is produced in a confined space.

These experiments are not only instructive in proving the sufficiency of electric light alone to promote vegetation, but they also go to prove the important fact that diurnal repose is not necessary for the life of plants, although the duration of the experiments is too limited perhaps to furnish that proof in an absolute manner. It may, however, be argued from analogy, that such repose is not necessary, seeing that crops grow and ripen in a wonderfully short space of time in the northern regions of Sweden and Norway, and Finland, where the summer does not exceed two months, during which period the sun scarcely sets.

The next step in the course of these experiments was to remove the electric lamp into a palm house, constructed of framed glass, which was 28 feet 3 inches long, 14 feet 6 inches wide, and averaging 14 feet 6 inches (8·62 m. × 14·42 m. × 4·42) in height. In the centre of this house a banana palm and a few other small palm trees are planted, the sides of the house all round being occupied with a considerable variety of flowering plants. The electric light was fixed as high as practicable at the south corner of the house, in order that its rays might fall upon the plants from a direction and at an angle coincident with those of the sun during the middle of the day. The temperature of the house was maintained at 65° F., and the electric lamp was kept alight from 5 p.m. to 6 a.m. for one week, from February 18 to February 24, excepting Sunday night. The time was hardly sufficient to produce very striking effects, but all the plants continued to present a healthy appearance. Of three Alicante vines, the one nearest the electric light made most progress, and the same could be said of the nectarines and roses. It was observed that other plants, such as geraniums, continued to exhibit a vigorous appearance, notwithstanding the heat of the place. This experiment is of importance in showing that the electric light, if put into conservatories or greenhouses, does not injure the plants, but rather improves their appearance and growth. The leaves assume a darker and more vigorous appearance, and it seems that the colouring of the flowers becomes more vivid, but a further period of time is necessary to establish this observation absolutely.

I decided to try the effect of electric light as a means of promoting growth in the open air and under glass at the same time.

The regulator was put back into its first position, 2 metres above the ground, with a sunken melon house on one side, and a sunken house containing roses, lilies, strawberries, and a variety of other plants on the other. The space of ground between these, about 1 metre broad and 7 metres long, was covered with boxes sown with early vegetables, including mustard, peas, beans, and potatoes, and in order to prevent cold winds from injuring the plants, low protecting walls were put up across the openings of the passage between the two houses.

Some weeks must elapse before any absolute results can be given, but growth is evidently promoted under all these various circumstances. In order to test this clearly, a portion of the plants both under glass and in the open air are shaded from the electric light without removing them from their position of equal temperature and exposed to solar light during daytime. The effect upon the flowering plants is very striking, electric light being apparently more efficacious to bring them on than daylight. Although the amount of heat given off from the electric arc is not great compared with a gas flame (giving off its products of combustion), yet the rays of intense heat of the arc counteract that loss of heat by radiation from the leaves into space, which during a clear night causes hoar frost. For this reason I expect that electric light may be usefully employed in front of fruit walls, in orchards, and in kitchen gardens, to save the fruit-bud at the time of setting; and in this application electric light will probably be found a useful agent, not only to promote rapid growth, but to insure a better yield of fruit.

The experiments seem to lead to the following conclusions:—

1. That electric light is efficacious in producing chlorophyll in the leaves of plants, and in promoting growth.

2. That an electric centre of light, equal to 1400 candles, placed at a distance of 2 metres from growing plants, appeared to be equal in effect to average daylight at this season of the year, but that more economical effects can be attained by more powerful light centres.

3. That the carbonic acid and nitrogenous compounds generated in diminutive quantities in the electric arc produce no sensible deleterious effects upon plants inclosed in the same space.

4. That plants do not appear to require a period of rest during the twenty-four hours of the day, but make increased and vigorous progress if subjected during daytime to sunlight and during the night to electric light.

5. That the radiation of heat from powerful electric arcs can be made available to counteract the effect of night frost, and is likely to promote the setting and ripening of fruit in the open air.

6. That while under the influence of electric light plants can sustain increased stove heat without collapsing, a circumstance favourable to forcing by electric light.

7. That the expense of electro-horticulture depends mainly upon the cost of mechanical energy, and is very moderate where natural forces of such energy, such as waterfalls, can be made available.

Since writing the above my attention has been drawn to an article in *Nature*, vol. xxi., p. 311, giving interesting observations by Dr. Schübeler, of Christiania, on "The Effect of Uninterrupted Sunlight on Plants in the Arctic Regions." These observations fully confirm the conclusion indicated by my experiments with electric light. Not only are plants able to grow continuously, according to Dr. Schübeler, but when under the influence of continuous light, they develop more brilliant flowers and larger and more aromatic fruit than under the alternating influence of light and darkness, whereas the formation of sugar appears to be dependent chiefly upon temperature.

It would follow from these observations, that with the aid of stoves and electric light, fruit, excelling both in sweetness and aroma, and flowers of great brightness, may be grown without solar aid. Dr. Schübeler mentions that in removing an acacia plant from the dark, and placing it under the influence of the Arctic midnight sun, the leaves opened slowly, and it is interesting to observe that the same effect took place when an *Acacia Lophantha* was placed (in the open air) under the influence of my midnight lamp.

In illustration of the subject of the foregoing paper, Dr. Siemens is reported to have exhibited to his audience a pot of tulips in bud which under the electric light were brought into full bloom in forty minutes.

The Pharmaceutical Journal.

SATURDAY, MARCH 20, 1880.

CORPORATIONS AND THE PHARMACY ACT.

THE decision of the Court of Appeal in respect of the litigation between the Pharmaceutical Society and the London and Provincial Supply Association has once more lent approval to the view which regards the pharmacist as being a simple trader in drugs, who is to face the free trade tendencies of the age without any show of favour on account either of special qualification required from him or of extraordinary necessities for securing the interests of the public. According to this decision, co-operative stores and associations analogous to them are held by the Lords Justices to lie outside the purview of the Pharmacy Act, and in the opinion of some persons the reasons for this holding recommend themselves to common sense. Such, at any rate, is the view put forward by our leading journal, and its enunciation in that quarter goes far to endorse the opinion we expressed last month as to the position in which the question then stood. From a strictly legal point of view the Lords Justices read the Act in such a way that they came to the conclusion that the word "person" as used in that Act is not to be taken to include corporations unless some cogent reason to the contrary is to be deduced from the scope and purport of the Act.

Lord Justice BRAMWELL specifies in detail the several considerations which lead him to regard corporations as being outside the law. He admits that the term "person" may include corporation, but having regard to the fact that when the Legislature made a special interpretation that "person" should be male and female, plural and singular, etc., it did not include "corporation," and that in the way statutes are now drawn "corporation" is always named when it is meant, he expresses himself as reluctant to hold that in any particular statute "person" includes "corporation," unless there is strong reason to do so. In the case in question, he holds there is no such reason, but, as he considers the contrary. Lord Justice BAGGALLAY agrees with him in this, subject, however, to the very important qualification of admitting, as of necessity, that if it be clear from the general scope and purport of an Act of Parliament that a certain act, viz., the selling, dispensing, or compounding of poisons, is or might be within the mischief intended to be guarded against, and further, that if by extending the meaning of the word "person" in such an Act so as to include corporation, the necessary protection against that mischief would be provided, such an interpretation might and ought to be adopted. Lord Justice THESIGER assents only with greater qualification to the view of Lord Justice BRAMWELL, and, as he says, "not without doubt," whether in regard to the providing for the safety of the public, which was the object of the Pharmacy Act, the judgment of the Court below might not be supported upon the ground that the object and scope of the Act peremptorily require corporations to be included within the term "person."

This diverse consideration of what is due to the "interests of the public" constitutes the difference between the several judgments of the three judges. Lord Justice BRAMWELL, with a manifest leaning to free trade in its entirety, seems to think public interests of little account unless they can protect and take care of themselves. Lord Justice BAGGALLAY, retaining still some lingering perception that in the matter of poisons prevention is better than cure, seeks refuge in the belief that the protection intended to be given to the public is sufficiently secured in the case of a corporation keeping open shop for selling, dispensing and compounding of poisons, by the presence of a qualified assistant or manager of the business, since in his view the seller referred to in the first section of the Act is the actual seller, and not the individual or corporation on whose behalf the sale is made. Hence he concludes that so far as the interests of the public are concerned all the requirements of the Pharmacy Act are satisfied by the provision of a qualified assistant. Lord Justice THESIGER, however, is not by any means satisfied that this is the case, and he prefers not to give a definite opinion upon the point whether the individual members of a corporation—as directors or otherwise—would not be liable, and that in this way the mischief intended to be provided against would not be without a remedy, even though a corporation as a separate entity be not liable to the penalty provided for in the Act.

Having regard to these very important qualifications of the assent given by two of the judges to the decision that the appeal should be allowed and the judgment of the Court below reversed, we cannot agree with the statement made by the *Times* that the judgment delivered the other day at Westminster sets this matter at rest. On the contrary, it still remains an open question to be decided, whether the Legislature intended or not to put an absolute veto upon the keeping open shop for the sale of drugs by trading companies. The absence from the Pharmacy Act of any express reference to such companies was considered by Lord Justice THESIGER as being difficult to account for consistently with the existence of such an intention, but when it is remembered that these companies had not, at the time of its passing, engaged in the trade in drugs and poisons no such difficulty will be apparent, nor will it even be necessary to suppose that the absence of any mention of such companies in the Act was a *casus omissus*.

The practical result of the appeal, notwithstanding the encouraging aspects to which we have alluded, is one that fully bears out the opinion we have expressed as to the gravity of the situation. Practically, the Pharmacy Act, 1868, may be said to have become, for the time, a dead letter, except in regard to the use of titles, and to the application of the seventeenth section. But the matter is not yet finally disposed of, and, in the further appeal to the House of Lords, the propriety of thus driving a coach and four through an Act of Parliament passed in the interest of the public, may be made to appear sufficiently questionable to secure its maintenance.

In connection with this view of the subject, it will not be out of place to recall to mind the history of the case upon which judgment has just been delivered for the third time.

The initiative step in this litigation was a proceeding, under the fifteenth section of the Pharmacy Act, against an individual who kept a grocery or general store, under the name of the London and Provincial Supply Association, for having committed an offence under the Pharmacy Act, by selling poisons without being duly qualified and registered as a chemist and druggist. The result was that Mr. Mackness, the proprietor of the business, paid the penalty of £5 and costs, intimating at the same time that in regard to the future it was his intention to take steps to terminate any violation of the law. This took place about the end of the year 1877, and when the result was reported to the Council in February, 1878, a letter had since been received from Mr. Mackness, stating that he had sold his business to the "London and Provincial Supply Association, *Limited*." In this way, the proceedings against a "person" developed into proceedings, under the seventeenth section of the Act, against an association of persons trading ostensibly as a limited liability company. Three summonses were heard before Mr. Newton, at the Marlborough Street Police Court, in March, 1878, and the question whether the word "person" in the Pharmacy Act included a corporation was then raised. Independently of that point, the magistrate decided in one case that the "London and Provincial Supply Association, *Limited*," had complied with the law, because the designation of the company and the place where its business was carried on was put on the label, together with the name of the actual seller of the poison. The summons was therefore dismissed.

The next step was the prosecution of the "London and Provincial Supply Association, *Limited*," under the fifteenth section of the Act, in the Bloomsbury County Court, judgment being given in favour of the defendants upon the ground that no offence was committed by the company so long as the business was conducted on behalf of the company by a duly qualified chemist and druggist.

The appeal from this decision was heard by the Lord Chief Justice and Mr. Justice Mellor, with the result that they reversed the judgment of the County Court Judge, one of the main reasons for doing this being the opinion that no association of persons should be free to do that which in their individual capacity would unquestionably be an offence.

But the Protean tendencies of Mr. Mackness were by no means exhausted by his metamorphosis into a "company, limited," and on the late hearing of the appeal before the Lords Justices he figured as the apostle of co-operation—the representative of the "stores." The policy of Mr. Wills in associating his client's attack upon the Pharmacy Act with the proceedings of co-operative stores cannot be questioned as a matter of advocacy, though the facts of the case are somewhat inconsistent with this ingenious capture of the popular prejudice in favour of stores for his client's benefit.

In this way there has been a further development of the case against a limited liability company into a case between the Pharmaceutical Society and the co-operative stores, and thus a totally false aspect has been given to the action taken by the Society. In the further prosecution of the case by an appeal to the House of Lords it will be desirable to clear away the erroneous impression thus produced and to secure an unbiassed consideration of the question whether or not it is expedient for the safety of the public that the provisions of the Pharmacy Act should be respected.

THE ANNUAL DINNER.

A meeting, convened by public advertisement, was held at 17, Bloomsbury Square, on Wednesday, March 17, to make preliminary arrangements for the Ninth Annual Dinner of the Members of the Pharmaceutical Society and their friends.

At this meeting it was resolved:—(1). That the Dinner be held at Willis's Rooms, on Tuesday, May 18. (2). That the price of tickets be 30*s*. each, and that tickets be obtainable only from the Honorary Secretary.

The following were appointed a Committee to make and carry out the necessary arrangements:—The President, Messrs. Carteighe, Robbins, Taylor and Williams, and Professor Attfield. Mr. Richard Bremridge was appointed Honorary Secretary.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association will be held on Thursday next, 25th inst., at 8.30 p.m., when a paper will be read on the "Preparation of Tinctures," by Mr. W. Elboone. A report on Inorganic Chemistry will be made by Mr. C. H. Hutchinson, F.C.S., on the "Formulæ of some Inorganic Compounds."

CHEMISTS' ASSISTANTS' ASSOCIATION.

The next meeting of the above Association will be held on Wednesday evening next, March 24, at 32a, George Street, when a paper will be read by Mr. W. Smart, "On the Growths and Functions of the Skin."

Provincial Transactions.

LEEDS CHEMISTS' ASSOCIATION.

The sixth meeting of the session was held in the library of the Association on Thursday evening, March 11, 1880, Mr. Councillor Stead, the President, in the chair.

Mr. C. H. Bothamley, Demonstrator and Assistant Lecturer on Chemistry at the Yorkshire College, delivered a lecture on "Flame." The lecturer commenced by defining flame as gas raised to incandescence by chemical combination, and then proceeded to consider the causes which determine its continuance. A brief sketch was given of the development of the Davy lamp, illustrated by photographs from Davy's original drawings. The structure of flame was next taken under consideration and attention drawn to series of analyses indicating the progress of combustion in various parts of the flame. The analyses showed that of the two principal constituents of a coal gas flame, hydrogen and marsh gas, the hydrogen diminished most rapidly in the early stages of combustion, whereas in the later stages the reverse is the case. The lecturer then discussed the various causes affecting the luminosity of different flames—(1) temperature; (2) the presence or absence of solid particles; (3) the specific gravity of the gases and vapours present; (4) the pressure under which combustion takes place. He pointed out that although the last two causes are generally classed together under the head "density," they are essentially different. In the one case the observed effect is due to a difference in the relative weights of the atoms concerned, their number in a given space remaining the same; in the other it is due to a difference in the number of atoms in a given space, their relative weights remaining the same. The researches of Stein and others have proved that the luminosity of ordinary gas and candle flames is mainly due to the presence of solid particles of carbon as originally supposed by Davy. The causes of the non-luminosity of the flames of mixtures of coal gas with air and various indifferent gases were also discussed. All flames containing carbon require to be raised to a certain temperature before the carbon separates in the solid state. By mixing the coal gas with indifferent gases, with air, or with carbon monoxide, the point of carbon separation is raised to a temperature higher than that actually attained by the flame, which is therefore non-luminous. By the addition of extraneous heat the temperature of the flame may be raised to the required point and it then becomes luminous.

At the close a cordial vote of thanks was accorded to the lecturer on the motion of Mr. T. B. Stead, seconded by Mr. P. Jefferson.

Proceedings of Scientific Societies.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the above, held on Wednesday evening, March 10, Mr. F. W. Branson in the chair, a paper was read by Mr. F. W. Collinson upon "Vegetable Foods, their Manufacture and Nutritive Values."

The author first made some general remarks concerning the characters of a food, and the difference between it and a medicine. He then showed how deserving vegetable diet was of its high position as human support, either judged from the composition of the body, or the requirements caused by the waste in physical processes. The various articles of vegetable diet were then enumerated, and divided into two clases, nitrogenous and carbonaceous, their nutritive values compared, and the modes of preparing them for human consumption described.

A discussion ensued supported by Messrs. Branson, Hardwick, Piper, Robinson and others.

A vote of thanks having been proposed by Mr. Piper, seconded by Mr. Phillips and carried, the meeting terminated.

ROYAL INSTITUTION OF GREAT BRITAIN.

Spectroscopic Investigation.*

BY JAMES DEWAR, M.A., F.R.S.,

Fullerian Professor of Chemistry, Royal Institution, etc.

(*Concluded from page* 677.)

When a tube containing cæsium chloride and sodium was observed, in the same way, the two dark lines in the blue were seen very soon after the heating began, and the more refrangible of them broadened out very sensibly as the temperature increased. The usual channelled spectrum of sodium was seen in the green and an additional channelling appeared in the yellow, which may be due to cæsium or to the mixture of the two metals. Indeed the cæsium chloride was not free from rubidium, and the dark lines of rubidium were distinctly seen in the violet. Metallic lithium acts on the chlorides of cæsium and rubidium, giving the same results as sodium.

It is remarkable that these absorption lines of cæsium coincide with the blue lines of cæsium as seen in the flame, not with the green line which that metal shows when heated in an electric spark of high density. It is to be observed, however, that when sparks from an induction-coil without a jar are taken between beads of cæsium chloride fused on platinum wires, a spectrum similar to the flame spectrum is seen, and it is only when a Leyden jar is used that the spectrum is reduced to a green line. In like manner both the violet lines of rubidium are reversed, and both these violet lines are seen when the spark of an induction coil, without jar, is passed between beads of rubidium chloride fused on platinum wires, though only one of them appears when a Leyden jar is used.

Mixtures of carbonate of cæsium with carbon, and of carbonate of rubidium with carbon, prepared by charring the tartrates, heated in narrow porcelain tubes, placed vertically in a furnace, gave sharp results. A small quantity of the cæsium mixture, introduced into a tube at a bright red heat, showed instantly the two blue lines reversed and so much expanded as to be almost in contact. The width of the dark lines decreased as the cæsium evaporated, but they remained quite distinct for a long time. A similar effect was produced by the rubidium mixture, only it was necessary to have the tube very much hotter, in order to get enough of violet light to see the reversal of the rubidium lines. In this case the two lines were so much expanded as to form one broad dark band, which gradually resolved itself into two as the rubidium evaporated. The reversal of these lines of cæsium and rubidium seems to take place almost or quite as readily as that of the D lines by sodium, and the vapours of those metals must be extremely opaque to the light of the refrangibility absorbed, for the absorption was conspicuous when only very minute quantities of the metals were present. The red, yellow, and green parts of the spectrum were carefully searched for absorption lines, but none due to cæsium or rubidium could be detected in any case. It is perhaps worthy of remark that the liberation of such extremely electro-positive elements as cæsium and rubidium from their chlorides by sodium and by lithium, though it is probably only partial, is a proof, if proof were wanting, that so-called chemical affinity only takes a part in determining the grouping of the elements in such mixtures; and it is probable that the equilibrium arrived at in any such case is a dynamical or mobile equilibrium, continually varying with change of temperature.

It is difficult to prevent the oxidation of magnesium

* Lecture delivered at the Weekly Evening Meeting of the Royal Institution of Great Britain, Friday, June 6, 1879.

in the iron tubes, and tubes wider than half an inch did not give satisfactory results. With half-inch tubes, the lines in the green were clearly and sharply reversed, also some dark lines, not measured, were seen in the blue. The sharpness of these lines depended on the regulation of the hydrogen current, by which the upper stratum of vapour could be cooled at will.

(1) The absorption spectrum of magnesium consists of two sharp lines in the green, of which one, which is broader than the other, and appears to broaden as the temperature increases, coincides in position with the least refrangible of the *b* group, while the other is less refrangible, and has a wave-length very nearly 5210. These lines are the first and the last to be seen, and were first taken for the extreme lines of the *b* group.

(2) A dark line in the blue, always more or less broad, difficult to measure exactly, but very near the place of the brightest blue line of magnesium. This line was not always visible, indeed rarely when magnesium alone was placed in the tube. It was better seen when a small quantity of potassium or sodium was added. The measure of the less refrangible edge of this band gave a wave-length of very nearly 4615.

(3) A third line or band in the green rather more refrangible than the *b* group. This is best seen when potassium and magnesium are introduced into the tube, but it may also be seen with sodium and magnesium. The less refrangible edge of this band is sharply defined, and has a wave-length about 5140, and it fades away towards the blue.

These absorptions are all seen both when potassium and sodium are used along with magnesium, and may be fairly ascribed to magnesium, or to magnesium together with hydrogen.

But besides these, other absorptions are seen which appear to be due to mixed vapours.

(4) Thus when sodium and magnesium are used together a dark line, with ill-defined edges, is seen in the green, with a wave-length about 5300. This is the characteristic absorption of the mixed vapours of sodium and magnesium; it is not seen with either vapour separately, nor is it seen when potassium is used instead of sodium.

(5) When potassium and magnesium are used together a pair of dark lines are seen in the red. The less refrangible of these sometimes broadens into a band with ill-defined edges, and has a mean wave-length of about 6580. The other is always a fine sharp line, with a wave-length about 6475. These lines are as regularly seen with the mixture of potassium and magnesium as the above-mentioned line (5300) is seen with the mixture of sodium and magnesium, but are not seen except with that mixture.

There is a certain resemblance between the absorptions above ascribed to magnesium, and the emission spectrum seen when the sparks of a small induction-coil, without Leyden jar, are taken between electrodes of magnesium.

The coincidences of the series of the solar spectrum hitherto observed have, for the most part, been with lines given by dense electric sparks; while it is not improbable that the conditions of temperature and the admixtures of vapours in the upper part of the solar atmosphere may resemble much more nearly those in our tubes.

It became a question of interest to find the conditions under which the same mixtures would give luminous spectra, consisting of the lines which had been seen reversed. On observing sparks from an induction-coil taken between magnesium points in an atmosphere of hydrogen, a bright line regularly appeared, with a wave-length about 5210, in the same position as one of the most conspicuous of the dark lines observed to be produced by vapour of magnesium with hydrogen in our iron tubes. This line is best seen, *i.e.*, is most steady, when no Leyden jar is used and the rheotome is screwed back so that it will but just work. It may, however, be seen when the coil is in its ordinary state and when a small Leyden jar is interposed; but it disappears (except in flashes) when a larger Leyden jar is used, if the hydrogen be at the atmospheric pressure. This line does not usually extend across the whole interval between the electrodes, and is sometimes only seen near the negative electrode. Its presence seems to depend on the temperature, as it is not seen continuously when a large Leyden jar is employed until the pressure of the hydrogen and its resistance is very much reduced. When well dried nitrogen or carbonic oxide is substituted for hydrogen this line disappears entirely; but if any hydrogen or traces of moisture be present it comes out when the pressure is much reduced. In such cases the hydrogen lines C and F are always visible as well. Sometimes several fine lines appear on the more refrangible side of this line, between it and the *b* group, which give it the appearance of being a narrow band, shaded on that side. Various samples of magnesium used as electrodes, and hydrogen prepared and purified in different ways, gave the same results.

In addition to the above-mentioned line, there is also produced a series of fine lines, commencing close to the most refrangible line of the *b* group, and extending with gradually diminishing intensity towards the blue. These lines are so close to one another that in a small spectroscope they appear like a broad shaded band. We have little doubt that the dark absorption line, with wave-length about 5140, shading towards the blue, observed in our iron tubes, was a reversal of part of these lines, though the latter extend much further towards the blue than the observed absorption extends.

Charred cream of tartar in iron tubes, arranged as before, gave a broad absorption band extending over the space from about wave-length 5700 to 5775, and in some cases still wider, with edges ill-defined, especially the more refrangible edge. By placing the charred cream of tartar in the tube before it was introduced into the furnace, and watching the increase of light as the tube got hot, this band was at first seen bright on a less bright background, it gradually faded, and then came out again reversed, and remained so. No very high temperature was required for this, but a rise of temperature had the effect of widening the band. Besides this absorption, there appeared a very indefinite faint absorption in the red, with the centre at a wave-length of about 6100, and a dark band, with a tolerably well defined edge on the less refrangible side, at about a wave-length of 4850, shading away towards the violet. A fainter dark band was sometimes seen beyond, with a wave-length of about 4645; but sometimes the light seemed abruptly terminated at about wave length 4850. It will be noticed that these absorptions are not the same as those seen when potassium is heated in hydrogen, nor do they correspond with known emission lines of potassium, although the first, which is also the most conspicuous and regularly visible of these absorptions, is very near a group of three bright lines of potassium. It seemed probable that they might be due to a combination of potassium with carbonic oxide. Potassium heated in carbonic oxide in glass tubes united readily with the gas, but the compound did not appear to volatilize at a dull red heat, and no absorption, not even that which potassium gives when heated in nitrogen under similar circumstances, could be seen. Induction sparks between an electrode of potassium and one of platinum in an atmosphere of carbonic oxide gave the usual bright lines of potassium, and also a bright band, identical in position with the above-mentioned band, between wave-lengths about 5700 and 5775. This band could not be seen when hydrogen was substituted for carbonic oxide. A mixture of sodium carbonate and charred sugar, heated in an iron tube, gave only the same absorption as sodium in hydrogen. There were also no indications of any absorption due to a compound of rubidium or of cæsium with carbonic oxide.

A mixture of barium carbonate, aluminium filings, and lamp-black, heated in a porcelain tube, gave two absorption lines in the green, corresponding in position to bright lines seen when sparks are taken from a solution of barium chloride, at wave-lengths 5242 and 5136, marked α and β by Lecoq de Boisbaudran. These two absorptions were very persistent, and were produced on several occasions. A third absorption line, corresponding to line δ of Boisbaudran, was sometimes seen, and on one occasion, when the temperature was as high as could be obtained in the furnace fed with Welsh coal, and a mixture of charred barium tartrate with aluminium was used, a fourth dark line was seen with wave-length 5535. This line was very fine and sharply defined, whereas the other three lines were ill-defined at the edges; it is, moreover, the only one of the four which corresponds to a bright line of metallic barium.

Repeated experiments with charred tartrates of calcium and of strontium mixed with aluminium gave no results; but on one occasion, when sodium carbonate was used along with the charred tartrate of strontium and aluminium, the blue line of strontium was seen reversed; and on another occasion, when a mixture of charred potassium, calcium, and strontium tartrates, and aluminium was used, the calcium line, with wave-length 4226, was seen reversed.

In order to command higher temperatures, experiments were made with the electric arc enclosed in lime, magnesia, or carbon crucibles.

In the first experiments thirty cells of Grove were employed; in the latter ones the Siemens arc from the powerful dynamo-machine belonging to the Royal Institution.

The electric arc in lime crucibles gives a very brilliant spectrum of bright lines, a copious stream of vapours ascending the tube. On drawing apart the poles, which could be done for nearly an inch without stopping the current, the calcium line with wave-length 4226 almost always appears more or less expanded with a dark line in the middle, both in the lime crucibles and in carbon crucibles into which some lime has been introduced; the remaining bright lines of calcium are also frequently seen in the like condition, but sometimes the dark line appears in the middle of K (the more refrangible of Fraunhofer's lines H), when there is none in the middle of H. On throwing some aluminium filings into the crucible, the line 4226 appears as a broad dark band, and both H and K, as well as the two aluminium lines between them, appear for a second as dark bands on a continuous background. Soon they appear as bright bands with dark middles; gradually the dark line disappears from H, and afterwards from K, while the aluminium lines remain with dark middles for a long time. When a mixture of lime and potassium carbonate was introduced into a carbon crucible, the group of three lines with wave-lengths 4254, 4434 and 4454 were all reversed, the least refrangible being the most strongly reversed, and remaining so longest, while the most refrangible was least strongly reversed and for the shortest time.

When aluminium was put into the crucible, only the two lines of that metal between H and K were seen reversed. The lines at the red end remained steadily bright.

When magnesium was put into a lime crucible, the *b* group expanded a little without appearing reversed, but when some aluminium was added, the least refrangible of the three lines appeared with a dark middle, and on adding more magnesium the second line put on the same appearance; and lastly, the most refrangible was reversed in like manner. The least refrangible of the three remained reversed for some time; and the order of reversibility of the group is that of refrangibility. Of the other magnesium lines, that in the yellowish-green (wave-length 5527) was much expanded, while the blue line (wave-length 4703) and a line still more refrangible than the hitherto recorded lines, with wave-length 4354, were still more expanded each time that magnesium was added.

The following experiments were made in carbon crucibles:—

With strontia the lines with wave-lengths 4607, 4215 and 4079 were all seen with dark lines in the middle, but no reversal of any strontium line less refrangible could be seen.

A mixture of barium and potassium carbonates produced the reversal of the lines with wave-lengths 5535 and 4933. When barium chlorate was dropped into a crucible the four lines with wave-lengths 4553, 4933, 5545 and 5518 were reversed.

To observe particularly the effects of potassium a mixture of lime and potassium carbonate previously ignited was thrown in. The violet lines of potassium, wave-length 4044, came out immediately as a broad black band, which soon resolved into *two* narrower dark bands having wave-lengths nearly 4042 and 4045. On turning to the red end the two extreme red lines were both seen reversed. No lines of potassium between the two extremes could be seen reversed, but the group of three yellow lines were all expanded, though not nebulous, and other lines in the green were seen much expanded.

Sodium carbonate gave only the D lines reversed, though the other lines were expanded, and the pairs in the green had each become a very broad nebulous band, and D almost as broad a black band. When sodium chlorate was dropped into a crucible, the pair of lines with wave-lengths 5681, 5687, were both momentarily reversed, the latter much more strongly than the former.

When a very little charred rubidium tartrate was put in, the two violet lines were sharply reversed, appearing only as black lines on a continuous light background. Turning to the red end, the more refrangible of the two lines in the extreme red (wave-lengths 7800) was seen to have a decided dark line in the middle, and it continued so for some time. The addition of more rubidium failed to cause any reversal of the extreme red line, or of any but the three lines already mentioned.

On putting lithium carbonate into the crucible, the violet line of lithium appeared as a nebulous band, and on adding some aluminium this violet band become enormously expanded, but showed no reversal. The blue lithium line (wave-length 4604) was well reversed, as was also the red line, while a fine dark line passed through the middle of the orange line. On adding a mixture of aluminium filings and the carbonates of lithium and potassium, the red line became a broad black band, and the orange line was well reversed. The green line was exceedingly bright, but not nebulous or reversed, and the violet line still remained much expanded, but unreversed.

Metallic indium placed in the crucible gave the lines with wave-lengths 4101 and 4509, and both were seen strongly reversed. No other absorption line of indium could be detected.

In some cases a current of hydrogen or of coal-gas was introduced into the crucibles by means of a small lateral opening, or by a perforation through one of the carbon electrodes; sometimes the perforated carbon was placed vertically, and we examined the light through the perforations. When no such current of gas is introduced, there is frequently a flame of carbonic oxide burning at the mouth of the tube. The current of hydrogen produces very marked effects. As a rule, it increases the brilliance of the continous spectrum, and diminishes relatively the apparent intensity of the bright lines, or makes them altogether disappear with the exception of the carbon lines. When this last is the case, the reversed lines are seen simply as black lines on a continuous background. The calcium line with wave-length 4226 is always seen under these circumstances as a more or less broad black band on a continuous background, and when the temperature of the crucible has risen sufficiently, the lines with wave-lengths 4434 and 4454, and next that with wave-length 4425, appear as simple black lines. So, too, do the blue and red lines of lithium, and the barium line of wave-length 5535, appear steadily as sharp black lines, when no trace of the other lines of these metals, either dark or bright, can be detected. Dark bands also frequently appear, with ill-defined edges, in the positions of the well-known bright green and orange bands of lime.

With sodium chloride, the pair of lines (5687, 5681) next more refrangible than the D group were repeatedly reversed. In every case the less refrangible of the two was the first to be seen reversed, and was the more strongly reversed, as has also been observed by Mr. Lockyer. But our observations on this pair of lines differ from his in so far as he says that "the double green line of sodium shows scarcely any trace of absorption when the lines are visible," while we have repeatedly seen the reversal as dark lines appearing on the expanded bright lines; a second pair of faint bright lines, like ghosts of the first, usually coming out at the same time on the more refrangible side.

Potassium carbonate gave, besides the violet and red lines which had been reversed before, the group, wave-lengths 5831, 5802 and 5872, all reversed, the middle line of the three being the first to show reversal. Also the lines wave-lengths 6913, 6946, well reversed, the less refrangible remaining reversed the longer. Also the group, wave-lengths 5353, 5338, 5319 reversed, the most refrangible not being reversed until after the others. Also the line wave-length 5112 reversed, while two other lines of this group, wave-lengths 5095 and 5081, were not seen reversed.

Using lithium chloride, not only were the red and blue lines, as usual, easily reversed, and the orange line well reversed for a long time, but also the green line was distinctly reversed; the violet line still unreversed, though broad and expanded. Had this green line belonged to cæsium, the two blue lines of that metal which are so easily reversed could not have failed to appear; but there was no trace of them.

In the case of rubidium, the less refrangible of the red lines was well reversed as a black line on a continuous background; but it is not easy to get, even from the arc in one of our crucibles, sufficient light in the low red to show the reversal of the extreme ray of this metal.

With charred barium tartrate, and also with baryta and aluminium together, the reversal of the line with wave-length 6496 was observed, in addition to the reversals previously described. The less refrangible line, wave-length 6677, was not reversed.

With charred strontium tartrate, the lines with wave-lengths 4812, 4831, and 4873, were reversed, and by the addition of aluminium, the line wave-length 4962 was reversed for a long time, and also the lines wave-lengths 4895, 4868.

On putting calcium chloride into the crucible, the line wave-length 4302 was reversed, this being the only one of the well-marked group to which it belongs which appeared reversed. On another occasion, when charred strontium tartrate was used, the line wave-length 4877 was seen reversed, as well as the strontium line near it. The lines wave-lengths 6161, 6121, have been seen momentarily reversed.

With magnesium, when a stream of hydrogen or of coal gas was led into the crucible, the line wave-length 5210, previously seen in iron tubes, and ascribed to a combination of magnesium with hydrogen, was regularly seen, usually as a dark line, sometimes with a tail of fine dark lines on the more refrangible side similar to the tail of bright lines seen in the sparks taken in hydrogen between magnesium points. Sometimes, however, this line (5210) was seen bright. It always disappeared when the gas was discontinued, and appeared again sharply on readmitting hydrogen. These effects were, however, only well defined in crucibles having a height of at least 3 inches above the arc.

On putting a fragment of metallic gallium into a crucible, the less refrangible line, wave-length 4170, came out bright, and soon a dark line appeared in the middle of it. The other line, wave-length 4031, showed the same effect, but less strongly.

Reviewing the series of reversals which have been observed, in many cases the least refrangible of binary groups is the most easily reversed, as has been previously remarked by Cornu.

Making a general summation of the results respecting the alkaline earth metals, potassium and sodium, having regard only to the most characteristic rays, which for barium may be taken as 21, for strontium 34, for calcium 37, for potassium 31, and for sodium 12, the reversals number respectively 6, 10, 11, 13 and 4. That is, in the case of the alkaline earth metals about one-third, and these chiefly in the more refrangible third of the visible spectrum, the characteristic rays remaining unreversed in the more refrangible part of the spectrum being respectively 2, 5 and 4.

The curious behaviour of the lines of different spectra with regard to reversal induced a comparison with the bright lines of the chromosphere of the sun, as observed by Young. It is well known that some of the principal lines of the metals giving comparatively simple spectra, such as lithium, aluminium, strontium, and potassium, are not represented amongst the dark lines of Fraunhofer, while other lines of those metals are seen, and an examination of the bright chromospheric lines shows that special rays highly characteristic of bodies which appear from other rays to be present in the chromosphere are absent, or are less frequent in their occurrence than others.

In the following table the relation between the observation on reversals and Young's on the chromospheric lines is shown:—

Lines in Wave-Lengths.	Frequency in Chromosphere.	Behaviour. Reversal in our Tubes.	Remarks.
SODIUM.			
6160, 6154	0	Expanded.	
D . .	50	Most easy.	Principal ray.
5687, 5681	2	Difficultly reversed.	
5155, 5152	2	Very diffused.	
4983, 4982	0	" "	
LITHIUM.			
6705 . .	0	Readily reversed.	Most characteristic at low temperature and low density.
6101 . .	3	Difficultly reversed.	
4972 . .	0	Difficultly reversed.	
4603 . .	0	Readily reversed.	
4130 . .	0	Very diffused.	Described by Boisbaudran.
MAGNESIUM.			
5527 . .	40	Expanded.	
b_1 5183 . .	50	Reversed.	Most characteristic.
b_2 5172 . .	50	"	Most characteristic.
b_4 5167 . .	30	Difficultly reversed.	Most characteristic.
4703 . .	0	Much expanded.	
? 4586 . .	0	Much expanded.	Doubtful whether due to magnesium.

Lines in Wave-Lenghts.	Frequency in Chromosphere.	Behaviour. Reversal in our Tubes.	Remarks.
MAGNESIUM.			
4481 . .	0	Not seen either bright or reversed.	Characteristic of spark absent in arc.
BARIUM.			
6677 . .	25	0	May be either Ba or Sr.
6496 . .	18	Reversed.	May be either Ba or Sr.
6140 . .	25	0	
5534 . .	50	Readily reversed.	Most persistent.
5518 . .	15	Reversed.	
4933 . .	30	,,	Well-marked ray.
4899 . .	30	0	
4553 . .	10	Pretty readily reversed.	
STRONTIUM.			
6677 . .	25	0	May be Sr or Ba.
6496 . .	18	0	,, ,,
4902 . 4895 . 4873 . 4868 . 4812 . 4831 .	...	Reversed.	
4607 . .	0	Readily and strongly reversed.	Most characteristic.
4215 . .	40	Readily reversed.	Well marked.
4077 . .	50	Readily reversed.	,, ,,
CALCIUM.			
6161 . .	8	Reversed difficultly.	Very bright.
6121 . .	5	Reversed difficultly.	
5587 . .	2	Doubtful reversal.	
5188 . .	10	Reversed.	
4877 . .			
4587 . .	2	0	
4576 . .	4	0	
4453 . .	0	Readily reversed.	
4435 . .	1	Readily reversed.	
4425 . .	2	Readily reversed.	
4302 . .			
4226 . .	3	Most easily reversed.	Very characteristic.
4095 (?) .	0	Strongly reversed.	
3968 . .	75	Well reversed.	
3933 . .	50	Rather more readily than the last.	
ALUMINIUM.			
6245 . .	8	0	Strong lines.
6237 . .	8	0	
3961 . 3943 .	0	Strongly reversed.	Very marked.
POTASSIUM.			
7670 . 7700 .	0	Strongly reversed.	Chief rays.
6946 . 6913 .	...	Reversed.	
5872 . 5831 . 5802 .	...	Reversed.	
5353 . 5338 . 5319 .	...	,,	
5112 . .	...	,,	
4044 . 4042 .	3	...	Well marked.
CÆSIUM.			
5990 . .	10	0	
4555 . .	10	Strongly reversed.	Most marked.

The group calcium, barium, and strontium on the one hand, and sodium, lithium, magnesium, and hydrogen, on the other, seem to behave in a similar way in the chromosphere of the sun; but before definite conclusions can be reached regarding the sequence of the reversals, a further series of long and laborious experiments must be executed.

Parliamentary and Law Proceedings.

THE PHARMACEUTICAL SOCIETY v. THE LONDON AND PROVINCIAL SUPPLY ASSOCIATION.

The judgments in this case were delivered on Tuesday, the 16th, in favour of the appellants. The judgments are as follows:—

Lord Justice Bramwell: I am of opinion that this appeal must be allowed. I think the word "person" in sect. 15 of the Pharmacy Act, 1868, does not include a corporation. That the word "person" may include corporation I will not deny, though at the same time, considering the way in which statutes are now drawn, that when "corporation" is meant it is always named, at least that there is no modern instance to the contrary, and that when the Legislature made a general interpretation clause that "person" should be male and female, plural and singular, etc., it did not include "corporation," I should be reluctant to hold that in any particular statute "person" included "corporation," unless there was strong reason so to do. In this case there is, in my opinion, no such reason, but the contrary. Sections 1 and 15 of the Act create an "offence" and provide for its punishment. But for section 15, section 1 would create a misdemeanour punishable by indictment, fine and imprisonment. But offences, certainly offences of commission, are the offences of individuals, not of corporations. A corporation cannot have the *mens rea*. I do not say that a corporation cannot be guilty of an offence of nonfeasance—it certainly can be; and it has been so held as to a misfeasance; but though if the Legislature pleased it might enact that a corporation should in a certain event be taken to have committed an offence, the presumption is that in speaking of "offenders" it speaks of individuals. If a statute were to say that any person publishing a libel should be guilty of an offence, or that no person should publish a libel, a corporate printing company publishing a libel would not be guilty in its corporate capacity; but the individuals publishing would be the offenders. So, for instance, as to the sale of beer or spirits. No doubt, if there was strong reason for saying "person" in this statute meant "corporation," one ought so to hold. As, for example, if the mischief to be prevented could not be otherwise. But that is not so here. For the individual offender may be got at. If the servant or shopman of a corporation sells poison, not being a pharmaceutical chemist and registered under the Act, it will be no answer to an action for the penalty to say that he did it as servant, whether of an individual or a corporation not qualified. If the act is in itself unlawful, it is not the less so because done as servant. If it would be lawful because the servant was qualified, though his employer was not, I think the statute is shown to be all the more reasonable, as in that case a corporation is on the same footing as a partnership, and there is no reason why it should not be. It may be asked, how is the "keeping open shop" to be reached; the servants do not keep it open? No, but the directors or managers do; they are the offenders in that case. I cannot see how they could deny that they kept open this shop. They do—they do it in fact. If they committed a public nuisance by smells, vapours or otherwise in the preparation, or (if supposable) in the sale of their drugs, they and not the corporation would be indictable. I see no reason then for including "corporation" in the word "person." I see many the other way. It is remarkable that in this particular statute "person" never includes "corporation" in any other section. It is manifest that "persons" in the preamble keeping open shops, and "persons" known as chemists and druggists, means individuals; for they are "persons" who it is expedient should possess a competent practical knowledge of their business. A corporation as such cannot possess a competent practical knowledge. Then such "persons" are to be examined. It is manifest "persons" there does not include corporations, why should it in section 1? So "persons" in section 3 who have been assistants cannot include corporations, nor the "person" in section 4 who is to be of full age, nor the "persons" in section 5 who had been admitted pharmaceutical chemists, for no corporation had been, nor the "person" in section 6, for a corporation never could have a certificate of competent skill, nor the "person" in section 10, who is a person that may die. In short "person" in no other section of this Act includes "corporation." Further than this, I am by no means certain that the statute is not levelled at the individual actually acting, and not (at least in all cases) his employer. Who would be liable under section 15 for compounding medicines of the British Pharmacopœia otherwise than according to its formularies? Surely the actual person compounding. Section 16 supposes there may be a qualified assistant, and not a qualified master. Again, section 17 which specially provides that for certain matters the master is liable, seems to suppose that otherwise he would not be. Then section 18 and the following, when they use the word "person" clearly do not mean "corporation." There is this advantage, as I have said, in this construction, that it does not exclude a corporation from the benefit of carrying on this business, nor the public from dealing with them. It is not needlessly in restraint of trade as it otherwise would be, at least not directly. If it does indirectly operate to preclude a corporation carrying on this trade, however qualified all its members may be, it is to be regretted; but then there is no need for making "person" include "corporation," nor for creating the novelty of a corporate offence. It only would operate against a corporation as it would against a partnership. Further, how is this the act of the corporation if it is unlawful? For if it is, it is *ultra vires* of the directors. An assistant hired by them to sell these poisons, if so doing is unlawful, could maintain no action against the corporation. They would have a good defence. Of course, if by their articles of association poisons are expressly to be sold, their sale would not be *ultra vires*; but that does not appear in this case, and at all events the possibility is a reason for fixing the individual and not the corporation. In the result, considering the way in which modern statutes are drawn, that corporations are specified where corporations are meant, that offences are wilful breaches of law or inattention to its commands and so the act of the individual offending, that there is no reason for holding corporations to be within the Act, that there are reasons to the contrary, and that in no other section of this Act does "persons" mean "corporation," I am of opinion it does not in these sections. I am aware that the penalty is recoverable by plaint in the County Court, 15 and 16 Vic. c. 62; but the sum recovered is at the disposition of the Crown, section 14, and it is a "penalty," and the act an "offence," and the person an "offender." I am aware also that there is ground for saying that under section 15 all of several partners keeping a shop must be qualified, though none attend, and the shopman need not be qualified. If so it may be said, so must all the shareholders and directors of a corporation. I do not know. The Act may have a more limited meaning, and be more reasonable. If not, still this furnishes no argument in favour of "person" meaning corporation.

Lord Justice Baggallay: I agree in the opinion that this appeal should be allowed. In modern times when the Legislature has intended that the word "person" or any other word primarily importing an individual in any particular statute shall include a corporation, it has been usual to introduce an interpretation clause, declaring that the word shall have such extended meaning. In the year 1868, the year in which the Act now under consideration was passed, at least four other Acts were passed into which such a clause was introduced; namely, the Sea Fisheries Act, the Fair of Kildare Act, the Regulation of Railways Act, and the Artizans and Labourers Dwellings Act; and in another, the Irish Fairs Act, the word "owner" was declared to have the same meaning. Now the omission from Lord Brougham's Act of any general declaration that the word "person" when used in subsequent statutes should include a corporation, and the absence from the Act now under consideration of any such interpretation clause, to my mind strongly supports the view that the Legislature had no intention that the word "person" when used in the Act should include a corporation. It probably is the fact, as was suggested in argument, that at the time when the Act passed it was not in the contemplation of the Legislature that a corporate body would embark in the business of selling or of dispensing or compounding poisons, and that consequently it had no intention of either including or of excluding a corporation when using the word "person;" but, however, this may be, it must I think be admitted that although an Act may not contain a declaration that the word "person" shall include a corporation, and although it may be clear that the Legislature could not be reasonably presumed to have any intention in the matter; yet, if it be clear from the general scope and purport of the Act that the selling, dispensing, or compounding of poisons by a corporation was or might be within the mischief intended to be guarded against, and if extending the meaning of the word "person" so as to include corporation would enable the necessary protection to be given, such an interpretation might and ought to be adopted. But when I turn to the Act itself I can find nothing to lead me to such a conclusion. The object of the Act is to prevent the selling, dispensing or compounding of poisons by unqualified persons. A corporation cannot of itself sell, dispense or compound; it can only do so by the aid of a servant or assistant, and if that servant or assistant is duly qualified in the manner required by the Act—as is admittedly the case with regard to the dispenser employed by the defendants—the object of the Act is obtained. And in the view I take of the Act, the protection intended to be given to the public is sufficiently secured in the case of a corporation keeping open a shop for selling, dispensing, or compounding of poisons, for in my opinion the seller referred to in the first section is the actual seller, and not the individual or corporation on whose behalf he may act, and this view is supported by the language of the 17th section, which when dealing not with the simple sale of poisons, but with selling particular poisons without the adoption of special precautions, imposes a comparatively small penalty on the seller, but declares that for the purposes of that section the person on whose behalf the sale is made shall be deemed to be the seller, thus implying, that except for the purpose of that section the person referred to in the Act as selling, means the person actually selling, and not the person by whom he is employed. I need not refer to many sections of the Act which are quite inapplicable to the case of a corporation, as they had been pointed out in detail by Lord Justice Bramwell. In the absence then of any declaration in the Act that the word "person" is to include a corporation, and not gathering from the general scope and purport of the Act that there is any necessity in the interest of the public that any such interpretation should be given to the word, I have arrived at the conclusion that such an interpretation ought not to be put upon it, and that this appeal should be allowed.

Lord Justice Thesiger: I also am of opinion, not without doubt, that this appeal should be allowed. The question for determination is whether an incorporated company is subject to the prohibition contained in section 1, and liable to pay the penalty imposed in section 15 of the Pharmacy Act, 1868, or in other words, whether the term "person," used in those sections, includes such a company. In dealing with this question, I start with the axiom that the term "person" is, in legal phraseology, wide enough to include not merely natural persons, that is, individuals, but, artificial persons, such as corporations, aggregate as well as sole. I start at the same time with the undisputed fact that the practice in modern statutes where corporations are intended to be affected is either to expressly name them or to use in reference to them the term "person," with an interpretation clause expressly providing that corporations are intended to be included in the term. As a proper resultant of the apposition between the axiom and the practice, it appears to me that the term "person" when contained in a modern Act of Parliament should never be construed to include corporations, except where, first, the term is expressly interpreted as including them; or, secondly, the context of the Act clearly shows that they are so included; or, thirdly, the object and scope of the Act peremptorily require them to be so included, and the context does not clearly negative a construction to that effect. Neither the first nor the second condition exists in the particular Act under consideration, but for a long time I have doubted whether the judgment of the court below might not be supported upon the third. The object of the Act is that of providing for the safety of the public in the matter of the sale of poisons. The means by which that object is proposed to be attained is, *inter alia*, that of subjecting those who keep open shop for the retailing, dispensing or compounding of poisons to certain conditions and restrictions. Corporations may keep open shop, their doing so without proper safeguards may expose the public to the mischief against which the Act is intended to guard. There is, therefore, a strong presumption *à priori* that they would be made subject to the same conditions and restrictions as those to which individuals would be subjected, or, at least, to some conditions and restrictions that would serve to the same end. Proceeding a step further it may be said that a statutory provision under which a particular thing is made unlawful for any individual to do, except under certain conditions, contains an indication that the thing itself is intended to be entirely prohibited except under those conditions, and consequently cannot be done by a corporation even though the conditions are in their nature such as cannot under any circumstances be complied with by them. Lastly, a penalty, by which the prohibition is to be enforced, recoverable by civil suit, is as applicable to corporations, who may, even under certain circumstances, be the subject of indictment, as it is to individuals. Notwithstanding, however, the force of these considerations, which still press themselves upon me I have come to the conclusion that the whole contents of the Act too clearly point to individuals alone being intended by the term "person" to allow of that term being held to include corporations in the 1st and 15th sections. I do not propose to repeat what has already been said by Lord Justice Bramwell upon this point. He has shown conclusively that the preamble and every section of the Act, putting aside for the moment the two sections whose meaning is in dispute, when using the term "person" or "persons" refer to individuals alone. But in addition to what he has pointed out I find in the first section itself evidence that the words "any person" in the earlier part of that section are limited to individuals and cannot be extended to corporations, for in a subsequent part of the same section the word "person" is again used with such a context as absolutely forbids its application to a corporation, and yet in such a relation to the same word contained in the earlier part of the section as to grammatically require that it should receive the same construction. I do not think that under such circumstances the court ought to strain the language of the Act so as to make it include corporations, even if it were clear that the mischief intended to be provided against would otherwise in the case of companies keeping open shop for the sale of poisons be remediless. But I feel bound to add that I am by no means satisfied, that although a corporation as a separate entity be not liable to the penalty which is sought to be recovered, in this case the individual members of the corporation, whether directors of a company or otherwise, may not be liable, and thus the mischief be remedied. I prefer, however, to give no definite opinion upon this point, for it involves the question whether the Legislature intended or not to practically put an absolute veto upon the keeping open shop for the sale of drugs by trading companies, and the absence from the Act of any express reference to such companies is almost equally difficult to be accounted for upon the notion that the Legislature had that intention as upon the notion that the Legislature did not think of the matter at all, and thereby a *casus omissus* has occurred.

Mr. Bosanquet: My lords, Mr. Lumley Smith is not here, and I am asked to apply to your lordships for leave to appeal to the House of Lords. Leave was given to appeal to this court on the ground of the importance of the case.

Lord Justice Bramwell: Mr. Bosanquet, I am not sure that any leave from us is necessary, and I think it is an objectionable thing for the court to do. You shall have it if it is necessary, but just inquire.

Mr. Bosanquet: I have had no time to look it up, my lord, I have only just been asked to do it. Perhaps you will allow Mr. Lumley Smith to mention it in the course of the day if necessary.

Lord Justice Bramwell: Certainly.

Lord Justice Thesiger: Leave to appeal was granted in the court below.

Lord Justice Bramwell: I think, indeed I know, I may say, that we should grant you that leave, but we do not like to do it unless it is necessary.

Reviews.

MEDICINAL PLANTS: BEING DESCRIPTIONS, WITH ORIGINAL FIGURES, OF THE PRINCIPAL PLANTS EMPLOYED IN MEDICINE, AND AN ACCOUNT OF THEIR PROPERTIES AND USES. By R. BENTLEY and H. TRIMEN. London: J. and A. Churchill. 4 vols. 1880.

We have from time to time called attention to the progress of this work, and it only remains now to say a few words on its completion. The total number of species depicted and described is three hundred and six included in forty-two numbers, the publication of which has extended over more than four years. Of these, two hundred and ninety-eight are flowering plants and eight cryptogams, viz., one fern, one lycopodium, two lichens, one fungus and three algæ. Since allusion has been not unfrequently made in these columns to points of special interest as they arose during the publication of the parts, it is not necessary now to add any criticisms of this nature. The authors apologize for the apparent inequality in the treatment of the different species, on the ground of the varying interest taken in substances at different times, some new remedies especially exciting much attention and thus demanding a full description, though perhaps, not of great permanent value. Now that the work is completed, the authors need not be afraid but that their labour will be appreciated. It is an indispensable work of reference to every one interested in pharmaceutical botany. The botanical descriptions of the species from the hand of Dr. Trimen, and the description of the general characters, composition, properties and uses of its parts and products which are employed in medicine or otherwise, by Professor Bentley, may be thoroughly relied on, and in nearly all cases the coloured drawings and the dissections of the most important parts of the plant give a very correct idea of the species from which the drug is obtained. Moreover, the work, in four handsome volumes, will form a decided ornament to the library shelves or drawing-room table.

Pharmacographia. A History of the Principal Drugs of Vegetable Origin met with in Great Britain and British India. By Friedrich A. Flückiger and Daniel Hanbury, F.R.S. Second edition. London: Macmillan and Co. 1879.

So highly esteemed was the last edition of this remarkable work, that it was speedily bought up, and for some time past there has been considerable difficulty in obtaining even a secondhand copy. Unfortunately, however, owing, we believe, to the publication of a cheaper edition in America, the authors suffered pecuniary loss rather than gain as the reward of years of conscientious and painstaking labour, a result which we sincerely hope will not follow the publication of the present edition. Since the deeply deplored decease of one of the authors, the whole of the labour of revision has fallen on Professor Flückiger, and so well has it been done that only from two or three isolated idiomatic expressions is it possible to tell that anyone but a born Englishman has written the additions; indeed, the condensed and vigorous style so closely resembles that of Daniel Hanbury, that the paragraphs now added might well have been written by him. Although sixty-eight pages of additional matter have been added to the body of the work, the fresh information has been so well intercalated that it is only after the most careful comparison that one discovers the fact that almost every other page contains new chemical facts or historical additions. Nothing that could have been inserted up to the date of going to press seems to have been left unnoticed. The number of journals and publications of all kinds that have to be consulted in order to bring any scientific work up to date is only known to those who have to ransack widely scattered literature in different languages for that purpose. One can only regret that 'Pharmacographia' does not include all the articles used in materia medica in this country. It would then assuredly be adopted as the text-book at all medical and pharmaceutical schools, instead of being used, as at present, only as a reliable work of reference. One or two slight errors have crept in, but not of an important character. Thus Bengal cardamoms are attributed to *Amomum subulatum*, Roxb., whereas it is the Nepal cardamom that is yielded by it. This mistake would appear to have been derived from the Kew Report (1877, p. 27), the author of which evidently misunderstands Dr. King's paper* in the journal of the Linnean Society of London.

* See *Journ. Linn. Soc. Botany*, vol. xvii., p. 5.

Hodthai is not, as the author supposes, identical with *habakhadi;* the former is the produce of *Balsamodendron Playfairii*, the latter of a species of *Balsamodendron* with larger leaves than that plant, and of which a specimen is still growing in Kew Gardens. Sagapenum is stated to have no alliaceous odour, and is removed from under Ammoniacum and placed under Galbanum. Its nearest ally is certainly assafœtida, for sagapenum has a distinct alliaceous odour and a strong alliaceous taste. Nor can we agree with the learned author, who is not the only one who makes the same remark, that the presence of stellate markings is characteristic of Russian and Chinese rhubarb. These spots occur also in *Rheum rhaponticum*, and are by no means found in all specimens of Russian or Turkey rhubarb.

Almost the only new drug introduced is jaborandi. Dr. Flückiger seems to have overlooked the publication of accounts of the spurious drug having occurred in commerce in England and France.

Probably no work was ever published without a few omissions or errors, and those above noticed are of no considerable importance. Without question, 'Pharmacographia' is and must remain for a considerable time the best and most trustworthy work in our language on the drugs of which it treats. Each successive edition, if as well done as the present, can but add to the mine of information it contains.

At the end of the volume a biographical and bibliographical index to the extent of seventeen pages has been added; this comprises a list of the works quoted in 'Pharmacographia.' It adds considerably to the value of the references, and must have cost much more time and trouble to compile than is indicated by the short paragraph devoted to each. The general index has been reduced from three to two columns on each page, and therefore occupies more room, but is more easy of reference.

BOOKS, PAMPHLETS, ETC., RECEIVED.

Practical Chemistry: The Principles of Qualitative Analysis. By William A. Tilden, D.Sc., Lond., F.C.S., etc. London: Longmans, Green and Co. 1880. From the Publishers.

Obituary.

Notice has been received of the death of the following:—

On the 3rd of January, 1880, Mr. Richard Arthur Hall, Pharmaceutical Chemist, Leigh, Lancs. Aged 23 years. Mr. Hall became a Member of the Pharmaceutical Society in 1879.

On the 29th of January, 1880, Mr. John Benjamin Bibby, Chemist and Druggist, Ince, Lancs. Aged 33 years.

On the 6th of February, 1880, Mr. Morris Applebee Gibbs, Chemist and Druggist, Little Newport Street, Leicester Square, London. Aged 59 years.

On the 9th of February, 1880, Mr. Thomas Cribb, Chemist and Druggist, Lisson Street, Lisson Grove, London. Aged 62 years.

On the 9th of February, 1880, Mr. Edward George Thornton, Chemist and Druggist, Lyme Regis. Aged 35 years.

On the 10th of February, 1880, Mr. Edward Wootton, Chemist and Druggist, High Street, Margate. Aged 70 years.

On the 14th of February, 1880, Mr. Michael Andrew McDermott, Chemist and Druggist, Commercial Road, London. Aged 36 years.

On the 18th of February, 1880, Mr. John Croswell, Chemist and Druggist, Tredegar, Mon. Aged 57 years.

On the 19th of February, 1880, Mr. Thomas Robson, Chemist and Druggist, Hartlepool. Aged 77 years.

On the 19th of February, 1880, Mr. Richard Farrant Salter, Chemist and Druggist, Topsham, Devon. Aged 40 years.

On the 26th of February, 1880, Mr. Samuel Arrandale, Chemist and Druggist, Denton, Lancs. Aged 47 years.

On the 1st of March, 1880, Mr. James Thomas Gwatkin, Pharmaceutical Chemist, Grand Parade, Brighton. Aged 66 years. Mr. Gwatkin was one of the Founders of the Pharmaceutical Society, and served it during many years as Local Secretary, which office he held at the time of his death.

On the 6th of March, 1880, Mr. Horatio King, Chemist and Druggist, Post Office Street, Norwich. Aged 54 years.

Dispensing Memoranda.

Reply.

[386]. In answer to *Dubius's* question regarding zinci oleas; I beg to state that I believe the proper consistence to be somewhat similar to what ol. cocoa nucis is in cold weather, and perfectly white, when Hubbock's zinci oxid. is used.

I think that if *Dubius* will, in making zinci oleas, apply a heat of about 120° Fahrenheit, for five minutes, taking care not to exceed that temperature, at the end of that time he will obtain a preparation similar to that I have described it to be.

Having made zinci oleas, I find it rather difficult to make an ointment with it, combined with vaseline; you cannot rub it down fine enough, so as not to appear lumpy in the ointment, and if you apply heat you obtain a very glutinous-like preparation by no means fit to send out, thus showing that care must be taken not to apply too much heat. I would suggest to dispensers, that when they have ung. zinci oleatis ordered, to make their zinci oleas fresh, and before it cools add their lard or vaseline, by so doing they will obtain a very elegant preparation.

EDMUND WHISTON.

Queries.

[394]

℞ Hydrargyri Chloridi granum et dimidium
Pulveris Opii . . . unam tertiam partem grani

Fiat pilula. Mitte decem. Sumat unam quartis horis dolore urgenti.

What size should the above pills be when sent out? and what would be used in a good dispensing establishment to increase the bulk and the excipient?

C. J. B.

[395]. What decomposition takes place in the following prescription?—

℞ Quinæ Disulph.	gr. xij.
Acid. Nit. Dil.	♏xx
Lithiæ Citratis	℈j
Tr. Aurantii	ʒiij
Sp. Chloroformi	ʒj
Aquæ	ad ℥vj

A sixth part at noon and 6 p.m.

I first dissolved the quinine in the acid and some water, the lithia in a mortar with water, and mixed them; I had a thick creamy mixture. The second time I put the quinine in last; there was a precipitate but not so much as in the first case. Attfield and Fownes gave very little information. Would sulphate of lithia and citrate of quinine be formed?

EMBRYO.

[396] "Minor" will be pleased to hear of a good method for silvering ordinary 4 grain pills.

[397].

℞ Camphoræ . . . . . grana triginta.

Fiant pilulæ duodecem. Capiat unam pro re nata.

What is the best excipient to use for the above in order to have pills not exceeding 3 grains?

C. J. B.

[398].

℞ Acid. Sulph. Dil.	ʒj
Acid. Phosph.	ʒvj
Spt. Æther. Chloric.	ʒj
Tinct. Camph. Co.	ʒiv
Ferri Citratis	ʒij
Syr. Aurantii	ʒiv
Aq.	ad ℥xij

Ft. mist.

Would any reader kindly state how the above should be dispensed so as to form a clear mixture, as my customer says it was sent out clear from the place where he had it first made up?

I have mixed the ingredients in every way I can think of, but always get the same thick deposit.

A JUNIOR.

Notes and Queries.

COSTER'S PASTE. — We have received a communication from Mr. Martindale stating that the formula for Coster's paste, quoted in last week's Journal on the authority of Mr. Startin, was incorrect, and that the correct formula is identical with that of the pigmentum iodi et olei picis of the University College Pharmacopœia, as follows:—"Iodine, two drachms; light oil of wood tar, one ounce. Mix carefully, applying heat if necessary; after ebullition, preserve for use." The "light oil of wood tar" has a specific gravity of ·853 to ·867, and is known in commerce as rectified spirit of tar. Mr. Martindale says that the formula was given to Dr. Ringer by Mr. Coster himself. The use of so vague a term as "pigmentum iodi," as in Mr. Startin's note, is condemned by Mr. Martindale.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

PHYSICIANS AND THEIR MANUALS OF DOMESTIC MEDICINES.

Sir,—Much as has been said of late by physicians and surgeons respecting the inability of chemists to prescribe medicines for simple ailments, and the unsuccessful attempt which has been made on the part of surgeons to prevent chemists from handing over their counter any medicines (patents excepted) but those that have been ordered through a prescription by a medical man, there seems to me an important matter, which ought to be brought under their notice at once, namely, the publishing of books for domestic reference in cases of illness, with receipts containing very poisonous drugs. Receipts of a dangerous and poisonous character are copied by mothers and others from these books to suit the ailment from which the patient suffers, taken to the chemist's to be made up, and in many cases even made up by themselves, and given to the patient, in many instances ignorant of the disease for which they are attempting to treat. For example, seeing a book advertised to be published by Messrs. Cassell, Petter, Galpin and Co., entitled the 'Family Physician,' compiled by physicians and surgeons of the principal London hospitals, and knowing that these publishers always bring out books worthy of being read, I commenced taking it in in 6*d*. numbers, for the object of gaining information suitable to my business as a chemist. On page 3, I found the following under "Children in Health and Disease.—Bed-wetting:"—"We have in belladonna a drug which has been of undoubted service in such cases. It should be given in the form of pills, because it is unadvisable to give more liquid to these children than is absolutely necessary. The dose must be small to begin with, and then may be gradually and cautiously increased. A pill containing a ¼ gr. or less of the extract (which should be purchased of some druggist of acknowledged reputation) should be administered every night at bedtime, and if this be found insufficient, the dose may at the end or a week be doubled. If the child complain of thirst, and the pupils of the eyes become dilated, the remedy must not be pushed too far; if delirium occur the belladonna must be withheld." Now, sir, I think you will agree with me that such a receipt is not to be trusted in such hands as this book will reach, neither should such drugs be prescribed, excepting personally by a medical man, who understands the treatment, and can prescribe accordingly. It is not at all unlikely that the chemist who made up the receipt would be called up, and highly censured for dispensing it, should any accident occur.

Birmingham. JOSIAH AUSTIN.

SALE OF PATENT MEDICINES.

Sir,—There seems to be a very general opinion that to meet competition in patent medicines it should be compulsory that all patent medicines containing any of the scheduled poisons should be labelled poison, and the sale restricted to chemists. Permit me to suggest whether this is not a foolish course for chemists to encourage, for this reason. A large majority of the most popular, and presumably, therefore, really useful medicines contain perhaps a small quantity of one or more scheduled poisons. I should suppose that every chemist who has any considerable sale for any of his own preparations can readily find several examples in his own articles. If, therefore, the above became law it would apply to each chemist's preparations as well as those patents that have a large sale. The result would be that the majority of preparations sold by chemists would have to be labelled "poison," to the alarm of the public (at least this is what is intended by the promotion of the above idea, in hope of restricting the sale of patents). A sure result would follow. A class of large advertisers would bring out medicines just free of the law, and largely advertise them as being sold by grocers, etc. As one who has had very considerable experience, I unhesitatingly affirm that if this was done and became a fashion the chemist's trade would certainly suffer seriously. A much better plan would be, when the question is ripe, to try and induce the Government to grant a council composed equally of chemists and medical men to license patent medicines, such medicines only that contain large doses of poisons to be labelled poison. Because a cough mixture contained a small dose of syrup of poppies, though an ordinary bottleful of which would not do the slightest harm, it would be absurd to label it poison.

1, *London House Yard, St. Paul's, E.C.* I. W.

DEATH RATE OF CHEMISTS AND DRUGGISTS.

Sir,—Will you allow me space for a few words on the vital statistics recently given by Mr. Andrews in the Journal (before p. 678). As the writer says that no conclusions are to be drawn from his table they may be passed by; but as he offers no apology for that furnished by some other gentleman, I presume Mr. Andrews considers it correct. I should say that any table of figures that shows that chemists and druggists live twice as long as physicians carries its own refutation on its face.

Does Mr. Andrews know that besides that palpable error the figures also imply that chemists attain to an average of eighty-seven years, and that barristers live one hundred and sixteen years, whilst physicians seem to die at the comparatively juvenile age of fifty-seven?

J. STAINER.

SALVIA SEEDS.

Sir,—In the notes on "Economic Botany of the Western United States," reprinted in the Journal, the properties of *Salvia Columbariæ*, Benth., are noticed. The seed yields the "chia," a mucilaginous substance much used as food by the Indians and Mexicans. The seed is also placed in the eye, where it gives no pain, to form a mucilage, by means of which a foreign body may be removed from that organ. The seeds of our own *Salvia verbenaca* have been used for the latter purpose, the mucilage consisting (as in the case of many seeds) of minute spiral vessels, which form an interesting microscopic object. G. C. DRUCE, F.L.S.

"*Chemist.*"—The publication of names sometimes involves a liability that we think it discreet not to incur.

W. Fowler is thanked for his communication. We shall always be glad to receive similar information.

A Student would probably get the information he desires from a paper on the subject of "Oleomargarine," recently presented to Parliament, which may be obtained for a few pence from Messrs. Hansard. See also on the "Manufacture of Artificial Butter," *Pharm. Journ.* [3], vii. 813.

J. A..—See before, pp. 486 and 644.

"*Dens.*"—There is nothing illegal in the extracting of teeth by any person, but any person not registered under the Dentists Act who in so doing held himself out to be a dentist would be liable to a penalty.

W. Lyle.—See the Fourth Cantor Lecture on the "Chemistry of Bread-Making," published in the *Journal of the Society of Arts* for January 16.

Stamp.—Any statement on the label or otherwise implying that a preparation is secret or occult, or prepared only by a particular person, or that it is useful in the relief of any ailment of the human frame, would render it necessary that such preparation should be stamped. As to the class of preparations of which "salines" and "fruit salt" are typical, it has been recently decided in the appeal court that they come within the exemption in favour of artificial mineral waters.

A. P. S.—Yes, if the preparations come within the provisions of the Patent Medicine Stamp Acts.

B. J. Kent.—(1) See before, p. 638. (2) The second ingredient, which we presume is the one that has caused your difficulty, is "pulv. d'extrait rad. rhei, q.s."

C. C. B.—The presence of spermaceti in oleum anisi may be detected by its insolubility in cold alcohol.

J. B.—The following recipe for mastic varnish is taken from the new edition of Cooley's 'Cyclopædia,' a most useful work to the chemist and druggist:—

"Take of pale and picked gum mastic, 5 lbs.; glass (pounded as small as barley, and well washed and dried), 3 lbs.; finest newly rectified oil of turpentine (lukewarm), 2 galls.; put them into a clean 4-gall. tin bottle or can, bung down securely, and keep rolling backwards and forwards pretty smartly on a counter, or any other solid place, for at least four hours, when, if the gum is all dissolved, the varnish may be decanted, strained through muslin into another bottle, and allowed to settle; if the solution is still incomplete, the agitation must be continued for some time longer, or the gentle warmth applied as well."

"*Ball.*"—A recipe for an aniline marking ink that becomes black after exposure to the air will be found in vol v. of the present series, p. 912.

Mathetes.—The best solvent for india rubber, according to Payen, is one consisting of 6 to 8 parts of absolute alcohol and 100 parts of carbon bisulphide.

Das Blumlein.—*Helleborus viridis.*

T. Horton.—The fruits are those of the olive. Laurel berries have no stone in them.

J. Dingle.—*Cladonia pyxidata.*

C. T.—*Scopolia carniolica.* The Curator of the Society's Museum would be glad of a good herbarium specimen, including root if possible.

C. T. Brookes.—You are recommended to make the inquiry of the Clerk to the Quarter Sessions.

A. B.—Try with care a weak solution of chloride of lime, or, if that is not successful, try, also with care, peroxide of hydrogen.

G. C. R. O.—If you will send a copy of the formula or a reference where it may be found we will give you our opinion.

M. P. S.—The presence of any such large amount of earthy salt as is ordinarily met with in water would probably be of little importance so far as absorption of carbonic acid gas is concerned, but in other respects it might be very objectionable.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Lawrence, Gibbons, Flower, Stenhouse, De Gustibus, etc., Student, Ion, Synthesis, T. W.

"THE MONTH."

Inter arma leges silent. The resumption of the strife in the law courts as to the meaning of the Pharmacy Act has been no doubt the incident of supreme interest during the last few weeks, and like many another conflict it has interfered with the ordinary course of affairs, since the chronicling of its progress necessitated a temporary suspension of the rule with respect to "The Month," and no *résumé* was presented at the end of February. The subject has, however, now been so fully dealt with that it need present no further hindrance to a resumption of these columns.

March is now itself again. Cold winds, bright sunshine and bursting buds herald the near approach of spring, and there is every prospect that the Easter holidays will present some little inducement to dwellers in smoky cities to seek the invigorating air of the country and to search for glimpses of the pale "primrose by the river's brim," the graceful wood anemone in its sylvan haunts, and the fragrant violet under the still leafless hedgerows.

The botanist, in his early perambulations, may even now expect to find a few medicinal plants awaiting him. *Daphne Laureola* and *D. Mezereum*, although neither of them common plants, are sometimes met with in the most unexpected places, where their seeds may have been dropped by birds, and the possibility of finding an unlooked-for treasure always gives a spice of enjoyment to an otherwise uninteresting and perhaps dreary walk. *Helleborus viridis*, in old orchards, and *H. fœtidus*, in thickets, are often met with in this way, and should now be in full blossom. Those who are fortunate enough to reside in localities where they grow, may now expect to find the asarabacca (*Asarum europœum*), the narrow-leaved lungwort (*Pulmonaria angustifolia*) and *Scrophularia vernalis*, in fit condition to collect for the herbarium. The dandelion and the coltsfoot are sure to be found in abundance everywhere; the catkins of the poplar (*Populus nigra*), the diminutive flowers of the elm, and the downy catkins of the willow, are all worthy of examination, for these are not to be found when the botanical session at schools commences.

At various botanical gardens one may expect to find a few flowers representing some of the larger or more important natural orders, thus, *Mandragora vernalis* and *Hyoscyamus orientalis* and the curious *Scopolia carniolica* represent the Atropaceæ; the latter plant, except for the thinner texture, more reticulated appearance and lighter green colour of the leaves and the pale lines on the corolla, might easily be mistaken for belladonna, from which, however, it is distinguished by having a stout creeping rhizome, instead of a root, and by the fruit being capsular instead of baccate. *Jeffersonia diphylla*, *Coptis trifoliata* and *Helleborus orientalis* in the Ranunculaceæ and *Kalmialatifolia* in the Ericaceæ, are frequently also to be found in blossom at this season of the year. At Kew Gardens the sweet orange, the mandarin and the Seville orange trees, as well as the lime, *Citrus Limetta*, and shaddock are now in blossom; the Kola nut and the coca and castor oil plant are still showing their inconspicuous flowers, and several varieties of tobacco, which are to be seen almost throughout the year, may be observed in the Economic House. In the open ground the cornelian cherry is putting forth its bright clusters of small yellow flowers and the *Helleborus niger* and other species, as well as the rare *Scrophularia vernalis*, are in full blossom. But on visiting No. 4 conservatory both the visual and olfactory organs are unexpectedly gratified by a delightful fragrance and a charming display of colour, in vivid contrast with the somewhat bare appearance of the grounds outside, where as yet but little is to be seen in blossom.

At Regent's Park only the Christmas rose and the mezereon are in flower in the Herbaceous Ground, and some of the blossoms of the latter exhibit that pale and sickly hue that flowers as well as human beings are apt to present when there is a deficiency of light and an impurity of atmosphere. In the Economic House there are, however, two or three medicinal plants in blossom. The *Eucalyptus globulus* is just showing flower buds, and the curious calyptrate calyx of the flower is distinctly visible. Last month the Socotrine aloes and the winter bark tree were both in full blossom, and the benzoin tree is now opening its flower-buds. The orange tree is also commencing to flower freely.

When the winter flora of this country is contrasted with that of "sunny Italy" one cannot help feeling a twinge of regret because of the murky skies and want of sunlight which causes such a wide difference in the two countries. A correspondent of the *Garden*, writing from San Remo, mentions among the plants in flower there in January, the marigold (*Calendula officinalis*), the Canadian fleabane (*Erigeron canadense*), the rosemary, *Juniperus oxycedrus*, wild thyme, and other fragrant herbs, and as well as the pretty little *Globularia Alyssum*, with its balls of rich blue flowers. All the above are of some medicinal interest, the last, and perhaps least known here, possessing purgative properties, the leaves having been sold at one time under the name of wild senna.*

The present and final number of 'Medicinal Plants' contains figures and descriptions of the following plants:—*Canarium commune*, *Conium maculatum*, *Coriandrum sativum*, *Cucurbita Pepo*, *Crinum asiaticum*, *Strychnos Ignatii*, *Pinus Abies*, *Avena sativa* and *Hordeum vulgare*. A correct reprint of *Pinus Picea* is also added, a transposition in the text having occurred in that already published in part 38. A systematic list of the contents of the work, an alphabetical index, a list of errata and the preface complete the work.

Of the immense amount of labour involved in a work of this kind, only those who have to bring a work up to date can have any idea. The vast amount of foreign literature scattered in various publications that has to be consulted, and the balancing or reconciling of contradictory or conflicting statements, render the production of a work like the present, one of considerable labour. No other publication can be said to give so complete and yet succinct an account of the medicinal plants of Great Britain, India and the United States and of their products, as this one. It includes no less than eighty-nine natural orders, two hundred and thirty-three genera and three hundred and six species, the information concerning which is brought up to the present time. The plan adopted, by means of which the whole can be arranged in consecutive systematic order by simply paying attention to the number attached to each species, is a most excellent one, and now that the work can be bound, it will be found that the four handsome volumes which it is intended

* *Pharm. Journ.* [1], vol. xvi., p. 426.

to make will have their contents arranged in the most convenient manner possible. No pharmaceutical or medical library will be complete without Bentley and Trimen's 'Medicinal Plants.'

In the *Gardeners' Chronicle* (February 14, p. 201) will be found an illustration of a peculiar pitcher plant, which attracted some attention at a recent meeting of the Linnean Society. The lid of the pitcher is furnished with two stout spines on its under surface, so that the animal which visits the pitchers of other species is considerably inconvenienced by being pricked on the back of the head when it attempts to secure the insects found in the pitchers of this species. Whether the ants which visit these organs have observed this fact, or whether the spines were developed so that the weakest should *not* go to the wall, must be left to the philosophers and naturalists of the future to determine. Sir John Lubbock's interesting studies of the habits of ants would almost lead one to accept the former theory as the correct one. However this may be, ants make an entrance to (or an exit from?) the pitcher by perforating the inner side of the stalk, and thus visit the pitchers to feed on the dead insects found there.

It is remarkable how soon scientific information which appears to have little marketable value at the time of its discovery is turned to account by practical men. A grower of early peaches has conceived and successfully carried out the idea of employing a hive of bees in his conservatory to fertilize the flowers during January. Might not this idea be also carried out with regard to some medicinal plants?

The *Garden* gives an interesting account of the germination of the seeds of *Megarrhiza Californica*, a plant which is used by the Indians in dropsy, and possesses cathartic properties. It seems that the seed coat opens towards the apex and a stout necklike body, similar to that of many monocotyledons, is protruded. This curves over and its apex swells into a tuber, the plumule or stem being developed from a niche in the neck or tigellum-like growth as in *Crinum*. The fleshy tuber is produced at the bottom of the pot in which the seed is sown; it forms fibres and when the requisite power to nourish the young plant is obtained this begins to be developed.*

In the *Scientific American*, Mr. W. Weaver, of Bogota, has advocated the introduction of cinchona cultivation in North California and Oregon, the mountains of which he considers eminently suitable for the experiment. The natives of the cinchona producing districts in South America, too, are at last waking up to the importance of replanting cinchonas, and, according to *New Remedies* (quoted from the *American Mail*), 150,000 trees have recently been planted in the states of Cundinamarca and Tolima and Santander.

Dr. Schroder, after investigating the effect of the smoke and fumes of chemical and metallurgical works, has arrived at the following conclusions:—The deleterious action of these fumes depends upon the acid gases, especially sulphurous and hydrochloric acids; the former turns the whole surface of the leaves brown, while the latter appears to principally attack the edges. Annual crops are less affected than trees. The walnut tree is the most sensitive; then follow the red beech, birch, lime, poplar, alder, ash and plane.

* See *Pharm. Journ.* [3], vol. vii., p. 393.

In a recent number of the *Pharm. Zeitung*, Dr. J. Biel, of St. Petersburg, calls attention to a false white quebracho bark which came to Hamburg. The first lot of white quebracho bark received in Hamburg was a very small quantity and the second lot consisted of three serons. Dr. Biel therefore supposes that what is being used in Germany at present is not the true drug, and therefore sounds this warning note, lest a drug which promises well should be unjustly condemned before it has had a fair trial. The false bark he describes as follows:—From the size of the finger to 2 inches broad, 2—5 millimetres thick, mostly in quills inrolled on both sides, and of different lengths, furnished with a yellowish white periderm presenting numerous deep longitudinal furrows and some transverse ones. The inner surface is dark brown with a fibrous fracture, the outer a horny fracture; the taste bitter but not aromatic. Viewed in transverse sections the outer layer consists of tabular cells disposed regularly in layers; the next portion of a spongy nature and nearly as thick as the outer, consisting of tangentially arranged thin-walled cells with numerous groups of stone cells, which latter form an easily seen uninterrupted ring as the inner limit of the outer layer. The middle layer or mesophlœum is composed of loose parenchyma cells partly filled with dark brown contents, and contains stone cells aggregated in groups of from 10 to 20; with these are mixed a few bundles of liber tissue. The inner bark or liber consists almost entirely of liber cells, traversed by medullary rays, whose cell-contents are of a dark colour.

At a meeting of the Obstetrical Society last month, Dr. J. W. Anderson, of Jamaica, read a paper "On an Infusion of Leaves of the Cotton Tree (*Gossypium Barbadense*) as a galactogogue." The use of the root-bark as a parturient has long been known in the United States, but the leaves of the castor oil plant, which are much more easily obtained in this country, are even better known as a valuable galactogogue than those of the cotton tree, and a new remedy of this kind seems scarcely needed unless it possesses advantages over those hitherto in use.

In the *Lancet*, Drs. Ringer and Murrell describe the effects of a remedy for neuralgia, which seems to be one of considerable promise. It has recently been introduced into this country by a gentleman residing in Fiji, who states that it has been used by the aborigines for several centuries, the secret of its preparation having been an heirloom in the family of a chief for two hundred years. One of the most remarkable circumstances connected with the remedy is that it does not produce toxic symptoms in large doses frequently repeated, neither the pupil, the secretions of the mouth and skin, nor the sensation of the skin supplied by the fifth nerve being affected by it. This drug, which is called Tongu, consists of a mixture of a hard fibrous bark, a fibrous root and a few fragments of leaves, neither of which appears to possess any marked taste.

It will be remembered that some months since *Xanthium spinosum* was brought forward as a remedy for hydrophobia but discarded on account of apparently possessing no sensible properties. This plant, however, according to Dr. Bancroft, has escaped from abandoned cotton plantations at Brisbane, and killed cattle which ate it. He states that the animals die with symptoms of pure debility, without convulsions, tetanus, or any excitement. The plant would seem therefore to deserve chemical investigation. He further states he has found the active principle of *Piper Novæ-Hollandiæ* to kill frogs with symptoms of a mixed narcotic and convulsive character.

Baron Mueller and L. Rummel describe, in the *Zeitschrift Oëst. Ap. Ver.*, a new glucoside obtained from *Gastrolobium bilobum*, an Australian plant, which possesses poisonous properties. It is called "gastrolobin," and is described as a blackish, brittle hygroscopic substance, with an odour and taste resembling that of sassafras, soluble in hot water and alcohol, and precipitated by a watery solution of acetate of lead. It is easily decomposed by mineral acids and partly by organic acids, and is soluble in ammonia with an intense yellow colour. It is not, however, as yet certain that the glucoside is the principle to which the poisonous properties of the plant are due. A poisonous principle has been found also in other species of this genus, and of the allied genera, *Oxylobium* and *Gompholobium*, and also in *Isotropis striata*, Benth.

Some papers lately read before the Berlin Chemical Society promise to be subversive of previously existing ideas respecting several of the solanaceous alkaloids. According to Herr Ladenberg, who recently succeeded in reforming atropine from tropine and tropic acid obtained from it by decomposition, hyoscyamine, daturine and duboisine are one and the same alkaloid, whilst atropine, if not also identical, appears to yield the same decomposition products, and can hardly be distinguished chemically from it. Herr Kraut also, has published some experiments which he thinks render it probable that belladonnine is an isomer with atropine, and he suggests, that it too may prove to be identical with hyoscyamine. Herr Ladenburg has further found that by the treatment with dilute hydrochloric acid of different salts of tropine, the base obtained by decomposing atropine or hyoscyamine with baryta, a class of alkaloids may be produced artificially, to which he has given the generic name of tropeines. One of these, obtained from the amygdalate of tropine, promises to be of therapeutic importance, it having powerful mydriatic properties, and being said to be preferable for use in some ophthalmic cases to atropine.

Dr. Purjesz, of Pesth, in the *Centralblatt für prakt. Augenheilkunde*, relates a case of poisoning by 2½ grains of sulphate of atropine which was entirely cured in three hours by the administration of a centigramme of muriate of pilocarpine every five or ten minutes until 16 centigrammes had been taken.

The deposit sometimes occurring in syrup of lactophosphate of lime has recently been examined by Professor Wayne (*Druggists' Circular*, March), who states that it consists of lactate of lime, resulting from the phosphate of lime at first dissolved in the lactic acid becoming subsequently decomposed by it. The syrup in this condition is therefore no longer a solution of phosphate of lime in lactic acid, but only a magma of lactate of lime with free phosphoric acid. This change, it is said, sometimes takes place quickly, and a similar one also occurs in syrup of lactophosphate of iron. It is not prevented by the addition of hydrochloric acid, but the lactate of lime or iron formed then remains in solution.

It has been found by Herr Tausch (*Chem. Zeitung*, March 4, p. 156) that commercial samples of hydrochlorate of morphia, when heated to 130° C., become brown under partial decomposition. Pure hydrochlorate of morphia, however, can be heated to that temperature without such change taking place. The decomposition and discoloration appear to be dependent upon the presence of resinous contaminations, and Herr Tausch concludes from his experiments that the commercial salt is almost always impure. Both the hydrochlorate of morphia and the free base lose their water of crystallization at 100° C.

A note in the *Chemical News*, by Mr. R. H. Ridout (Feb. 13, p. 73) on the products of the slow oxidation of phosphorus is not without an application to a common form of specialty terminology that reveals anything but the real nature of the preparation. Four or five years since a country practitioner having in consultation with a London specialist been recommended to use an injection of "ozonized water," unsuccesfully tried in various places to obtain a supply. Mr. Ridout being applied to, although aware of the general impression that ozone is insoluble in water, made an experiment by aspirating a current of air over moist phosphorus. An abundant evolution of an oxidizing body was thus produced, which was passed through caustic soda to free it from phosphorus vapour and then through recently distilled water; but after this action had been continued for six hours the water was found to contain not a trace of any oxidizing agent. After this evidence of the insolubility of ozone in water an application was made to the specialist for a sample, which proved to be a solution of potassium permanganate.

Dr. Vasowicz, in *La Ruche Pharmaceutique*, has detailed some experiments made with a view to ascertain the correctness of the statements of Dr. Jehn that oil of peppermint is coloured red by hydrate of chloral. He shows that in those cases in which the oil was of ascertained purity no coloration took place; in those in which it was not possible to ascertain the exact purity a yellowish coloration occurred.

The cupric pellets for testing sugar, suggested by Dr. Pavy, and referred to before (p. 604), have since been the subject of some correspondence in the *Chemical News*. Mr. Langbeck has pointed out that Schiff (*Annalen*, cxii., 369) has attained the same end by the mixture of a concentrated aqueous solution of sulphate of copper (250 parts) with a solution of tartarated soda (280 parts), well washing and drying the light blue salt that separates, and preserving it in small glass tubes protected from daylight. When required for use the salt is dissolved in a sufficiency of soda ley, sp. gr. 1·14, and if it has been properly prepared 3·686 grams of it is reduced by 0·5 gram of glucose. On the other hand Mr. Glassford remarks that the difficulty of preserving Fehling's solution is entirely overcome by keeping the cupric sulphate and alkaline tartrate in solution in different bottles and mixing when required.

Ammoniacal glycyrrhizin appears to be steadily making its way upon the continent. According to the *Journal de Pharmacie* the French Minister of War has just ordered its definite introduction into the military hospitals, where a preparation containing 4 decigrammes of glycyrrhizin in a litre of water is to take the place of the old *tisane de reglisse*.

A writer in the *Grocer* (February 21), calls attention to the presence in the market of a "spurious pearl tapioca," manufactured in Germany from potato starch. It is said to be a clever imitation, in size and colour, of tapioca from cassava, but differs from it in changing when boiled into a soft and pappy compound, without consistency.

The *Canadian Pharmaceutical Journal* recommends the trial of the "cold blast" for the purpose of drying herbs and drugs. Quartered apples thus preserved are said to be much superior, both in appearance and flavour, to those dried by heat or in the sun.

A writer in the *Boston Medical and Surgical Journal* points out that the distressing symptoms such as headache, impaired appetite and derangements of the stomach and liver, which sometimes follow the administration of tincture of chloride of iron, disappear when half a grain of chloride of ammonium is added to each minim of the tincture.

In the *Philadelphia Medical Times* Professor H. C. Wood recommends a simple but apparently very effectual remedy for hæmorrhoids. This consists in the injection of ½ to 1 ounce of a saturated solution of chlorate of potassium with a few drops of laudanum. This is only used as an adjunct to the usual systematic treatment, and of course under medical supervision, but the results obtained are stated to be surprising.

The *Allg. Hopfer Zeitung* points out that one of the best remedies for relieving the pain of burns and scalds is oil of peppermint, applied by a camel's hair pencil. It is said to give prompt relief and to lead to a rapid cure without scars. This accords with what is already known of the similar action of turpentine and creosote. Either of these agents should not be applied where the skin is destroyed, if the object be to relieve pain.

Dr. Lush, in the *British Medical Journal*, Nov. 22, 1879, gives the following lotion as almost, if not quite, a specific for the intense burning irritation which often attends chronic eczema of the palms, especially if the patient has a rheumatic tendency:—

Sodæ Bicarb.	ʒij.
Pot. Bicarb.	ʒj.
Glycerini	1·5 dr.
R. Opii	2 dr.
Aq.	18 dr.

M. Arloing, of Paris, has recently shown that formate of sodium lowers the temperature of the body in a marked manner and suggests that it might be employed in some cases where the salicylate of sodium is contra-indicated, the formate not congesting the kidneys nor modifying the temperature of the body so profoundly.

According to the *Gardeners' Chronicle* (February 14, p. 211) the value of camphor in Japan has considerably increased of late. Although the production is very large, it could easily be increased were proper means adopted, the method in practice at present being very wasteful, large tracts of country being denuded of valuable trees. The export of Japanese wax, however, continues to diminish, being now less than one-fourth the quantity taken in 1876. This is attributed partly to the introduction of kerosene oil, partly to the damage done to the trees during the civil war in the south of Japan, and partly to the fact that manufacturers in Europe are already abandoning its employment in favour of cheaper substitutes, so that the consumption is rapidly falling off.

M. Pasteur, whose name is inseparably connected with the history of the lower organisms, and who recently has been pushing his investigations in the direction of their physiological importance, has presented to the Academy of Sciences another important memoir that appears to throw light upon the nature and propagation of zymotic disease. (*Comptes Rendus*, vol. xc., p. 239.) This time he has taken for his subject the *choléra des poules*, a disease that is occasionally very disastrous in the poultry yard. He believes it to be produced by an extremely minute organism, having prodigious powers of multiplication in a suitable medium. In filtered yeast water, a medium favourable to the development of many microscopic organisms, it speedily dies; but in a broth of fowls' flesh it flourishes, and by successive minute impregnations of fresh quantities of such liquor, the organism was obtained by a species of cultivation free from contamination with other organisms. A few drops of this liquor on a piece of bread is said to be capable of setting up the disease and inducing almost invariably a fatal termination, the organisms entering the system by the intestinal canal, and multiplying enormously, while the excrements become charged with them and capable of setting up the disease in other fowls. Guinea pigs inoculated with the organism only suffer inconvenience from a local abscess, but the discharge from this abscess is fatal to fowls and rabbits. Although in its normal form this organism almost invariably produces death in fowls, M. Pasteur states that by a special treatment, the particulars of which for the present he keeps secret, it can be so modified that the disease produced by it is, as a rule, no longer fatal; whilst a bird that has once suffered from the modified form of the disease is only in rare cases susceptible to reinoculation even with the most virulent form of the organism. The apparent analogy of this phenomenon with that of cow pock and small pox is plausible, and M. Pasteur considers it to form a link between maladies known to have a living virus and those virulent maladies in which a living virus has not yet been detected.

Considerable interest has been awakened by Dr. Siemens's paper, recently read at the Royal Society, on the "Influence of Electric Light upon Vegetation." Horticulture will receive a new stimulus as the result of his experiments, and forced fruits and vegetables will probably be produced, not merely equal in size, but in flavour, to those grown in the summer months. At the last meeting of the Society specimens of strawberries grown partly under electric light showed an extraordinary advantage in point of size and colour over those grown without it. One of the conclusions arrived at by Dr. Siemens, to the effect that plants do not appear to require a period of rest during the twenty-four hours, but make increased and vigorous progress if subjected during daytime to sunlight and during the night to electric light, is a rather startling one, and suggests that further experiments are necessary to show whether such treatment would not ultimately destroy the vitality of the plants and render them entirely unfit for reproductive processes. Such a result seems to be the case with many vegetables, which by prolonged and forced cultivation have ceased to produce seed and in some cases flowers. It seems not improbable that the attacks of fungi in coffee plantations, in potatoes and other plants, may be due to the vitality of the plants being impaired by excessive demands on their vitality and that they are consequently unable to resist the onset of those parasitic diseases. The failure of the lavender crop during recent years is in all probability due partly to this cause, and partly to the fact of the matters removed from the soil by the plants not being always returned to it in the form of the dead leaves, as nature dictates. Although Dr. Siemens's results are more especially of value to horticulturists' yet the fact of the practical identity of solar and electric light as regards vegetation is particularly interesting from a pharmaceutical point of view. In this country where the intense light of tropical regions is otherwise unattainable, it will be possible to investigate in a scientific manner the influence of light in promoting the formation of the different alkaloids in the cinchona plants, the poppy, etc.

The revived interest in the subject of the artificial production of the diamond, provoked by Mr. Mactear's experiment, has been intensified by the communication made by Mr. Hannay to the Royal Society at its last meeting in February. Mr. Hannay, continuing his researches in respect to the solubility of solids in gases, recently referred to in these columns (*ante*, p. 504), made numerous experiments with different forms of carbon in vapours that he thought most probable to act as solvents, in the hope that from one of them the carbon might be redeposited in a crystalline form. These experiments, Mr. Hannay says, were unsuccessful, but it was noticed that when a gas containing carbon and hydrogen was heated under pressure in presence of certain metals its hydrogen was attracted by the metal and the carbon was set free. Ultimately the operation was conducted in the presence of a "stable nitrogen compound," and under these conditions Mr. Hannay says that "when the whole is near a red heat and under very high pressure the carbon is so acted upon by the nitrogen compound that it is obtained in the clear, transparent form of the diamond." At any rate, there seems to be no doubt that some minute crystalline fragments submitted with the paper as the product of such an operation were really identical with the natural diamond. The stable nitrogen compound used was not specified, but Professor Dewar pointed out the analogy between such a reaction and the production of graphite by heating a cyanide in caustic soda to a low red heat. These statements, so interesting to scientific men, are probably not altogether comfortable to diamond owners, but it will be somewhat reassuring to them to learn that the cost of producing diamonds artificially still far exceeds the market value of the product.

How to effect the dissociation of the "elements" —and especially of the metalloids—is a problem still occupying the attention of scientific men. According to *Nature* (March 11), M. Pictet, who two years since liquefied oxygen, starting with the fact that none of the metalloids, with the exception, perhaps, of oxygen, has yet been detected in the sun, infers that their absence is due to dissociation, and proposes to attempt to reproduce the conditions under which this takes place. This he would do by means of an enormous parabolic mirror, in the focus of which the sun's rays should be concentrated upon the metalloids which it is sought to decompose. Some of the data for working out this problem are known, and assuming that to dissociate bromine would require "a hundred times as much heat (at the temperature of its dissociation point) as water vapour requires (at its dissociation point) to split it up," M. Pictet calculates that a gram of bromine would need 350 calorics to resolve it into its elements, and that to dissociate one gram per minute would require that the solar rays should be concentrated by a mirror of at least 35 square metres of surface. At the focus would be a chamber or crucible of zircon or lime, or other refractory substance, into which the vapours to be operated upon would be led, and which to avoid loss of heat would be kept hot from without by oxyhydrogen flames. From this chamber the products of dissociation—if any—would be withdrawn by aspiration through metal tubes containing metallic gauze and cooled by refrigeration from without to $-50°$, a proceeding which it is supposed would hinder at least a considerable portion of the constituents from recombining.

The publication of the results of a series of experiments by Professor Krafts (*Comptes Rendus*, xc., 183) that appeared to be somewhat antagonistic to the important statements made by Professor V. Meyer last summer, with respect to the density of chlorine, has induced the latter chemist to communicate to the Berlin Chemical Society (*Berichte*, xiii., 394—408) a series of notes confirmatory and explanatory of Professor Kraft's experiments. It will be remembered that Meyer, working with chlorine obtained by decomposition of platinous chloride, found that when it was heated to 1567 C.° it underwent a diminution of density equal to one-third. Krafts, working with free chlorine, failed to obtain the same result, and it now appears that at any temperature at present used the change is limited to chlorine in the nascent state. Iodine behaves similarly to a certain extent, for at about 600° C. the vapour density corresponds to the formula I_2; at 800° it undergoes considerable diminution; and at from 1027° to 1567° C., it exactly and permanently corresponds to the formula $\frac{2}{3}I_2$. But it is curious that though pure iodine was used in these experiments there was no permanence in the normal vapour density corresponding to that experienced when free chlorine was used. Nevertheless there is the fact that the investigation of Deville and Troost of the boiling-point of zinc was carried out with an iodine thermometer and based upon the ascertained permanent vapour density of iodine at a temperature of 1040°. The explanatory hypothesis apparently favoured by Meyer is that iodine vapour produced under certain conditions may remain, as he found free chlorine to do, permanent in its density, and that perhaps those conditions may be induced by the way in which Deville and Troost operated, which differed in the iodine being gradually heated. Bromine appears to behave similarly to iodine, but great difficulty was met with in dealing with it in the free state in consequence of the explosive rapidity with which it vaporized at a yellow heat. In operating upon it in the nascent state, a new salt, platinum tetrabromide, $PtBr_4$, was used. It is well, in view of certain inferences that have been drawn from these experiments, to quote Professor Meyer's cautious description of the result as "the dissociation of the chlorine to molecules of the size of $\frac{2}{3}Cl_2$." He also remarks that the power chlorine has of existing at the same temperature both as Cl_2 and $\frac{2}{3}Cl_2$, according as free or nascent chlorine is operated on, is analogous to the case of oxygen and ozone.

Professor A. Sacchi has recently reported to the Royal Academy of Sciences at Naples the probable presence of a new metal in the lava ejected from Vesuvius in the year 1631. This metal he proposes to call "vesbium," after the ancient name for Vesuvius mentioned by Galen. It appears allied to vanadium and molybdenum, although not answering to the special tests for either of these metals. As the professor has as yet only 3 grams of vesbic acid, he makes no definite claim as to the existence of vesbium until he has obtained a sufficient quantity to insure purity of the salts and exactness of results.

The vacancy in the Pharmacy section of the French Academy of Medicine, caused by the death of M. Poggiale, was on the 3rd ult. filled up by the election of M. Jungfleisch. The other candidates were MM. Méhu, Baudrimont and Prunier.

If the argument that pharmacists should take a prominent part in the preparation of a national Pharmacopœia required an illustration it could be found in the admirable draft report on the Revision of the United States Pharmacopœia, just issued by the committee of pharmacists appointed by the American Pharmaceutical Association. It can be safely said that a report so valuable and practical from the pharmaceutical point of view as the one prepared by Mr. Rice, the chairman of this committee, could hardly have emanated from a committee of medical men. In France, too, where the Government has decided that the Codex shall be revised, the commission nominated to undertake the work includes several pharmacists, and, more than that, the commission itself has submitted to the Society of Pharmacy for consideration a list of the members of various sub-committees, many of them pharmacists, whom it proposes to entrust with divisions of the work.

Since the last appearance of the "Month" another veteran German pharmacist has passed away, in Dr. August Wiggers, Professor of Pharmacy in the University of Gottingen. The deceased was in his 77th year, and his jubilee was celebrated about two years since. From France, too, the death is reported of M. Baudrimont, Professor of Chemistry to the Faculty of Sciences, Bordeaux, at the age of seventy-four years.

That a considerable amount of responsibility rests upon dispensing chemists is evident from the character of some of the prescriptions which are sent to these columns.

The one No. 385 is a fair example of one class, where ol. sinapis sem. ʒvij is ordered in a two ounce liniment, and the difficulty is further increased by the fact that the writer of the prescription, when applied to by the dispenser, failed to explain what it really was he did mean. The particular oil which should be used, therefore, was left to the discretion of the chemist, whose first duty would be to protect the patient from injury, and in the next place to protect himself from censure.

Referring to the only oil of mustard in the B.P., Mr. Talbot will see that the sole officinal preparation in which it is ordered, is the lin. sinap. comp., where the proportion is 1 vol. in 41. Presuming that the ol. sinap., B.P., was intended, it may safely be assumed that the writer was not aware of the character of the article ordered; it would, therefore, be safer to use the expressed oil, which generally has a little pungency, and is said to possess some value as an external application in rheumatism. The presence of the spirit would indicate that the volatile oil was intended, but the proportion of this is unusual, and as it possesses such powerful vesicating properties, to dispense the liniment with the volatile oil would be very injudicious, unless under special circumstances which are not, in this instance, indicated by the prescriber.

It will be seen on referring to the lists of some wholesale houses that there is an ol. sinap. express., as well as an ol. sinap. ess., and probably the writer of the prescription is better acquainted with the contents of the wholesale price lists than he may be with his Pharmacopœia.

The query No. 386, with regard to zinci oleas has been very correctly answered by Mr. Baldock, and nothing further than a reference to his remarks need be said with regard to this question. In Mr. Baldock's answer the name has been inadvertently printed oleate of lime. Oleate of zinc when properly made is usually of the character of a stiff ointment whose consistence varies with the percentage of zinc

"Dubius" asks, No. 387, with regard to infusion of buchu, "Should the remainder of the leaves, after decantation, be pressed to obtain the mucilage, or should the liquid merely be allowed to run from the leaves without pressure?" The directions of the Pharmacopœia on this point are very clear, "Infuse in a covered vessel for one hour and strain." The infusions of the Pharmacopœia are directed to be made in covered vessels for different periods of time, and when the full time has elapsed the infusion should be strained from the dregs; but in no case should the dregs be pressed, neither in any case should any of the infusion be poured off for use previously to the straining of the whole. The instructions are concise, but clear.

When tr. nuc. vom. and acid. nit. mur. dil. are mixed together in relative proportions something like No. 388, there is at once turbidity, resulting from some of the resin of the nux vomica being thrown out of solution. In an hour or so it becomes darker and loses a little of its opacity; afterwards there is a separation of the resin as a flocculent matter; this is followed by chemical action with slight disengagement of gas, and the formation, judging from the smell, probably of nitric ether. Again, in a day or two, the mixture assumes a colour very like the original, the flocculent matter aggregating into particles and floating in the liquid. These successive changes probably result in the formation of nitric ether, and the re-solution of some of the separated resin after all action has ceased. This combination of medicines in so concentrated a state is unsuitable for prescriptions; the presence of gas formed by the combination may result in the bursting of the bottle, and the dispenser does good service by pointing out the chemical incompatibility involved.

The ingredients of prescription No. 389 may be well combined by the use of glycerine of tragacanth as an excipient. It has on previous occasions been recommended as very suitable, and perhaps one of the best, for a mixture of aloes with sulphate of iron in a pill mass.

In using glycerine of tragacanth as an excipient great care should be taken to use only just sufficient, with a good deal of manipulation; an excess tends to make the pills very soft, from which they cannot afterwards be recovered.

The writer of prescription No. 390 orders liq. quinæ ammon. gr. iv. ad ʒj; this is four times the strength of tr. quinæ am., B.P., for which preparation it may be presumed the liquor was intended. The proportion of quinine is not held in solution in the relative proportions of liq. ammon. and proof spirit ordered in the B.P. The excess, therefore, of quinine may be rubbed to a powder and suspended by mucilage, and more especially is mucilage needed in this combination as the ammonia neutralizing the hydrochloric acid used to dissolve the strychnia will throw that active ingredient out of solution, and if not suspended by means of mucilage, or some such agent, the whole may be taken in the last dose of the mixture.

The change mentioned by W. Symons in No. 391 as occurring in a mixture of mag. sulph. with mag. carb. pond. etc., has not been observed, and, therefore, cannot now be explained. As some time seems necessary to produce the effect, it may, on a future occasion be adverted to in these columns.

It is sometimes difficult for a dispenser to know what the writer of the prescription intends. He can only gather his intention from what he writes, and his mode of writing it. In No. 392, the prescriber directs glycerol. plumbi diacet. ℥ij, to be applied to the parts as directed every night and morning. With regard to the sodæ biborac. ℥ij which follows, he may have given private instructions to the patient how to deal with that substance, but in the absence of knowledge beyond that given in the writing, there is only one course open to the chemist, that is to send the sodæ bibor. separately. Many dispensers are so favourably placed that they experience no difficulty with regard to what physicians mean, and, therefore, dispense their prescriptions with a previous knowledge of their intentions; but without any such previous knowledge the dispenser has no other course before him but to send out the two separately. The prescriber may very probably say that the dispenser should have mixed them, as he intended them to have been mixed; but had they been mixed in the presence of these directions, he may with much greater force have said, that he did not intend them to be mixed, and wrote his prescription accordingly. Mr. Baldock's view may be the correct one, that the sodæ bibor. with the glycerole should have been sent out of the consistence of an ointment, but there is ample room for doubt, and it was to discuss such doubtful questions as this now before us, that called the Dispensing Memoranda into existence, and as long as prescriptions such as these create a reasonable doubt in the mind of the dispenser, so long will these pages continue to supply a want to many of our less favoured brethren in pharmacy.

The mixture No. 393 contains dec. senegæ, and the question is, should dec. senegæ, P.L., be used or the inf. senegæ, B.P.? As there is no dec. senegæ in the B.P., it may be assumed that the writer of the prescription means the decoction of the London Pharmacopœia, which would be the proper preparation to use.

The pills, No. 394, may be made into a mass with conf. rosæ can., using as small a quantity as possible to make the pills of a suitable consistence. It is impossible to say what size the pills should be, much would depend on the manipulation of the dispenser.

In the prescription, No. 395, there is no decomposition apparent, either by separation or precipitation, if dispensed in the following manner:—The citrate of lithia should be dissolved in half the fluid, and the dissolved quinine added to the other half, and then mixed; the result will be an opaque mixture, mainly if not wholly due to the tincture of orange peel.

In answer to "Minor," No. 396, if pills be of firm consistence they may be silvered without difficulty by first moistening their surfaces with mucilage and then shaking them in a gallipot with silver leaf.

In No. 397 C. J. B. requires an excipient for camphor pills. This subject has been referred to on a former occasion, and will be found on p. 166, vol. ix., series 3 of this Journal. Castor oil has been recommended for this purpose, and glycerine of tragacanth is a very suitable excipient.

"Junior," in No. 398, gives a prescription which has been dispensed and sent out clear; there results from a mixture of these ingredients a reddish precipitate of phosphate of iron from the ammonio citrate. The precipitate is redissolved in a considerable excess of sulphuric acid, but that is not admissible. It is one of those incompatibilities which should, when possible, be brought under the notice of the prescriber.

WHAT IS MATTER?*

BY C. G. KNOTT, SC.D. EDINBURGH UNIVERSITY.

Matter and energy are the two recognized existences in the physical universe. The latter is the active principle, being that in virtue of which change is possible; the former is to be regarded as being purely passive, merely the vehicle by means of which energy works and through which its workings are evident. And yet, so far distinct as they are, it seems barely possible to separate them even in thought. Matter without energy may be imagined, but can never be realized; and it is doubtful whether energy without matter of some form can even be conceived. We know of matter only by means of transformations of energy; we recognize energy only through its affections of matter. Hence, in discussing the ultimate nature of matter and the experimental grounds for any belief regarding it, we shall find it impossible to escape from the consideration of energy; indeed, we shall ere long find that one of the most ingenious modern theories concerning the structure of atoms makes matter, *as we know it*, a form of energy. Our many sensations so impress us with a belief in the existence of matter, that it is not surprising that speculation as to its ultimate nature should have been rife from the very beginnings of philosophic thought. By experience, and by experience alone, can we obtain that knowledge of the various properties of matter which is indispensable to the formation of a truly philosophical theory; so that the true order of inquiry is first to become acquainted with these properties and then discuss their bearing severally and together upon the great question, what is matter? Now, it is evident that many properties of matter are dependent upon the peculiar circumstances in which the portion of matter under consideration is placed. Thus iron, which is tolerably hard under ordinary temperatures becomes soft and plastic at a white heat; glass, which is ordinarily thought of as being rigid, inflexible and brittle, may be made to assume the form of delicate elastic threads or fibres; and gold, which is usually opaque, may be obtained so thin as to be transparent. Such characteristics are not persistent; indeed, the only properties of matter which seem to be persistent are gravitation and indestructibility, and of these, gravitation should perhaps be regarded as being not a property of matter, but an affection of matter imposed upon it by energy conditions. Still, from the non-persistent properties of matter much is to be learned. The changes above specified lead at once to the consideration of internal structure, and so to the wide question concerning the ultimate nature of matter. At the very outset, there are two rival theories, the one of which regards matter

* Abstract of a Lecture delivered before the North British Branch of the Pharmaceutical Society, February 26, 1880.

as being ultimately coarse grained, while the other maintains that matter is continuous though heterogeneous. In other words, is matter indefinitely divisible, or, if the division could be performed far enough, should we at length come to a point beyond which we could not go,—in fine, should we reach the atom? The latter was the view taken by Epicurus, Lucretius, and the early atomists: and in some form or other, the atomic theory has been held by the great majority of scientific men down to our own day. By both physics and chemistry we have been led to the hypothesis of the molecular or "particular" structure of matter; and further than the molecule we have not as yet been able to penetrate except in thought, though the presumption is that a molecule has an atomic structure. Let us then glance at a few of the arguments furnished us from the domain of molecular physics.

All matter, as we know it, must exist in the solid, liquid or gaseous condition. Consider, then, a block of solid marble. We may divide it into two, then the one half into two smaller fragments, and so on, but not indefinitely. Marble is not a homogeneous structure, and at length we obtain two fragments which have no resemblance to each other and which are neither of them marble. We have reached the limit of divisibility of marble, though not of matter. We thus pass from huge blocks to finest dust, and we may, in imagination at least, reverse the process and reconstruct or build up a solid mass from the most impalpable powder. This latter process is carried on in nature on an extensive scale, and in the formation of crystals we find an interesting argument in favour of the molecular structure of matter. The symmetrical pyramidal form of a pile of equal spherical balls is very similar to some of the forms assumed by natural crystals, and the inference is that these have been constructed in a somewhat analogous manner, namely, by the aggregation of the molecules which make up the crystal and which in virtue of the action of their molecular forces assume a stable configuration. This implies the similarity of the molecules of a given portion of homogeneous matter. Passing to the consideration of liquids, we meet with many striking illustrations. For example, comparing water and mercury, we know by experiment that water is not indefinitely divisible, but of mercury we are not so sure. Water in fact is coarse-grained, a molecule of water having the same relation to an average-sized drop that a good-sized plum has to the earth. At a certain point in our subdivision of water we get as far as we can go, further sub-division being a decomposition of the water molecule into its component molecules of hydrogen and oxygen. This decomposition is most easily effected by means of a strong electric current, whose energy is employed in pulling apart the components of the water molecule. By collecting and mixing the gases so evolved, we may by heating the mixture recover this energy in the sound and heat of an explosion. Electrolysis, indeed, furnishes endless examples, and gives a means for estimating the sizes of molecules. The effect of heat upon a solid is in general to make it expand and rise in temperature, and at length transform it into a liquid, which in its turn goes through an analogous succession of changes till it is finally made to assume a gaseous form. According to the molecular theory of matter, the molecules of a gas are perfectly free from each other and move about in all directions with considerable velocities. They are constantly coming into collision with each other and impinging upon the walls of the vessel which contains them. In these impacts we find a sufficient explanation of the phenomenon of fluid pressure; and, with the assumption that heat has the effect of increasing the average velocity of the moving molecules, we are able to deduce at once the well-known laws connecting the pressure volume and temperature of a gas. The assumption regarding the effect of heat is one which receives countenance from other phenomena. Thus a liquid is believed to differ from a gas only in the much smaller velocities of its component molecules which are in closer proximity; while in a solid the molecules are so closely wedged together as to admit of no translatory motion at all. Vibratory motion in each individual molecule is of course still possible, and to it the effects due to temperature are referred. Upon this hypothesis, then, the gradual transition from solid through liquid to gas by the agency of heat receives a simple and beautiful explanation; while the laws of Boyle and Charles, and the principles established experimentally by Graham, which regulate the diffusion of gases and liquids, are direct physical consequences of the so-called kinetic theory of gases. In spectrum analysis we discover evidence that a free molecule has definite fundamental modes of vibration, which give definite wave-lengths of light, exactly as a tuning fork gives a musical note of a definite pitch; that the molecules of different kinds of matter have different periods of vibration, and may thus be distinguished by their characteristic rays; and that heat is the great agent in starting and sustaining these vibrations. Molecules then must be of a structure which is physically capable of vibrating; but what of the atom in this respect? It is quite clear that the hard incompressible sphere of the early atomists could never vibrate; but, apart from this, such an atom in its very nature is inconceivable. An atom which owed its indivisibility to its hardness would require to be infinitely hard so as to resist any force, however great. To Sir William Thomson, however, we are indebted for the conception of an atom, which has the property of indivisibility without the inconceivable property of infinite hardness, and has in addition the power of vibrating. This atom is the *vortex-atom.* A vortex is produced when any portion of a fluid is set rotating round an axis, as, for example, in eddies, whirlpools, waterspouts, whirlwinds, and cyclones and storms generally. Professor Helmholtz, of Berlin, proved more than twenty years ago that if, in a frictionless fluid, a vortex-filament, *i.e.*, a column rotating round an instantaneous axis, exists, it must either return into itself so as to form a *vortex-ring*, or extend through the fluid till it reaches the bounding surface, and also that where such vortex motion does exist it must always exist, and where it does not exist it never can by physical means be made to exist. It is upon this indestructibility of vortex motion that Sir W. Thomson has based his theory of the vortex-atom, which is simply a vortex column returning into itself after it may be several knottings. The simple vortex-ring is frequently formed by the smoke emanating from a funnel or a cannon's mouth, and may be very simply produced, as was done first by Professor Tait of Edinburgh, by projecting smoke-rings from a hole in one side of a box filled with sal-ammoniac by impacts on the cloth or india-rubber sheeting which forms the opposite side. In this case we can form vortex-rings because the fluid we are dealing with is *not* a frictionless fluid. By such an apparatus curious properties of vortex-rings may be demonstrated, such as their rebounding after collision like elastic solids, their spreading out indefinitely as they approach a plane surface, and the tendency which the foremost of two rings has to expand and slacken speed, and permit its contracting and accelerated successor to shoot through it. According to Thomson, then, an atom is a vortex-ring existing in a homogeneous frictionless continuous fluid filling space—an atom which must therefore exist always, and cannot be cut, cannot even be got at to be cut; hence matter, as we know it, is simply a form of energy, being a rotatory condition of a finer, more ethereal, but still material substratum. The authors of the 'Unseen Universe' have speculated upon the possibility of this homogeneous matrix of matter being after all not quite frictionless, so that, finally, in accordance with the doctrine of dissipation of energy, our material universe—

"Shall dissolve;
And, like the baseless fabric of [a] vision,
Leave not a wrack behind."

The Pharmaceutical Journal.

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INDIAN DRUGS.

SOME observations on Indian drugs made at a recent Evening Meeting of the Society by Dr. M. C. COOKE were of sufficient importance to justify a further expansion in the pages of this Journal of the views then propounded. Unfortunately there is a habit of alluding to *Indian* drugs and other products in so vague a manner as to lead to the impression that only a small district, or a few neighbouring ports, constitute the locality from whence the products are derived, instead of that immense variety of states, climates and peoples, included in the term British India.

At all exhibitions where the products of India have been represented, it has been abundantly evident that even the same substance varies extensively, according to the different districts from whence it is sent. It is under such circumstances most instructive to compare the productions of different localities the one with the other. Confining ourselves to drugs, we would note the drugs of Bombay, Madras, Calcutta, Lahore, and also of the independent states, as each having a special interest of its own, which cannot but enforce the conclusion that an important feature in connection with Indian drugs is the *locality* from whence they are derived, a feature which should never be forgotten when attaching labels to a collection of drugs from India. The following seem to be some of the aspects in which this question of locality may be viewed. Primarily, the source of the principal imports. Many drugs in extensive use in India are not products of any part of the country, but are imports, such as asafœtida, olibanum, much of the senna, etc. If the locality whence a drug has been obtained in India is always associated with it, there will be less difficulty in conjecturing and ultimately tracing its source. One of the most important centres is Bombay. A great number of drugs are met with commonly in Bombay which are rare or unknown in Calcutta or Lahore. The most of these are imports from Aden.

Moreover, the trade between Bombay and Aden, as well as Zanzibar and other African districts, must not be lost sight of in the examination of a collection of Bombay drugs. Take olibanum, for example; that met with in collections of drugs from other parts of India is universally dark, dirty, broken, poor, and small in quantity, whilst from Bombay the finest tears ever met with in commerce may be obtained. The Arabian origin of many of the Bombay drugs is also a circumstance which cannot be overlooked.

There is another element which adds an interest to Bombay drugs, and that is the intimate political relationship which for a long time subsisted between Bombay and Sind. It is not unnatural to expect to find Sind drugs in Bombay, and such products as mastic, googul (or bdellium), boojkund (the galls of *Pistacia*), and others, will be recognized in every collection. There is yet another advantage possessed by most of the collections of Bombay drugs which have come under our notice, that the native names which accompany them are to a very large extent Arabic or Persian. It may seem useless, at first sight, to retain the native name in a collection of drugs in this country; but a little reflection will show that such is not the case.

Drugs from India have an interest historically, and by retaining even the modern Arabic and Persian names we link the articles themselves with old authors; they become commentaries on the 'Ulfaz Udwiyeh,' and through a Persian channel communicate with the Greeks. It is through a knowledge of drugs from India and Persia, with their Arabic and Persian names, that we are most likely to acquire an accurate knowledge of Dioscorides and Theophrastus.

In Madras the interference with native produce is very limited; there are no great channels of communication and no foreign imports of importance; hence the Madras drugs are chiefly native, except in the case of such imports as are common throughout India. Instead of imported senna, as at Bombay, we meet with the growth of Southern India. We look in vain for the Koraraima cardamom, with its hole through the centre, but Mysore cardamoms are plentiful. We have the lesser galangal, as we have it also in Calcutta, but not alone the product of a single species of *Alpinia*, but of two or three native species. Thus, without instituting comparisons, we may affirm that Madras drugs have an individuality, an importance of their own, which renders it advisable to study them as Madras drugs, and not merely as illustrations of the Pharmacopœia of India. The native names attached to products from this locality are chiefly Tamil and Telugu, the preservation of which is by no means of equal moment to the preservation of Arabic names. Possibly they may be forgotten with advantage.

From Calcutta the drug collections are unfortunately less valuable to the student than those from Bombay or Madras. Commerce at Calcutta concentrates and radiates in a puzzling manner. One can never estimate the probabilities as to whence any given substance may be derived. The aloeswood, for instance, may have come down from Nepal, or it may have come through the Tenasserim provinces, or it may have come round by sea from Malacca. Then again we cannot deny the fact, whatever may be its cause, that Calcutta drugs are inferior in quality to those from the other Presidencies. Whether the fault lies with the collectors, or whether there is a general inferiority in the markets, we cannot tell, but the constant recurrence of the same circumstance tends to the conclusion that it is not the collectors' fault. Very few, if any, of the drugs derived from Calcutta are not obtainable also from Madras or Bombay, if we except those from eastwards of Calcutta. At present Burma, Chittagong, Tenasserim, and the Malay Peninsula contribute but little to the drugs of that city. The wood-oils and cardamom seeds (*Amomum xanthoides*) being amongst the rare exceptions. This may not always be the case, when British Burma is more developed. Still the drugs of Bengal possess interest with the pharmacologist in the fact that they are not identical in quality with those of other Presidencies. Some may possess superior quality, and others,—feculas, for example,—may be derived from a different botanical source. The native names in Hindustani, or Bengali, if not in themselves so desirable as Arabic or Persian names, possess this value, that when a drug with a known Arabic name is once identified with one having a Hindustani name the very wide area over which Hindustani is known would enable us to obtain information concerning it, under its Hindustani name, from nearly any part of India.

It is not with any intention of depreciating one Presidency at the expense of another, that these observations are made; but for the purpose of showing that the pharmacologist who really desires to make acquaintance with the drugs of India must not be content with seeing and knowing such drugs only as are derived from one centre, but should endeavour to see and compare them with those of all the important centres, notably from the three Presidencies and from the north-west.

This leads us to allude to Lahore as another important place, to be taken into account in obtaining a knowledge of Indian drugs. One of the highways to India is through the passes in the north-west. Hence it is not too much to expect that a collection of drugs from Lahore should contain imports from Cabul, Candahar, Herat and Persia, as well as from Cashmere, Bokhara and Thibet. We have seen drugs from Lahore of a most interesting kind, never sent to Europe from any other locality in India. Here we come into contact with another current of imports, quite distinct from that which flows into Bombay, not to mention the indigenous products of the Punjab and the Himalayas. Here, again, we are glad to recognize Arabic and Persian names predominating, as at Bombay.

As an illustration, by the way, we would allude to "salep," which has a great value in India, although it has little in this country. More or less, salep is known and appreciated throughout India, but even the casual observer would at once recognize a great difference in the drug as derived from places widely separated from each other. It may be affirmed thst there are at least six distinct varieties of salep, and yet we are unable with certainty to refer any one of them to its botanical source. It is by no means improbable that several species of orchidaceous plants may be collected in any given locality as salep, and yet, without picking or sorting, certain of these saleps have an individual character. Whence do they come? The question would require a different answer according to the locality in which it was propounded. At Lahore, the presumption would be in favour of the Himalayas, at Madras it would revert to the Nilghiris, at Calcutta it would be difficult to answer, and at Bombay the mind would at once concern itself with the imports. The Turks and Persians also know and appreciate salep. Does it travel down the Persian Gulf to Bassora, with the blue galls, or Aleppo galls as they are termed, or down the Red Sea to Aden, and thence to Bombay? This example must yield some force to our suggestion as to the importance of taking the locality into consideration in connection with products obtained from such an immense expanse of country as British India.

THE MEDICAL REGISTRAR.

The Medical Register for 1880, which has just been issued gives fresh evidence of the zeal and activity of the present Registrar to the Medical Council. During 1879 there were 551 names removed that were improperly on the Medical Register, and as there were 654 similarly removed in 1878, it would seem that careful supervision did not come before it was wanted. The number of names added by registration during 1879 was 996, and the number of deaths reported was 548. The total number included in the Medical Register for 1880 is 22,516.

REGISTRATION OF FIRMS.

In a Bill that was introduced into the recent House of Commons by Mr. Sampson Lloyd, having for its object the consolidation of the existing law of partnerships and the introduction of a system of limited partnerships corresponding to the Continental *Société en commandité*, there is a provision for the registration of firms which, if passed, might prove to be a considerable assistance in carrying out the Pharmacy Act. It provides that every limited partnership or firm carrying on business in England or Ireland under a "firm name" which does not consist of the full usual names of all the partners, and every person carrying on business under a "firm name" consisting of or containing any name or addition other than the full usual names of that person, shall be registered. The registration is to include the "firm name," the nature of the business, the place or places of business, and the full name, usual residence, and other occupation, if any, of the person or persons carrying on the business.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH.

The fifth evening meeting of the session was held in the Society's rooms, 119A, George Street, Edinburgh, on Wednesday, March 10, Mr. J. B. Stephenson in the chair.

A paper on "Dialysed Iron: its manufacture and value," was read by William Inglis Clark, Sc.D., Edinburgh, which he illustrated by experiments and diagrams.

DIALYSED IRON.

BY W. INGLIS CLARK, D.SC., ETC.,
Pharmaceutical Chemist.

In selecting the subject of dialysed iron for this evening, I was influenced by the consideration that no paper bearing on its manufacture or possible value had been presented to this branch of the Society, while my own experiments might assist in the scientific development of the question of its value as a remedial agent, and at the same time prove interesting to the younger members who attend these meetings.

A glance at the Year-Books of Pharmacy will show that the manufacture of dialysed iron has received attention from many observers, and that only a moderate amount of care is necessary, in order to produce a satisfactory article; but I do not suppose that many of those here present will have found time or occasion to practise the various published processes, and I may be, therefore, excused if I tread on what may be, to some, old and familiar ground, and recapitulate the various methods of manufacture.

What is Dialysed Iron?—It is a very basic oxychloride of iron prepared by the process of dialysis. This certainly does not agree with published statements which represent it as a solution of pure peroxide of iron in the colloid form; but, as I can readily show you, the purest forms of this preparation contain notable quantities of chlorine. It is only necessary to precipitate with ammonia, filter and neutralize with nitric acid, when the chlorine can be at once tested for by argentic nitrate.

The salts of iron are distinguished for their tendency to become basic, that is to form salts in which more or less oxide is united to or dissolved in a normal salt, and those who have manufactured liq. ferri perchlor., B.P., and the tincture from it will know how difficult it is to prevent the production of the oxychlorides or basic chlorides of iron. Indeed, the darkening of tr. ferri perchlor. is owing to this cause, the ferric chloride suffering decomposition, part of the hydrochloric acid being acted on by alcohol to form various chlorinated substances, along with aldehyde, and the oxide thus set free dissolving in the remainder of the ferric chloride to form a dark red oxychloride. Should this action proceed too far, eventually a very basic insoluble chloride or even hydrate is deposited and the tincture becomes colourless. We have in this case a natural formation of a basic iron salt, such as is aimed at in the preparation of dialysed iron, and it will be noticed that the ferruginous taste of the tincture will have perceptibly diminished, in proportion as the hydrochloric acid has been appropriated by the alcohol and the ratio of the oxide to ferric chloride has increased.

Preparation.—It has been long known that by dissolving freshly precipitated ferric hydrate in ferric chloride, a very basic solution is obtained, and that with patience and care the resulting salt might be approximately represented by the formula $Fe_2Cl_6 23Fe_2O_3$, while Graham showed that by dialysing such a solution he could obtain a liquid the composition of which indicated the formula $Fe_2Cl_6 95Fe_2O_3$. Dialysed iron, viewed apart from its method of manufacture, may be regarded as a solution of a very large amount of ferric oxide in a very small amount of ferric chloride, and if it were possible, by simple addition of ferric hydrate to the chloride, to approximate to Graham's figures, the resulting liquor would be identical with dialysed iron. The difficulty which meets us in such a simple method of manufacture lies in the presence of ammonium chloride, which prevents the solution of the oxide after a certain limit is reached. The source of this is the action of a minute trace of ammonia, present in the precipitated hydrate, on the hydrochloric acid of the ferric chloride. I have obtained a very soluble form of hydrate by the precipitation of dialysed iron with ordinary town water. This is soluble in pure distilled water, and very readily in a trace of ferric chloride, but it must be regarded as being a basic chloride and not a pure hydrate.

In an able article, by Emil Scheffer (*Pharm. Journ., Amer.*, 1878, p. 79), on dialysed iron, the nature of the ferric hydrates obtained under different circumstances is discussed. He showed that there were three stages in the preparation of ferric chloride by ammonia, and that the composition and physical properties of the precipitates varied therewith. I must refer you to the paper itself, but I shall briefly touch on the points above mentioned.

On adding ammonia to a solution of ferric chloride the first effect is to throw down a precipitate, which, if time be allowed, will dissolve again, but on further addition a point is reached when all the iron has been precipitated and the supernatant liquid is *acid.* More ammonia may be added till the liquid is *neutral*, and any further addition will make it *alkaline.* On examining the precipitates at these three points, we find that those obtained from the acid or neutral liquids are basic chlorides, and are soluble in pure distilled water, after being well washed, but that that from the alkaline liquid is a hydrate containing ammonia, and is insoluble in pure water. As the neutral point is reached the solubility of the precipitate rapidly diminishes, showing that the presence of ferric chloride is essential to solution. I have verified all Mr. Scheffer's results, and place before you a solution of a precipitate obtained from an almost neutral solution. This was carefully washed upon a vacuum filter for nearly a week, transferred to this bottle along with some distilled water, and after some weeks began to dissolve. Now, after twelve months, it is not entirely dissolved, but you will perceive that it is absolutely free from ferruginous taste, and would pass as a typical specimen of dialysed iron. For some time I thought that this process would be practicable for manufacturing purposes, but the difficulty in adjusting the amount of ammonia to be added, in washing away the ammonium chloride, and finally in dissolving the highly basic chloride, relegated this to the interesting but impracticable methods.

In practice, dialysed iron is always prepared from liq. ferri perchlor., B.P., and I shall, with your permission, discuss this process at some length.

Dialysis of Simple Liquor.—In *Pharm. Journ.*, September, 1878, we read, referring to perchloride of iron, "Lot B. shows that an ordinary acid solution of iron simply undergoes diffusion without decomposition, when put to dialyse." Seemingly then it is impossible to make dialysed iron by simple dialysis of liq. ferri perchlor., but this is by no means borne out by my experiments. A sample of liquor was analysed for use. It contained in 10 c.c. chlorine 3·9227 grams, and Fe_2O_3 2·82 grams, showing an excess of chlorine equivalent to HCl ·1781 gram. It was therefore a solution of ferric chloride with slight excess of acid, and was an ordinary commercial sample. For a dialyser, in experimental work, I alway use a bell jar with parchment tied over the mouth, the whole being suspended so that the parchment is about $\frac{1}{8}$ inch below the surface of distilled water. In this I placed 10 c.c. of the liquor previously diluted with water to 50 c.c., and after complete dialysis, I found that 1·85 gram or 65·6 per cent. of Fe_2O_3 had passed through the septum, leaving 34·4 per cent. which had not diffused. Thinking that dilution might cause dissociation in the dialyser, I started a second experiment, using 10 c.c. undiluted in it. Dialysis gave 1·817 gram Fe_2O_3 = 64·4 per cent., showing plainly that dilution was not the cause of the decomposition. In order that the liquor might be strongly acid, I now added to 10 c.c. of it 5 c.c. ac. hydrochlor., B.P., and found the loss to be 2·015 grams, Fe_2O_3 = 71·46 per cent. By boiling the liquor with an equal volume of hydrochloric acid, the loss was 70·5 per cent., and after varying the amounts of free acid I find the loss to vary from 63 per cent. to 81 per cent., but in no case to exceed the latter figure.

In order to reconcile these results with the published ones before referred to, I thought it possible that my liquor had been over heated in preparation, and rendered basic, a consideration which was, however, hardly possible since, as we have seen, it contained excess of acid. To decide this point, I prepared a solution of ferric chloride, oxidizing the ferrous salt by means of potassium chlorate, so as to avoid the use of nitric acid, and slowly, and at a low temperature, evaporating to the required B.P. strength. On dialysing this, 90 per cent. of the iron passed through, leaving dialysed iron inside. In order to determine the effect of further evaporation on this sample, I reduced it to half its bulk, making it up to its original volume with water, and on now dialysing only 68·9 per cent. of iron diffused. From this we see, as might have been expected, that if there be a deficiency of acid the loss of iron is much reduced.

I next took crystallized ferric chloride, obtained in nodular masses from a concentrated liquor, heated it in a flask with receiver, and obtained first a distillate of hydrochloric acid, water, free chlorine and ferric chloride, and subsequently scales of ferric chloride apparently contaminated with oxide. The first distillate on being placed in a dialyser passed entirely through; but the scales dissolved in water, and immediately filtered from a trace of oxide which had mechanically passed over, on dialysis suffered decomposition and only partly diffused. A sample of neutral ferric chloride, obtained by passing chlorine over metallic iron, on being placed in a dialyser, passed through to a large extent; but towards the end of the process precipitation took place inside the dialyser, and the remaining liquid was colourless.

From all these experiments we learn—

a. That ferric chloride may under some circumstances diffuse without partial decomposition.

b. That ordinary acid solutions, such as liq. ferri perchlor., B.P., invariably decompose when placed in a dialyser, and that the amount of decomposition is increased by deficiency of hydrochloric acid or evaporation, while it is but slightly diminished and not prevented by large excess of hydrochloric acid.

In order to examine this decomposition, I placed 10 c.c. of the same liq. ferri perchlor. fort. in the dialyser, and analysed the diffusate after various periods of time. The following table indicates the results, and shows that throughout the whole period of the experiment the salt which diffused away was more acid than ferric chloride, and was never more basic than that with which I started. This is the more interesting as Professor Redwood has since shown that when ammonio-citrate of iron is dialysed, the salt which passes through becomes more basic than that which was originally placed in the dialyser.

Table showing composition of diffusate from 10 c.c. liq. ferri perchlor. f. containing:—

Fe_2O_3 = 2·820 grams.
Cl = 3·922 „

	Fe_2O_3.	Cl.
Diffusate in ½ hour . .	·380	·7685
„ ½ „ . .	·341	·5528
„ ½ „ . .	·247	·4207
„ 2 „ . .	·597	·9318
„ 18 „ . .	·625	1·0401
„ 24 „ . .	·072	·1056
35½	2·262	3·8194

From the table, by calculation, it can be seen that the ratio of acid to base was much higher during the first half-hour than at any subsequent time, but that throughout it was always greater than that required by the formula Fe_2Cl_6.

Dialysis of Partly Neutralized Liquor.—We can now see that for the profitable production of dialysed iron, some means of preventing the loss of so much iron by diffusion must be adopted, and such is the addition of an alkali or an alkaline carbonate. Some recommend sodium carbonate on account of the rapid diffusive power of the sodium chloride which is formed; but I find ammonia more convenient, and the increase of time in the manufacture is insignificant. In using ammonia two methods may be employed. We have seen that ferric oxide is soluble in ferric chloride, and in practice I find that 1 part of B.P. liquor will dissolve the oxide from at least 6 parts, so that we may either take 6 parts of liquor, dilute with water, precipitate with ammonia, wash and dissolve in 1 part of the same, or to 7 parts, diluted with water, add the amount of ammonia (previously determined) necessary to precipitate the 6 parts. In either case we get a dark red solution which may be dialysed with but slight loss of iron.

It will be evident to everyone that by washing away the saline matters from the precipitate in the one case, we have greatly shortened the process, for it is the removal of the ammonium chloride by diffusion that is tedious and nearly six-sevenths will be contained in the wash water. I append a table showing the progress in two dialysers of equal quantities of liquor which had been treated in the above manner, and from it we learn that by precipitating and washing three-fourths of the liquor, with subsequent solution in the remaining one-fourth, the time necessary to produce dialysed iron is only one-half of what it is when washing is not made use of.

The dialysers were suspended in one-half litre of distilled water which was changed at the hours specified. The liquor used contained in 10 c.c.:—

Chlorine . . . . 4·1892 grams.
Fe_2O_3 . . . . 2·9714 „

Hours dialysed.	M Cl. in dialyser.	M Cl. diffused.	Cl. in dialyser.	Cl. diffused.
At starting . .	4·1892		4·1892	
After washing .	1·1583	3·0309	4·1892	
1 hour . . .	·9033	·2550	2·8192	1·370
2 „ . . .	·7300	·1733	2·0272	·792
3 „ . . .	·5957	·1325	1·5472	·480
4 „ . . .	·4975	·1000	1·1386	·308
5 „ . . .	·4165	·0810	·9186	·220
6 „ . . .	·3545	·0620	·7617	·157
7 „ . . .	·3050	·0495	·6437	·118
8 „ . . .			·5357	·108
9 „ . . .			·4691	·066
10 „ . . .			·4101	·059
11 „ . . .			·3641	·046
12 „ . . .			·3261	·038
13 „ . . .			·2941	·032
23½ „ . . .	·1390	·1660		
47½ „ . . .	·1140	·0250		

In the series marked M, 7·5 c.c. were precipitated, washed and the precipitate dissolved in 2·5 c.c., and diluted with water to 40 c.c., while in N, the ammonia equivalent to 7·5 c.c. was added to the 10 c.c., and the whole made to 40 c.c.

Loss of Iron.—I have already said that the loss of iron is greatly diminished by the partial neutralization of the liquor with ammonia, and I append the ascertained loss for different amounts of ammonia:—

Table showing Loss of Iron.

NH_3=Liq. Ferri.	Per cent. of total iron lost.	Per cent. of Fe_2Cl_6 lost.
None.	64—80	Av. 72
25 per cent.	47	62·6
50	26	52
75	9·04	36·1
87·5	1·73	13·9

I have also determined the loss of iron (*a*) when the precipitate of half the liquor has been washed and then dissolved, as compared with the simple addition of ammonia (*b*).

In the former case (*a*) the loss was 26·3 per cent., while in the latter (*b*), it was 25·6 per cent. I was led to examine this because of the extraordinary diminution in the percentage of iron lost as the liquor is neutralized. As will be seen from the table, when 25 per cent. is neutralized, 62·6 per cent. of the iron as ferric chloride is lost, while with 87·5 per cent. neutralized, the loss is only 13·9 per cent., or one-fifth of the proportionate loss. Judging from the dissociation of iron ammonia alum (Thompson, *Journ. Chem. Soc.*, Dec. 1879), I thought it possible that the accumulation of ammonium chloride in the liquor might be the cause of the reduction in the loss, and if this were so, in the cases previously referred to, the loss of iron in *a* should have been much less than that in *b*, a conclusion which was not borne out by fact. In like manner the addition of ammonium or potassium chlorides should cause a great increase in the loss of iron. I therefore added to 10 c.c. of liq. ferri as much chloride of ammonium or potassium as would have been produced by neutralizing 7·5 c.c. with ammonia or potash, with the following results:—

10 c.c. of liquor = . . .	loss of Fe = 72	per cent.
10 c.c. + NH_4Cl 8·8 grms. .	„ „ = 72	„
10 c.c. + KCl 12.3 „ .	„ „ = 70	„

The only explanation of the reduced loss seems to me to be in the increased ratio of the ferric oxide to chloride in the liquor, although this is not proportional to the reduction in loss.

Strength of Solution.—In order to have as rapid dialysis as possible, the liquor in the dialyser must be concentrated, for dialysis proceeds proportionally to the percentage of chlorine in the dialyser, if the liquids outside be similar. Thus, if we add 1 grm. chlorine as ammonium chloride in each of two dialysers, the one with 100 c.c. of water, the other with 1000 c.c., dialysis would go on ten times faster from the former than from the latter. This has a bearing on the question of "precipitation and washing *v.* addition of ammonia;" for when washing is not resorted to, there being a greater amount of crystalloids present, a much larger quantity of water enters the dialyser than in the other case, and we get a very dilute, slow dialysing liquor.

Is Change of Water Necessary?—In any dialyser the rate of dialysis is proportional (approximately) to the difference between the percentage of chlorine in the dialyser and in the external water; and it is evident that if the outside water be strongly charged with chlorine it will exercise an influence on the rapidity of dialysis, more especially when the percentage in the dialyser becomes very small. Let us calculate its effect. If 6 parts of liq. ferri perchlor. fort. be precipitated, and the precipitate dissolved in one part, the resulting solution will measure about 10 parts (with the included water) and the percentage of chlorine will be at least 3·5. Now I found on the large scale, with about 17 pints of the strong liquor dialysing from five dialysers, each 15 inches square, into 100 gallons of water, renewed as stated, that the outside water contained of chlorine:—

First day	·114	per cent.
Second day	·074	„
Third day	·047	„
Fourth day and fifth day	·057	„
Sixth day to thirteenth day . . .	·0023	„

There the ratio after the first day must have been roughly as 3 per cent. to ·114 per cent.; *i.e.*, 26·3 to 1 so that by leaving the same water in for another day, we retard dialysis by one twenty-sixth, as compared with fresh water. At the thirteenth day the liquid in the dialysers would contain about 1 per cent. chlorine and outside = ·0023 per cent., *i.e.*, as 435 to 1, or dialysis would be retarded $\frac{1}{435}$ by not changing the water. We thus see that if without expense we can have a constant flow of water there is an advantage, more especially at first, but not to the extent that might be expected from the various published statements as to the necessity of using distilled water, especially at starting. The difference between distilled and Edinburgh water for such dialysis as I have referred to is:—

	Dialyser.		Water.
Distilled . . .	3 per cent.	to	0000
Edinburgh . .	3 „	„	00001

Hot Dialysis.—From Graham's researches we find that dialysis is twice as rapid at 120° F. as it is at 60° F., and we would therefore shorten the time if we could use hot water for dialysis. Such I have successfully used on the large scale, and my method of working is as follows:—Mix 3 pints liq. ferri perchl. with 2 gallons of water, add just sufficient ammonia to impart a faint ammoniacal odour after stirring. Wash the precipitate well, and squeeze as strongly as possible, then add to it in a capsule 10 oz. liq. ferri fort. Warm slightly, with stirring, and when dissolved place in a dialyser, 15 inches square, consisting of two frames of wood, 4 inches deep, fitting outside each other and stretching the parchment tight. A number of these dialysers are placed on a wooden frame, supporting the edges only, and to the under side of which cork is fastened. By this device, no trouble is experienced by the toppling over of the dialysers. Warm water is passed below the dialysers, and in a few hours a jelly results. In the course of two or three days this dissolves up, and sometimes in less than a week such a quantity as I have referred to is perfectly tasteless, but usually a fortnight is required. It is advisable to use cooler water towards the end of the process. The points to be attended to, are:—

Avoidance of excess of ammonia in precipitating the liquor.

Thorough washing and squeezing of the precipitate.

Complete solution before placing in the dialyser.

Care, lest evaporation from the dialyser dry up the contents.

Strength of Liquor.—By the use of hot dialysis it is easy to get a liquor containing 10 per cent. of ferric oxide, but I think that the commercial article should be made the same strength as the tr. or liq. ferri perchlor., B.P., *i.e.*, 2 grains in 1 fluid drachm. I need hardly remind you of the necessity of igniting the residue of oxide, before weighing, and of allowing it to cool in a desiccator, for the various papers (*Pharmaceutical Journal*, various) have fully insisted on these points. I may, however, draw attention to the care which must be exercised in igniting the residue, after evaporation, for containing as it does some ferric chloride, the first increase of heat volatilizes this, and in so doing, bursts the little fragments of oxide, scattering them if the vessel be uncovered. A better and safer plan is to precipitate with ammonia, filter, wash, ignite, cool in desiccator, and weigh the precipitate.

I have hitherto referred only to the manufacture of dialysed iron, touching on such details as seemed to warrant attention, but I must now bring forward some experiments which are of interest with regard to the value of this form of iron when given internally. It has been claimed for dialysed iron that the absence of astringent properties, free acid and ferruginous taste, render it of special value among the preparations of iron. On the other hand, dialysed iron is precipitated by mere admixture with town water, and even when administered diluted with distilled water it must be entirely precipitated by the time it reaches the stomach. This, at first sight, appears a serious objection, for unless in solution, the iron cannot be assimilated, and on this ground dialysed iron has been pronounced worthless. It is, however, held by many that the stomach contains sufficient hydrochloric acid to redissolve the precipitated ferric oxide, and that this actually happens when it is administered, while the testimony of physicians would seem to show that it is capable of absorption. In a recent paper, Professor Redwood has attacked this view of the behaviour of dialysed iron, and expresses a belief that even when so dissolved in the stomach it cannot be assimilated, because of the colloid and non-diffusing form in which it dissolves. This belief is based on his experiments, which have shown that if the dialysed iron be mixed with excess of ordinary water, the whole of the iron is precipitated, and that if this be collected, washed, and dissolved in hydrochloric acid, a pseudo-solution is obtained, which is not capable of dialysis, and cannot therefore be absorbed into the system. He further points out, that according to this experiment, the ferric oxide from dialysed iron is different from that obtained from ferric chloride. I have made many experiments on this point, but still some curious results await explanation. When the precipitate from dialysed iron is treated with strong hydrochloric acid in successive drops, we get—

a. A dark red clear solution.

b. A precipitate, redissolving, on standing, to a clear liquid, turbid by reflected light, and increasing in turbidity as more acid is added, till a point is reached—

c. When a precipitate falls (*d*), and a clear, bright yellow liquid (*e*) remains. Large excess of hydrochloric acid dissolves up the precipitate *d* by the aid of heat, and it is also soluble in cold distilled water. If these successive liquids be placed in dialysers, *a* will diffuse a notable amount of iron, the proportion varying with the amount of acid that had been added. *b* being the same liquid as *a* with excess of acid, I have always found much iron to pass through even in a few minutes. From my experiments I find that the precipitate falls, especially on heating, before sufficient hydrochloric acid has been added to convert the iron into Fe_2Cl_6. If the filtrate *e* from the precipitate be dialysed, nearly the whole of the iron diffuses through.

It would thus seem that a soluble oxychloride at first results, which by further addition of acid becomes decomposed, with an insoluble oxychloride and ferric chloride. The precipitate from ferric chloride by ammonia on addition of hydrochloric acid at first gives a non-diffusive dark red solution, but it undergoes no further decomposition on addition of acid; showing that some difference actually occurs in the two oxides.

The experiments above recorded were all made with strong, or but slightly diluted hydrochloric acid, and they were performed before the appearance of Professor Redwood's paper on the subject, so that the results therein described seemed irreconcileable with my own work. In order to imitate the precipitation of dialysed iron in the stomach I had prepared mixtures containing dialysed iron, sodium chloride, etc., and on treatment with hydrochloric acid I had invariably got diffusible iron. In some of the experiments I used no heat at all, while in others I boiled the liquid with the result above mentioned. In order to see the effect of adding hydrochloric acid to dialysed iron, I took 5 c.c. liq. ferri perchlor. f., precipitated with ammonia, washed the precipitate, and dissolved it in 5 c.c. of the same liquor. Complete dialysis showed a loss of 26·3 per cent. of iron. To the contents of the dialyser were now added 10 c.c. ac. hydrochlor., B.P.; a slight momentary precipitation occurred, and on continuing dialysis, exactly 26·3 per cent. of iron passed through again. Allowing for the diminution in iron when the acid was added, 35·7 per cent. passed through on continuing dialysis. In this case the acid was 1·3 times what was requsite to produce Fe_2Cl_6. We thus see that in the cold, if the acid be only mixed in the dialyser, a large amount of iron is rendered diffusible.

I also took 50 c.c. Wyeth's dialysed iron, mixed it with 10 c.c. ac. hydrochlor., B.P., or slightly less than is requisite to change it into Fe_2Cl_6, boiled for one minute, placed in a dialyser, found the separation of insoluble basic chloride, previously described, and in twenty-four hours found the oxide of iron which had diffused to weigh 1·815 gram. If the dialysed iron contained 5 per cent. oxide of iron, the percentage which diffused was thus over 72 per cent. Two explanations of the difference in my results with those of Professor Redwood have suggested themselves.

1st. I found that the more completely a sample of dialysed iron had been dialysed, the more difficult was it to form a diffusible compound without using excess of acid. I had prepared samples, stopping the operation while traces of chlorine could still be directly tested for in the liquor, or as soon as such direct testing indicated no chlorine, and by comparing these with very colloid forms I found that in the former cases the action of hydrochloric acid was much more rapid and complete than in the latter, the solution of the precipitate taking place without the deposition of a basic precipitate. This would indicate that the advantages of dialysed iron would be most found in those samples which approached most nearly to an ordinary oxychloride, and yet were free from astringent properties.

2nd. I found that dilution of dialysed iron (for I have not had time since the publication of Professor Redwood's paper to use the precipitate) materially modified the action of hydrochloric acid on it, and at first noting the decomposition at the boiling point, I found that the precipitation of the basic chloride with accompanying formation of diffusible chloride occurred at the following points of dilution:—

	Wyeth's iron	+	Ac. Hydrochlor. B.P.	+ Water
1	5 c.c.	+	0·55 c.c.	+25 c.c.
2	5 c.c.	+	1·00 c.c.	+50 c.c.
3	5 c.c.	+	2·05 c.c.	+100 c.c.
4	5 c.c.	+	5·0 c.c.	+235 c.c.
5	5 c.c.	+	1·0 c.c.	+80 c.c. = no precip.

From this we see that ·55 c.c. containing about half the amount of acid required to form Fe_2Cl_6 with the iron was able to produce a diffusible chloride when diluted to 25 c.c., while 5 c.c. were needed to accomplish the same when dilution was carried to 240 c.c. This shows that ·76 per cent. of HCl is necessary to form the diffusible chloride and basic precipitate at the boiling point, whatever be the relation of acid to the dialysed iron present. In the cold the same order of decomposition is found, and the same amount of acid will suffice if time be allowed.

I have also made the following experiments:—

(*a*). 5 c.c. Wyeth's dialysed iron were diluted with distilled water to 40 c.c.; 10 c.c. hydrochloric acid, one-tenth of B.P. strength, were now run in, making the whole 50 c.c.; the HCl = ·762 per cent. This was boiled for two minutes, and after two days' dialysis ·086 grm. Fe_2O_3 = 34·4 per cent. had diffused.

In the following seven experiments the dialysed iron was mixed with the distilled water and dilute hydrochloric acid run in. The mixture was immediately placed in a dialyser, and the distilled water into which diffusion took place was kept at 100° F. for two or three hours. After that the whole was allowed to cool, the water frequently changed, and after two or four days the iron estimated as Fe_2O_3. I give the results in a tabular form for comparison:—

	Wyeth's iron	+ HCl B.P. Per cent.	Water to.	Fe_2O_3 diffused. grm.	Per cent.	Time.
b.	5 c.c.	1 c.c. = ·762	50 c.c.	·056	= 22·4	2 days.
c.	20 „	1 „ = ·381	100 „	·0635	= 6·35	2 „
d.	10 „	1 „ = ·381	100 „	·044	= 8·8	2 „
e.	20 „	1 „ = ·1905	200 „	·0375	= 3·75	2 „
f.	10 „	1 „ = ·1905	200 „	·026	= 5·2	2 „
g.	40 „	1 „ = ·0952	400 „	·0335	= 1·67	4 „
h.	10 „	1 „ = ·0952	400 „	·0235	= 4·7	4 „

Some very interesting facts are derivable from these results. In *a* and *b* we see that the action is much more complete at the boiling point than at a lower temperature. In *c* the hydrochloric acid present was only equivalent to the formation of Fe_2Cl_6 with half the iron, while in *d* it was sufficient for the whole of the iron.

In *c* 6·35 per cent. of iron diffused
In *d* 8·8 " " "

So that by doubling the acid 1·23 times as much iron was rendered diffusible. In *e* and *f* the hydrochloric acid was also equivalent to 50 and 100 per cent. of the iron.

In *e* 3·75 per cent. of iron diffused
In *f* 5·2 " " "

So that by doubling the acid 1·38 times as much iron diffused. In *g* and *h* the acid was equivalent to 25 and 100 per cent. of the iron.

In *g* 1·67 per cent. of iron diffused
In *h* 4·7 " " "

By quadrupling the acid 2·81 times as much iron diffused.

Now in *g* and *h* we have mixtures which contain a less percentage of HCl than is normally present in the stomach, and yet 1·67 per cent. and 4·7 per cent. of the iron were capable of diffusion, an amount which might easily account for the benefits said to be derived from the use of dialysed iron. It is instructive to note that with the same volume of dilute acid (·0952 per cent. HCl) a much higher percentage of iron is capable of absorption when the amount of dialysed iron present is small than when it is large. This points to the advantage of giving dialysed iron in small doses often repeated, under which circumstances the most favourable conditions for absorption are obtained. It will be noticed that I have assumed Wyeth's article to contain 5 per cent. of Fe_2O_3. I have found the amount to range from 4·35 per cent. to 4·95 per cent., and of course if less than 5 per cent. were present the percentage of diffusible iron must be greater. Again I did not allow diffusion to proceed to the fullest extent, but stopped it after two or four days, and therefore the amounts given are actually less than what might be obtained. It may be urged that no substance would remain so long in the stomach, but the amount of absorbing surface must be far greater than that used in my experiments, while the quantity of substance to diffuse would be much less, so that my figures may be considered, at least approximately, indicative of what might occur in the stomach.

The dilution of the dialysed iron, coupled perhaps with the use in Professor Redwood's case of some very colloid preparation, may, in my opinion, account for all the differences which seem to exist between our results.

Even supposing, however, that the iron remains in a colloid non-diffusing form, it does not follow that it cannot be assimilated, else how can gelatine, starch and other colloids be digested, unless they pass through an intermediate crystalloid state? The value of dialysed iron, in my opinion, is far more surely to be tested by noting the increase of red-blood corpuscles, than by purely chemico-physical research, for we know too little of the processes involved in nutrition; but if we assume that assimilation of mineral substances is accomplished by dialysis only, then it may be interesting to test the value of liq. ferri perchlor. by this gauge. We have seen that the B.P. liquor only diffuses about 72 per cent. of iron, while a liquor prepared by the chlorate of potash oxidation process lost about 90 per cent. Again, I find that the evaporation of such a liquor to half its volume, with subsequent dilution with water, reduces the dialysing power from 90 per cent. to 68·9 per cent. According to our test a liquor which has been so evaporated (even though acid has been added afterwards, as seems to be shown by my experiments, though in a modified degree) cannot possess the same medicinal properties as it had before evaporation. Pursuing our examination, I find that a solution of oxide in hydrochloric acid diffuses more than 90 per cent., while crystals of perchloride obtained from the liquor show a similar diffusing power. Such solutions must be more active than the B.P. liquor. It may be in your knowledge that many medical men prefer the old E.P. tinct. ferri mur., prepared from oxide, to the B.P. preparation. If such is more diffusible, (this I have not ascertained), the reason for the preference would be plain, and so also we should expect a freshly prepared sample of the tincture to be more efficacious than one which had become basic by standing. I thought it would be interesting in this connection to to see if iron, which had once diffused, would diffuse entirely a second time. I find it does not. I placed liq. ferri perchlor. fort. in a dialyser, and diffused for some time into a limited amount of water. The solution so obtained was placed in a dialyser, but failed to pass entirely through, leaving an appreciable quantity of dark red solution inside.

I have said nothing of the use of dialysed iron in cases of arsenical poisoning, for this is too well known to require comment, but I trust that, in having thus fully entered into the chemical relations of this substance, I may have assisted, however little, in determining its value as a chalybeate.

The paper was fully illustrated by diagrams and by experiments bearing out the results arrived at.

Mr. Nesbit (Portobello) said he had always been much interested in this preparation, and had some years ago prepared it by the process now recommended by Dr. Clark. He thought the name a very misleading one. Almost every medical man he had spoken to on the subject had been under the impression that it was what its name implied—a solution that would pass through a septum, and not a colloid. They, however, all concurred in the opinion that it possessed the tonic properties of iron in a mild form. He had, since Professor Redwood's first paper appeared, made some experiments on its diffusion when mixed with acidified solutions of pepsine of the strength of gastric juice. The results were somewhat different from those of Dr. Clark, but the experiments had been made under different circumstances. In the first place, he had not found vegetable parchment so satisfactory a dialyser as animal membrane, and as the latter was what it must pass through before entering the circulation, he considered it the most suitable material to use. In the second place, he had not boiled the dialysed iron with the hydrochloric acid, as that would induce a chemical combination which it might not undergo in the stomach. The following experiments were made with Wyeth's dialysed iron containing 5 per cent. Fe_2O_3:—(1) 100 grains were diluted with distilled water and 6·8 grs. HCl added—the quantity required to form the iron present into Fe_2Cl_6. The solution, which was perfectly transparent, was dialysed for eight hours at 100° F.; when the diffusate was tested it gave no trace of iron, but abundant evidence of hydrochloric acid. An excess of acid was now added to the colloid; after twelve hours a considerable quantity of iron had passed through the membrane. (2) To two ounces of acid solution of pepsine of the strength of gastric juice were added 100 grains of hard boiled white of egg, and ℥ss (an ordinary dose) of dialysed iron. On adding the latter, the liquid became turbid, and after standing a short time a considerable precipitate was deposited. On digestion at 100° F. for four hours the white of egg remained altogether unacted upon. (3) The last experiment was repeated with the same materials, but adding the dialysed iron after the white of egg had been completely dissolved in the solution of pepsine. The liquid was dialysed for four hours at 100° F., but without a trace of iron being found in the diffusate. After these experiments, he entertained great doubts of the usefulness of the preparation, as it not only appeared to be incapable of digestion, but might even retard that process. At the same time it was not the province of the pharmaceutist to decide as to its effect on the human frame; that must be left to the physician and physiologist. Dr. Clark had alluded to gelatine, a colloid, and yet used largely as an aliment. He had not made any experiments on that substance, but had always understood that doubts existed as to its nutritive value. He assumed, however, that on entering the stomach it would, by the action of the gastric juice, be chemically changed, and thus rendered capable of absorption.

Mr. Napier suggested that the discrepancy between the diffusibility of colloid iron as brought out by Professor Redwood and Dr. Clark might be due to a difference in the condition of the iron in the original dialysis, and that the presence of hydrochloric acid and muriate of soda in the stomach, under vital conditions, might also materially affect this property. He had had occasion to try the effects of this preparation on himself, and while he had found it quite non-irritant to the mucous surfaces, and not sensibly affecting the circulation, its action as a tonic was at best feeble. A microscopic examination of the increase of blood corpuscles would best determine its therapeutic value. It would be a matter of great regret were a preparation brought forward with so fair promise to have to be put aside as useless. Perhaps, as Dr. Clark was not quite satisfied as to the absolute accuracy of his results, it might be hoped he would prosecute his investigations and favour the Society at no distant date with some further results.

The President remarked that he had always taken a great interest in this preparation. He confessed to somewhat of a prejudice against it; from the first, he thought it too good news to be true that a preparation could be deprived of all sensible and chemical qualities, whilst its medicinal were retained. He considered the article as still upon its trial, and thought the question of its therapeutic value was to be settled more on the results obtained under its administration than on facts and inferences connected with its chemical nature—useful and suggestive as these undoubtedly were. Fortunately the effects of iron were not so equivocal as to require the counting of the blood corpuscles on the microscopic field as evidence of their reality. He mentioned a case which had come under his personal observation, in which it was desirable to get iron rapidly and in large quantities into the system. Under dialysed iron for two months this case had made little or no improvement; but under Blaud's pills, which contain $2\frac{1}{2}$ grains of sulphate of iron each, it subsequently underwent a rapid and wonderful improvement.

On the motion of Mr. Napier, seconded by Mr. Nesbit, a hearty vote of thanks was awarded to Dr. Clark for his communication.

Provincial Transactions.

ABERDEEN SOCIETY OF CHEMISTS AND DRUGGISTS.

Mr. Robert Gibson, of Manchester, delivered an address before the Society on Wednesday evening, February 25. There was a large and enthusiastic attendance. The subject of Mr. Gibson's address was "Commercial Success," which he treated in a manner suited to instruct, entertain and leave lasting impressions for good upon the minds of all who listened to it.

The chair was occupied by Mr. William Sinclair, who along with Mr. G. S. Shepherd, proposed the usual votes of thanks.

The annual meeting was held in the rooms on March 9, Mr. Giles presiding. The following gentlemen were elected office-bearers for the ensuing year:—President, Mr. John Gordon; Vice-President, Mr. R. D. Presslie; Secretary, Mr. A. Strachan; Treasurer, Mr. J. Paterson; Librarian, Mr. C. Coutts; Auditor, Mr. Wm. Giles.

The Treasurer's report showed a balance of £28 4*s*. 0½*d*. standing to the credit of the Society. The Lecture, Library and Price List Committees were reappointed.

THE REGISTERED CHEMISTS' ASSOCIATION OF LIVERPOOL.

The fifth annual dinner of this Association was held on the 16th inst. After the dinner the loyal toasts were duly honoured. The President, Mr. A. Redford, then gave the toast of the evening, "The Registered Chemists' Association of Liverpool." He considered such meetings as the present not only enjoyable but useful in their tendency to improve the business relationships of the members by better personal acquaintance with each other. Although in the Liverpool Chemists' Association an admirable organization for scientific and educational purposes existed, yet a Trade Association like that, where questions that affect chemists as traders can be thoroughly considered, and by which united efforts may be put forth, was well worthy of institution and maintainance; and its objects could only be attained in proportion as the chemists of the town join its membership, and work together. After referring to the necessity of combination against vexatious attacks by analysts (happily not known in Liverpool), against injurious legislation by an ill-informed or mis-informed parliament, he touched upon the past work of the Association, and coming to the recent agitation upon the "patents" question, expressed the belief that the position taken up from the first by the committee and endorsed by the trade, had assisted in other places to stem the tide of panic, and to maintain their relations to one another as honourable traders. He believed that the ethical outcome of some men's faithfulness to the general interests, to the probable disparagement of their individual gains, must be morally most invigorating. He could not believe that the system of amalgamating the most heterogeneous pursuits together in one huge establishment could long affect them, but fighting the for "selfishness" under the banner bearing the device of the "hand-in-hand," with the motto "union in strength," and alive to the need of adopting well-considered reforms, they need not fear but that public sentiment will support those who with true and noble aims reach forward to the most perfect ideal of duty and utility. He coupled with the toast the names of Mr. R. Parkinson, Treasurer, and Mr. B. Dickins, Hon. Secretary, who briefly responded.

The toast of the Liverpool Chemists' Association was given by Mr. J. Woodcock, who desired to pay the highest tribute to the zeal and ability of the officers of that Association then present with them; the President, Mr. Charles Symes, Ph.D., and Mr. M. Conroy, F.C.S., the Hon. Secretary. He said that it was incumbent upon all who desired the culture and improvement of their class to encourage and countenance both the societies, as the scientific element was of the utmost possible advantage to the pharmacist.

Mr. C. Symes, Ph.D., in responding to the toast said:—He would like to see more of the registered chemists joining and taking an active part in the Association. It might possibly be assumed that the papers read and the subjects discussed at its meetings were too scientific or not sufficiently practical for the purposes of business men. But was that so? He thought all they attempted to do was to keep pace with the times. He felt sure he should carry the meeting with him when he said that they lived in days of unusual competition; days in which the influences of education were felt on every side. Now he had learned to believe in the good which trade association could accomplish; he looked with satisfaction on the power for good which exists in such organizations as the Trade Association of Great Britain and the Registered Chemists' Association of Liverpool; and at the temperate yet firm and unflinching manner in which that power had been exercised. But he could not close his eyes to the fact, that if the competition referred to was to be met and successfully combated, if they were to show themselves equal to the educational progress of the times, then (while they held firmly to their trade principles) they must not ignore the higher development wrought out by the Pharmaceutical Society, the scientific advancement promoted by the Conference and the efforts in the joint direction put forth by the Liverpool Chemists' Association and other bodies of a kindred nature. It was thus they could keep abreast of chemical discovery, raise their status and make themselves masters of the position. Thus they could best demonstrate to the public and the medical profession that they were worthy their confidence, and that the remuneration they ask in exchange for the duties they perform is the minimum of their just due and that it should be increased rather than be diminished.

Mr. M. Conroy, F.C.S., also responded, and expressed his wish that more were added to the list of members. The society was healthy and flourishing.

The toast of "The Pharmaceutical Society and The Chemists and Druggists' Trade Association of Great Britain," was given by Mr. J. Fingland, and responded to by Mr. Shaw, who spoke of the strong financial position of the older Society, and of the usefulness of the Benevolent Fund. In connection with the Trade Association he alluded to the loss it sustains in Mr. Haydon's removal to another office, and much regreted parting with so efficient a worker.

Mr. W. Wright gave "The Wholesale Trade," and Messrs. J. J. Evans and R. Sumner responded. Mr. Sumner remarked that there was now a very much better appreciation of quality of goods sent than formerly existed, and that by reason of greater ability and knowledge on the part of retail chemists.

Mr. M. Bell, on behalf of Messrs. Raimes and Co., also thanked the company for their reception of the toast.

"The Chemists and Druggists of Birkenhead and Kindred Associations," was proposed by Mr. J. A. Turner. His speech was altogether too humorous to epitomize. Mr. A. Stewart responded. He said that their Association, although not yet twelve months old, had done good service in restraining some from lowering prices. He advocated the formation of such Associations in every town in the kingdom.

Mr. Hocken then gave the toast of the President, Mr. A. Redford, which was drunk with musical honours. After responding, the President then gave the Vice-President, Mr. C. Symes.

Mr. W. P. Evans gave "The Ladies," responded to by Mr. F. J. Mackinlay; and Messrs. J. Fred. Swift and J. T. Pugmire, who had much assisted the enjoyment of the evening with music, were similarly thanked.

Mr. H. Jackson (Messrs. W. and H. Jackson) gave an impressive recitation, and Mr. A. H. Mason "The Vicar of Bray."

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on March 18. Mr. Warren De La Rue, President, in the chair. The following certificates were read for the first time:—J. M. Dennis, R. Grimwood, W. F. Haydon, F. B. Last, H. Liepmann, A. J. Smith, J. W. Stanley.

Professor Tidy was then called upon to read his paper on—

River Water.—The author discusses the subject under three heads:—1. Analytical details of river waters. 2. The various sources of impurity to which river water is subject and the means whereby purity is maintained by nature or may be effected by art. 3. The extent to which statistics warrant us in condemning or in approving the supply of river water for drinking purposes.

1. Analytical details of river waters—River Thames.—The author gives tables showing the composition of the Thames water as supplied to the metropolis, from January, 1876, to December, 1879. The details given, are total solid matter, oxygen required to oxidize the organic matter, organic carbon and nitrogen, as determined by Dr. Frankland, nitrogen, as nitrates and nitrites, lime, magnesia, chlorine, sulphuric anhydride, hardness before and after boiling. The solid matter is at its highest in February, 21·63 grains per gallon, descending regularly to August, 18·24 grains per gallon, whence it again rises. Boiling reduces the hardness to less than one-third. From September to January, the chlorine is under 1 grain per gallon; from February to August, it is over 1 grain per gallon. The quantity of solid matter is no gauge as to its organic purity, as judged by the oxygen required. The testimony of the results obtained with the oxygen process agree remarkably with those obtained by the combustion process, as has already been pointed out by the author; the same story being thus told by two absolutely independent experimental witnesses. The author regrets the frequency with which cases occur, where conclusions of great importance sanitarily are based on experimental determinations as incapable of arrangement or of interpretation as they are outside the sphere of scientific accuracy. The nitrates and nitrites do not accord with the results indicating the organic matter; it may be that the organic nitrogen of one month becomes the inorganic nitrogen of the next. The author has estimated the gases dissolved in filtered Thames water on twenty-seven different occasions. The oxygen in solution during the winter months (2·19 cubic inches per gallon) was found to be very nearly double the amount held in solution during the summer months (1·19). The author intends to turn his attention to a further examination of this part of the subject. Some analyses of unfiltered Thames water from Hampton are then given. River Lea.—Monthly analyses (1877—1879 inclusive) of the water from this river are given. The total solid matter is again highest in February, 23·34 grains per gallon, sinking to a minimum in September, 17·99 grains per gallon. The chlorine is slightly higher than in the Thames. As far as organic matter is concerned, this river is slightly purer than the Thames, the results of the oxygen and combustion processes again exhibit a remarkable correspondence. River Nile.—Monthly analyses of this river taken during one year at Cairo are given, the total solid matter ranged from 9·5 to 14·3 grains per gallon; the chlorine from 0·645 to 1·395; the oxygen required from 0·08 to 0·27. All the samples but that of May were thick. During April, May and June, when the Nile is lowest, the water is worst as regards total solid matter, 12·73 to 14·33; chlorine, 0·64 to 1·39, etc.; the month of July is the transition month, the river rapidly rising; during September and October, the condition of maximum flood persists, during the fall the river attains its maximum purity. The Severn.—Analyses of samples of water collected from the Severn at various spots, in January, 1878, from Worcester, above the sewage outfall down to Tewkesbury, a distance of sixteen miles, together with analyses of the river Teine, are given. The Severn water contains about 16 grains of solid matter per gallon, the chlorine being double the amount of that present in the Thames. The quantity of chlorine varies remarkably at different spots, probably from the influx of brine springs from the new red sandstone. The Shannon.—The samples were collected in October, 1879, the river being about two feet above summer level. This river was selected because it drains a larger area than any single river in the British Islands; because though uncontaminated with animal impurity, it contains a large quantity of dissolved peaty matter and because it is a type of the Irish rivers which so often pass through lakes in their course to the sea. The analyses include samples taken at the extreme ends of one of the lakes, Loch Derg. The solid matter varied from 15·3 to 20·2 grains per gallon, there was but a trace of nitrogen as nitric acid, the chlorine was remarkably constant, about 1·0 grain per gallon.

2. The various sources of impurity to which river water is subject, and the means whereby purity is maintained by nature or may be effected by art. (The pollution produced by trade refuse is not considered in the present paper). Flood water.—During the first few days of a flood the drainage, called by the author "primary flood water," materially affects the river for the worse, as all the soluble and some of the insoluble matters accumulated in the soil during the period when the rainfall was insignificant, pass into the river. The river becomes

heavy in total solid matter, excessive in dissolved organic matter, and turbid. The velocity of the river is increased and carries down accumulations, organic and mineral, from the higher reaches of the river. The author then gives analyses of the Thames water before and after two heavy floods, November 18, 1875, and January 11, 1877; the rise in the total solid matter is not so great as was expected. The rise in the organic matter was well marked, the high flood water requiring 0·173 grain of oxygen per gallon against 0·064 grain ten days before. Further analyses of ordinary floods are given, which show similar results. Primary flood water is therefore inferior to normal river water as regards organic purity and general clearness. By "secondary flood water" the author implies the water that comes down after some considerable period of flood, when the drainage area has been washed clean, the river passing slowly from a state of maximum impurity to one of maximum purity. The total solid matter of a secondary flood water being only 17·28 grains against 22·84 grains in primary flood water, the oxygen required being reduced to about a sixth, the hardness by three degrees, whilst the suspended matters are too small to be capable of estimation. Although the Thames when at or below summer level is brighter and clearer than at any other time, the water is not of such good quality as during the period succeeding a flood. The author then discusses the influence of floods as exhibited in the river Nile, and shown in the analyses already referred to, the influence of the geological nature of the drainage area, of the time of year at which the floods occur, of the interval between one flood and the next, and of the exact time occupied by a given rainfall on the flood water carried into the river. He then takes up the subject of peat. Peat exists for the water analyst as old peat or recent peat, the latter giving a yellowish-green, the former a coffee-brown tint, the colour passing through all gradations, according to the age and quantity of peat present. The author then insisted on the value of the "two foot tube," *i.e.*, a tube 2 feet long, 2 inches in diameter, with white glass ends, as a most valuable adjunct to analysis; thus 0·4 per 100,000 of organic carbon would have a very different significance to the chemist if the tint exhibited by a large bulk of the water was brown, indicating vegetable matter, to what it would if the water was colourless. Professor Tidy has never known in practice a case where the water of a river became colourless simply through the bleaching of peat, and thinks that it is quite possible to compare the depths of colour in two waters, though the tints are different. The oxidation of peat has been carefully studied by the author in the Shannon. He has analysed the water at various places, the most notable instance of oxidation being at the falls of Castle Connell; a short distance above the organic carbon being 0·84 parts per 100,000, a short distance below 0·593 per 100,000. Another instance of this diminution of carbon was noticed in the North of England, where the water is peaty, and is delivered from a storage reservoir to the supply reservoir, 6820 yards distant, by two channels, one a closed iron pipe, the other an open brick conduit. The water delivered by the iron pipe has distinctly a peaty tint, the same water delivered from the conduit is clear and nearly colourless. The water in the storage reservoir contained 0·46 organic carbon per 100,000, that from the iron pipe 0·49, that from the open conduit, 0·23. This, says the author, is a perfect experimental proof of the oxidation of peat. The quantity of peat can also be considerably reduced by admixture with water containing much suspended mineral matter, which causes a precipitation of the peat. Thus the entrance of the turbid river Malcaire brings down the organic carbon in the Shannon from 0·914 to 0·61. This action was also confirmed by shaking up a peaty water with turbid Malcaire water in the laboratory. Thus the quantity of peat in running water is kept in check, (1) By the inherent power which water possesses of self-purification, owing to the oxidation of the peat by the oxygen held in solution in the water, the process being enormously helped by certain natural and physical conditions whereby the more complete aeration of the water and the intimate contact between the oxygen and peat is effected; (2) By mechanical precipitation by admixture with coarse mineral suspended matter. From peat the author passes to animal impurity. He agrees entirely with Dr. Frankland as to the vital importance of this subject. No one, says Professor Tidy, should be required to drink his own excreta, much less the excreta of his neighbours. The two important questions are, does the water of a river, having been once polluted by admixture with sewage, again after a moderate flow assume its original state of purity? and, secondly, if such a natural process of self-purification exists what are the conditions requisite for its fulfilment, and what are the circumstances affecting these conditions? The author answers the first question in the affirmative, and considers that this self-purification depends upon three things: "a." The subsidence of the coarser suspended impurities. "b." On the presence of animal life after the water has assumed a certain degree of purity. "c." The oxidation of the organic matter, the dissolved oxygen being derived partly from the air and partly from plant life. The rapidity of this oxidation depends on the degree of dilution of the sewage, the distance of run, the velocity of the current, the temperature, and certain natural or artificial physical conditions, such as the mixing of the water and air at locks, weirs, etc. The author then proceeds to enumerate the proofs of this oxidation. From analogy we should expect water to purify itself, as the air which is constantly receiving masses of organic *débris* eliminates by oxidation, etc., its sewage matter. Are men never to drink water because it has been once contaminated by sewage? As well might we say that air which has once received scales from a person suffering from scarlet fever or the infected breath of a measly patient must never be breathed again. If oxidation purifies in the one case may not oxidation be expected to act in the other? The proofs of this oxidation are threefold. A. The naked eye inspection of rivers receiving sewage.—The sewage at the outfall is probably offensive; as it passes down the river it blackens from the formation of sulphide of iron; further on this black colour decreases, disappears, and the river at last exhibits no signs of odour, colour or turbidity. Again, soon after the sewage has been turned into the river the sewage fungus appears, all other vegetable life being absent, no fish are seen, the banks are black. A short distance further on the fungus vanishes, vegetation is luxuriant, fish abound, the river clears and no trace of black deposit can be seen. Thus the river Soar at Leicester is black with sewage; at Loughborough thirteen miles distant the river is perfectly clear and fish are abundant. The Irwell at Manchester is polluted with every form of filth; in nine miles the offensive character of the stream has entirely disappeared, and so on in many cases. Such examples prove the power of self-purification possessed by rivers. B. Analysis.—The Thames at Lechlade may be taken as pure river water; after flowing a distance of 110 miles and receiving the sewage of many towns, etc., the water at Hampton contains rather less organic carbon and nitrogen that at Lechlade; what has become of this sewage if it has not been oxidized? The same is true of many other rivers, the Severn, the Wear. The author then refers to the diametrically opposite conclusions in the sixth report of the Rivers Commission, in which Dr. Frankland states that organic matter is not appreciably oxidized by the flow of a few miles. Professor Tidy does not for one moment question the accuracy of the results, but strongly dissents from the conclusions, and submits that analyses indicating a reduction of organic carbon and nitrogen between two spots are of much greater value than any analyses indicating the reverse; because Dr. Frankland cannot that say the organic matter found at B when he collected his second sample was the same as that at A where the first sample was taken, and between the two spots A and B a fresh quantity of organic matter may have been introduced. Thus to take an illustration. Six passengers enter a carriage at station No. 1; at station No. 3 six passengers are still in the carriage, but unless there is evidence to show that they are the same six passengers there is nothing to prove that the whole of the six passengers who got in at station 1 did not get out at station 2, and six fresh passengers get in. But if at station 3 only two passengers are found it is absolutely certain that at least four must have got out at station 2. The author then criticizes experiments in which Dr. Frankland shook up a mixture of water with 10 per cent. of sewage and thus imitated the flow of a polluted stream for 96 and 192 miles; the author contends that these experiments did not imitate at all accurately the flow of a stream, and the results obtained are therefore valueless. C. The author set up an apparatus which did to some extent represent the action of running streams; it consisted essentially of a series of about twenty V-shaped wooden troughs lined with glass, the troughs were placed one over the other and were inclined alternately in opposite directions, so that the water flowed from a cistern into the upper trough and thence gradually down the twenty troughs into a cistern beneath, from which it was pumped up into the higher cistern. After many difficulties from the smoky atmosphere in London, the author, with the assistance of Mr. Hart, obtained results with various mixtures of New River water with sewage from Abbey Mills, which proved satisfactorily a decided decrease of organic matter after a run of one mile. After two or three runs the offensive sewage smell disappeared; the last traces of sewage matter seemed to be the most difficult to oxidize. From these considerations the author concludes by paraphrasing a well-known passage in the sixth report of the Rivers Commission, p. 138, "I am led to the inevitable conclusion that the oxidation of the organic matter in sewage when mixed with unpolluted water and allowed a certain flow proceeds with extreme rapidity and that it is impossible to say how short a distance such a mixture need flow under favourable conditions before the sewage matter becomes thoroughly oxidized. It is certain to my mind that there is no river in the United Kingdom but what is many times longer than is required to effect the destruction of sewage by oxidation." Some of the methods for purifying water are then considered. A water which is impure from the presence of sewage should be unhesitatingly rejected. In urging the claims of rivers as one of the sources for water supply, the author means always rivers free from sewage, *i.e.*, rivers, the purity of which at the suggested intake can be proved by chemical analysis. Having such a water, however, much may be done by art to improve it by storage, subsidence and filtration; these methods are considered in detail. Pure sand of uniform medium fineness is recommended as the best filtering medium on the large scale, the rate of filtration should be 2 gallons per hour per square foot, the filter bed should be changed about every two years.

3. How far do statistics warrant us in condemning or in approving the supply of river water for drinking purposes? —In the opinion of the author, peaty waters have not been proved to produce diarrhœa. As regards animal pollution, the author admits that disease has been produced by drinking impure and polluted water, but the argument against the use of a river water is based, (1) on the existence of germs, (2) on the supposition that the oxidation process which might affect organic matter would probably leave organized bodies untouched. Germs would probably be destroyed by oxidation and endosmose after a run of ten or twelve miles in a river. If they are not destroyed as organic matter they ought as organized bodies to increase, and as we pass down the river each town should exhibit an increasing death rate from the multiplication of the disease germs. Statistics, however, show a very different state of things. A disease usually spreads up not down a river. From an examination of numerous statistics it is seen that the death rate of towns in which the water is obtained from wells is practically identical with that in towns supplied by rivers, and that in London as regards mortality there is very little to chose between districts supplied by well water and those supplied by river water, so that it is clear that the *materies morbi* is subject to the same laws of destruction as ordinary organic matter. As a matter of sentiment, the author would prefer well water. If all the mischief be laid to an undiscoverable germ, a terrible doubt is cast on the value of all chemical analysis. There is no well-authenticated case where river water, having received sewage, the dilution being considerable and circumstances favourable for oxidation, has after a flow of ten to twelve miles been manifestly the cause of an outbreak of disease. In all well-proved cases of outbreaks of disease resulting from the use of drinking water, such water would have been unhesitatingly condemned on analysis by the chemist. The author protests most strongly against the startling statement in the report of the Rivers Commission, "that the supply of deep well water would confer on the metropolis *an absolute immunity* from epidemics of cholera." Regarding all the above facts, the author submits the two conclusions: —1. That when sewage is discharged into running water, provided that the dilution of that sewage with pure water be sufficient, the whole of the organic impurity will be got rid of after the run of a few miles. 2. That facts indicate that, whatever may be the actual cause of certain diseases, the *materies morbi* that finds its way into the river at the sewage outfall is destroyed, along with the organic impurity, after a certain flow.

The above paper of about 130 pages contains a large number of tables of analyses, etc.; it was listened to with great interest by a crowded meeting of the Society.

The President said that the large assemblage that evening evinced the great interest taken by chemists in this vital question of a suitable water supply. This interest had been increased by the forcible yet courteous way in which Professor Tidy had supported his views. He would call on Dr. Frankland for any remarks he would like to make.

Dr. Frankland said that at that late hour it was quite impossible to do justice to the discussion of this important paper. He did not know any subject of greater moment to the health of towns. He had listened to many statements founded on opinions, surmises and casual observations, but they had made but little impression, as they lacked the quantitative element. The present paper differed entirely from such statements. Professor Tidy had furnished a large number of facts which deserved serious consideration; as far as he could see there was no fundamental difference between the facts of Professor Tidy and previous results of his own, but considerable explanation was necessary to understand how such diverse opinions could be drawn from identical facts. He would therefore propose that the discussion be deferred until after the paper had been printed.

The discussion was th n adjourned *sine die.*

The cordial thanks of the meeting were given to Professor Tidy for his paper, and the Society adjourned to April 1, when the following papers will be read:—"On β Orcinol," by Dr. Stenhouse and Mr. Groves; "Preliminary Note on the Action of the New Diastase Eurotin on Starch," by R. W. Atkinson; "Note on the Products of the Combustion of Coal Gas," by L. T. Wright; "On Polysulphide of Sodium," by H. C. Jones; "On the Reflection from Copper and on the Colorimetric Estimation of Copper," by T. Bayley; "On Pyrene," by Watson Smith and G. W. Davies; "Analyses of the Ash of the Wood of two varieties of the Eucalyptus," by Watson Smith.

The anniversary meeting takes place on Tuesday, March 30.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, March 11, Mr. R. H. Parker, Vice-President in the chair.

Mr. H. Allen read a paper on "Wind and Weather," illustrated by numerous diagrams and charts. After a description of the atmosphere and its various changes, together with the methods of observing those changes, the author proceeded to notice its general circulation, and the extent to which the latter is modified by the form and motion of the earth, the distribution of land and water, and the inequalities of the surface. The general characters of the climate of different parts of the earth were then described; after which the irregularities to which the weather of Great Britain is subject were discussed, and the paper concluded with an account of the means at the disposal of the meteorologist for foretelling these irregularities.

A vote of thanks was accorded to Mr. Allen for his paper.

A Report on Materia Medica was made by Mr. R. H. Parker on "Coca." The geographical source of *Erythroxylon coca* together with the mode of cultivation and collection of the leaves were referred to in detail, and the varied opinions as to its position in the vegetable kingdom. A minute botanical description of the plant in general and of the leaves in particular was given. The difference was noticed between the apex of the fresh leaf as seen in this country, and that of the dried leaf as imported, the former being blunt and emarginate with a small apiculus in the notch at the apex, while the latter is almost invariably more or less acute and apiculate. The proximate principles of coca leaves, cocaine, hygrine, cocatannic acid and coca wax were described and the medicinal properties of the drug discussed at some length. The report concluded with a description of the microscopic structure of the fresh leaf grown at the Royal Botanic Society's garden, an epitome of which is as follows:—The epidermal layer of the upper surface consists of tubular cells of oblong outline, beneath which are several layers of closely packed small elliptic cells filled with chlorophyll and starch; the epidermal layer of the under surface is composed of tubular cells with sinuous outline, upon which project numerous and regularly disposed hemispherical or half oblong cells, very minute and appearing in the transverse section as tent-like projections; these occur on the under surface only and form a feature peculiar to this leaf. Beneath the epidermal layer is a very loose tissue composed of irregularly branched cells filled with chlorophyll and starch. The microscopic structure of the two longitudinal ridges characteristic of the bark of the coca leaf is very different from that of other portions of the surface of the leaf and closely simulates the structural arrangement of the vein tissue. This appearance scarcely lends support to the theory that these ridges are formed by pressure produced by the peculiar character of venation.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Sale of Patents.

Sir,—I saw some time ago in the advertisement columns of one of our trade journals that a handsome present would be given to any one selling a certain number of a much-advertised patent medicine. Thinking it was only a Yankee "notion," I did not take much notice of it; but when, a few days ago, I saw a pamphlet setting forth that a prize (*sic*) would be given to chemists retailing so many of another patent, I thought it was time something was said about the matter.

There has been a great deal said and written lately about "The Future of the Drug Trade," and surely this is a sign of degeneracy. We ought to be above the Cheap Jack who offers a joint of mutton to his customers.

Are we to pass the high-class examinations we do just to sell any quack medicine that is puffed, and then to be rewarded with a prize like so many school-boys?

We heard the examinations were going to raise the status of chemists and druggists, but they have not done so yet, if we are not above this sort of thing.

Articles which require such desperate efforts to make them popular we could evidently do without, since they cannot recommend themselves, and a chemist in the majority of cases might easily substitute his own preparations for So and So's "cough elixir," "liver pills," etc., etc., with more satisfaction to his customers and a larger profit for himself.

If chemists would combine to do this we should soon have the patent medicine trade a thing of the past, and should no longer be offered such insults.

Ferrum.

"Detection of Traces of Bismuth."

Sir,—On reading the paper under the above heading, by Mr. J. C. Thresh, in the *Pharmaceutical Journal* for February 14, I was surprised to find that he mentions as a discovery of his own a test for bismuth which is contained in a text-book issued in 1874 by Bloxam, entitled, 'Laboratory Teaching,' on page 22 of which the test claimed to be discovered by Mr. Thresh is written as follows:—"To confirm the presence of bismuth add to the original solution (or to the solution of the oxide precipitated by ammonia in hydrochloric acid, even after dilution) a little solution of iodide of potassium; this will produce a red or yellow colour if bismuth be present (or even in a strong solution a brown precipitate of iodide of bismuth)."

As this work is intended as a text-book for beginners of practical chemistry, this may be the reason why Mr. Thresh has overlooked it.

52, *Alexandra Road, Kilburn Park, N.W.* J. Woodland.

The above has been submitted to Mr. Thresh, whose reply is as follows:—

Sir,—Before reading Mr. Woodland's letter I must acknowledge that I was not aware that the potassium iodide test mentioned by me in the paper entitled "Detection of Traces of Bismuth," had previously been published, no mention of such a method being found in any of the more advanced treatises on practical chemistry to which I have access.

But Mr. Woodland appears somewhat to mistake the import of the paper, which certainly was not to laud a new test for bismuth discovered by myself, but had special reference to the detection of traces of bismuth in complex mixtures. The whole of the paper relates to experiments made to determine the reliability of the method under most varied circumstances, and knowing the exceeding difficulty of ascertaining in all cases whether a reaction has before been observed, chemical literature being now so enormous, special care was taken in wording the article to avoid as far as possible any pointed allusions to the originality of the test.

As showing under what circumstances potassium iodide may be employed for detecting traces of bismuth in presence of any or all of the commonly occurring metals, any slight value which the paper may have originally possessed does not appear to me to be in any way decreased by the fact which Mr. Woodland has kindly pointed out.

Buxton, March, 1880. John C. Thresh.

J. Gillett and "*Chemist*."—We refer you to the Secretary of the Pharmaceutical Society for any further information you may require upon the subject referred to in your letters.

C. Ellisson.—Copies of the Manchester Price List may be obtained from Mr. Silverlock, printer, Blackfriars Road, S.E.

R. Calvert.—At present it is impossible to say.

Communications, Letters, etc., have been received from Messrs. Pattison, Conroy, Parsons, Tebbutt, F. Smith, Fletcher, Chichester, Amicus, Alpha, E. L.

JAPANESE BELLADONNA.

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society.

In January last, I received from Professor Flückiger, of Strassburg, a specimen of a root labelled "Japanese belladonna," and which, in his opinion, "seemed to contain atropine."

The root was totally different in character to true belladonna; but, having at that time no clue to its botanical source, I put it on one side for future investigation.

My attention was again called to this belladonna root by a sample received, a few days ago, from Messrs. Hearon, Squire and Francis, who informed me that it was offered at a drug sale in London early this month, but that no one bid for it.

Just at this time I had occasion to refer to a figure of *Scopolia carniolica*, Jacq.,* and was struck by the remarkable resemblance between the root of this plant, as figured by Jacquin, and the Japanese belladonna.

On turning to the recently published work by Franchet and Savatier on Japanese plants, I found that an allied species, *S. japonica*, Max., occurs in Japan, and that no other solanaceous plant there described would be likely to have a stout rhizome like that of scopolia, most of the solanaceous plants of that country being either annuals, or suffruticose perennials like dulcamara. On referring to Maximowicz's description of *Scopolia japonica*,† I found that he considered it to be the *Atropa Belladonna* of Japanese botanists. Although Franchet and Savatier record it only, on the authority of Tschonaski, from near streams on the highest mountains of Nikoo, and on that of Tanaka, from an unknown locality, yet it is well known that the Japanese cultivate several solanaceous plants, and probably this one among them since it is figured both in the 'Sô mokou Zoussetz,' vol. iii., fol. 17 (under the name of *Hashiri dokoro*), and in the 'Phonzou Zoufou,' vol. xxi., fol. 22 (under *Ro outo*). It would seem, therefore, to be a well known plant, and may reasonably be supposed to be as hardy as the *S. carniolica* of English gardens, and the root might well be an article of commerce in Japan.

I entertain no doubt, therefore, that the Japanese belladonna root which has lately been offered for sale in Europe is the root of *Scopolia japonica*, Max. This species differs from the European one (*S. carniolica*) chiefly in its more acute leaves, which have constantly longer petioles, in the style being curved or declinate instead of straight, and in the teeth of the calyx being sometimes very unequal. The fruit is unknown. In size, the Japanese plant equals robust specimens of the European species.

The rhizome, as met with in commerce, varies in length from 2 to 4 or 5 inches, and on the average is ½ inch in diameter, cylindrical or slightly compressed, rarely branched, knotty, and more or less bent and marked on the upper surface with circular, disc-like scars where the leafy stems have arisen. It is the slightly alternate disposition of the nodes from which these stems arise which gives the rhizome its knotty character. No rootlets remain attached to the rhizome, but each node is surrounded with one or more indistinct rows of dots or scars, apparently indicating their presence. The rhizome is externally of a brown colour, not white when abraded, as in belladonna, of a pale brown colour internally, speckled with

Japanese Belladonna Root.—The left hand figure represents the root, the right hand one the twisted rhizome, and the central one a transverse section of the rhizome with the vascular bundles more marked than usual.

numerous very minute dots, which appear under a lens to be white and starchy, and scattered through a resinous or horny looking structure. The bark is so similar in colour and so closely applied to the meditullium as not to be readily distinguishable by the naked eye. The odour is slightly mousy and narcotic, and the taste hardly any except a slight bitterness. From portions which were mixed with the rhizome, it would appear to terminate in a genuine root of some length and thickness.

The recent investigations by Ladenburg (see below), concerning the relationship of the solanaceous alkaloids to each other, seem to point out that the active principle of this drug might be worth examination, as well as that of its European congener.

A few remarks on the genus *Scopolia* may perhaps not be out of place here. It was founded by Jacquin on the peculiarity of the fruit, which is a capsule. The capsule, with the calyx and pedicel, fall off together, and after a time, the capsule dehisces transversely, like that of henbane. In colour of the flower and in foliage the plant so closely resembles belladonna, that were it not for the fact that belladonna has a baccate fruit and no rhizome, even a good botanist might be led to call it an *Atropa*. The genus is named after Antoine Scopoli, an Idrian physician and professor of botany, who appears to have been the first to notice the European species.

The Japanese scopolia has the leaves often more or less deeply dentate, or even repand-dentate, in which character it presents an analogy to *Solanum nigrum* in this country, the leaves of which may sometimes be found quite entire and sometimes coarsely-toothed.

* Jacquin, 'Obs. Bot.,' p. 20.

† Max., 'Mel. Biol. in Bull de l'Acad. Imp. des Sc. de St. Pétersbourg,' vol. viii., p. 629.

NOTE ON DUBOISINE.*

BY A. LADENBURG.

Recently a new alkaloid has come into commerce, derived from an Australian plant, *Duboisia myoporoides*. The plant is at present generally referred to

* *Berichte d. deutschen chemischen Gesellschaft*, xiii., 257.

the Solanaceæ, notwithstanding that morphologically it is far removed from *Atropa* and *Hyoscyamus*. Upon the preparation and properties of this alkaloid few communications have been published, and among these it appears to me that only that by Gerrard* is of importance. That author describes the alkaloid as a yellow oil, which in its chemical and physiological aspects approaches to atropine; indeed he appears to consider the identity of the two possible, notwithstanding that he has observed some differences between them. Among the known properties of duboisine is its powerful mydriatic action, which alone is remarkable, and this has already procured for it a considerable place in the pharmacopœia, or, better still, an important *rôle* in ophthalmic clinics. But although the action of duboisine upon the human pupil is very similar to that of atropine, it is at present chiefly used when individuals who have an idiosyncrasy against atropine, or who have become intolerant of it, have to be ophthalmically examined. From this use of duboisine a difference in this base from atropine must be assumed, and a chemical examination of duboisine appeared to me desirable, in order to ascertain whether in its composition it was allied to atropine, and whether it belonged to the class of tropeines.†

I procured from Merck, in Darmstadt, two grams of sulphate of duboisine, and received it in the form of a brown resin, evidently the evaporation residue of an aqueous solution. This was hygroscopic, and readily soluble in water. From this solution there was precipitated by potassium carbonate an oil that did not solidify. The reactions were similar to those of atropine, but the precipitates almost throughout were resinous. According to the method adopted for the purification of this kind of alkaloid in the case of hyoscyamine,‡ I directed my principal attention to the gold salt, and this I soon succeeded in bringing to the solid state by fractional precipitation, *i.e.*, by removing the resin first precipitated and the oil that separated after longer standing. The gold salt so obtained was recrystallized from hot water, and finally obtained in the handsome lustrous crystals so characteristic of the gold salt of hyoscyamine. After drying, the melting point was 159° C., and the composition corresponded to the formula—

$$C_{17}H_{23}NO_3,HCl,AuCl_3.$$

	Found.	Calculated.
C	32·23	32·48
H	4·00	3·82
Au.	31·00	31·23

The gold double salt in warm aqueous solution was decomposed by sulphuretted hydrogen, filtered from the gold sulphide, and the colourless solution strongly concentrated. This was after cooling treated with potassium carbonate in excess, when a precipitate was formed that at first was amorphous and gelatinous, but after some time was transformed into beautiful small needles. These were removed by filtration, washed with a little water, and dissolved in chloroform, in which they were very soluble. The solution was twice shaken with water, to remove potassium carbonate, and then evaporated in an exsiccator. There remained a well crystallized tolerably hard mass, the melting point of which was found to be 106·5° C., whilst that of pure hyoscyamine is 108·5° C. The analysis corresponded to hyoscyamine, the loss depending probably upon traces of admixed potassium carbonate.

	Found.	Calculated.
C	70·17	70·59
H	7·82	7·95

The qualitative reactions of this base are identical with those of hyoscyamine. I have not yet published the latter; but the following will serve for both alkaloids:—A dilute hydrochloric solution gives with picric acid a yellow oil that almost momentarily solidifies to handsome regular tables. Platinum chloride produces no precipitate. Iodine in potassium iodide causes at once a separation of a crystalline periodide. Tannic acid produces a slight turbidity; iodide of mercury and potassium a white amorphous precipitate.

I believe through the foregoing investigation the identity of duboisine and hyoscyamine to have been proved.

* *Pharmaceutical Journal*, [3], viii., p. 787.
† See before, p. 751.
‡ See before, p. 751.

NOTE ON DATURINE.*

BY A. LADENBURG AND G. MEYER.

It is assumed on the ground of an investigation by Von Planta† that daturine is identical with atropine. Planta's experiments show, however, only that both alkaloids have the same composition, which alone is not sufficient to establish their identity. For instance this author states that the gold salt of daturine melts between 90° and 100°, whilst he places the melting point of the gold salt of atropine quite correctly at 135° C. He mentions also that the melting points of the free bases nearly correspond, being respectively 88° and 90° C. But as it has recently been proved that atropine first melts at 113·5 a renewed examination of daturine appeared to be desirable.

Daturine was obtained in a tolerably pure condition from Merck, in Darmstadt, as a scarcely crystalline white powder, melting at 90° to 95° C. The attempt to purify it, like atropine, by dissolving it in a little alcohol and pouring this solution into water gave a jelly-like mass, which changed only slowly into an aggregation of fine needles, an appearance which is never observed in atropine. The melting point of this preparation lay above 100° C. A repetition of the experiment gave only so small a yield that this method of purification was given up as impracticable.

A larger quantity of the alkaloid was now converted into the double gold salt, which at first separated out oily, but very quickly solidified. After recrystallization from hot water it was obtained in shining golden yellow lamellæ, having quite the appearance of the gold salt of hyoscyamine and also possessing the same melting point, 159° C. Analysis of this gold salt gave—

	Calculated for $C_{17}H_{23}NO_3HClAu\,Cl_3$	Found.
C	32·48	32·52
H	3·82	3·99

The gold salt was freed from gold by means of sulphuretted hydrogen, and the resulting hydrochlorate in tolerably concentrated solution was precipitated by potassium carbonate. The precipitate was taken up by chloroform and this upon evaporation left behind a hard crystalline mass which after drying on a water-bath melted at 105-106° C. To purify it further it was recrystallized from hot toluol,

* *Berichte d. deutschen chemischen Gesellschaft*, xiii., 380.
† *Ann. Chem. Pharm.*, lxxiv., 252.

from which it separated on cooling in needles. After longer drying at 100° C. the preparation melted at 105-108° C. The melting-point of hyoscyamine lies at 108·5° C.

Analysis gave—

	Calculated for $C_{17}H_{23}NO_3$	Found.
C	70·58	70·47
H	7·96	8·33

In the quantitative reactions also no difference was shown between daturine and hyoscyamine. Picric acid produced in the acid solution an oily precipitate, quickly solidifying to right-angled lamellæ. Tannin produced only a slight turbidity, but after neutralization a thicker and whiter precipitate was formed. Iodine in iodide of potassium produced a scarcely crystalline brown powder and iodide of mercury and potassium formed a white cheesy precipitate, whilst platinic chloride, mercuric chloride and potassium ferrocyanide gave no precipitates in dilute solutions.

We believe, therefore, that we are warranted in affirming the identity of daturine with hyoscyamine and duboisine.

It is interesting to notice that there occur in nature only two strongly mydriatic acting alkaloids, atropine and hyoscyamine, which are isomeric with one another and stand extraordinarily near to each other.

NOTES ON THE LIVER-ROT IN SHEEP.

BY F. PORTER SMITH, F.R.G.S.,

Medical Officer of Health, Shepton Mallet.

Whilst the wool of the sheep was undoubtedly the first product of this useful animal to attract the attention of man, the carcase has of late years become the main object of the sheep-breeder. In many foreign countries the flesh is disliked, or at least rarely eaten. The Calmucs and Cossacks seldom touch it, and the Mongols make a wine from it. In some parts of America, and in Spain, mutton is scarcely considered fit for food. The occurrence of the liver-rot, coe, or bane, is likely to create a prejudice against what is practically the most important meat element in the diet of the sound, and especially of the sick members of our highly civilized country. Apart from these latter considerations, the study of the diseases of such an animal as the sheep, so widely spread all through the land, must tend to throw light upon the epidemic diseases of mankind. It speaks little for the oversight of the Government of the day that, while an expensive network of sanitary agencies is stretched all over these islands, nothing scarcely has been done to closely investigate the origin, extent and means of prevention of this bane of the farmer. Epizootics have long been a recognized subject of study, but there is a new world of facts to be adventured upon in this branch of practical agriculture. As early as the year 1532, in the "Book of Husbandrye," by Sir Anthony Fitzherbert, the principal features of the liver-rot were well known, and its effects on the health of the sheep carefully described. At that period, from the absence of draining, the liver-rot must have been much more (proportionably) destructive than it is now. Thanks to the more general and more intelligent adoption of systems of drainage, the estimate of a writer of some thirty-five years ago that "more than a million sheep and lambs *die* of it annually," must have been too high for the average of later years. In some seasons this number has been much exceeded. In the winters of 1830-31 it was more than doubled, and in some of the midland, eastern and southern counties, where the pestilence was most rife, the existing race of sheep was almost entirely swept away. In no season for the last thirty-five years, have I had any difficulty in procuring coed livers from both "urban" and "rural" unsanitary carcases.

The disease is not confined to this country. Just as the "measle," or trichina, is as common in the pig-market of Central China as in Somersetshire, so the Mongol, the Norwegian, the Spanish, the North American, and the Australian flocks are scourged with this pest, even in *natural* pastures.

Recent discoveries have led to the assignment of several forms of minute vegetable and animal growths as the probable causes of human diseases, little suspected to be connected with "foreign residents" in the blood or other parts of the body, of which we have only a gross instance in the too familiar disease "worms." The liver-rot, as it occurs in sheep, is due to the presence in the gall-bladder, and bile-channels of the liver, of a small parasitic creature, called the "fluke," from its resemblance (on a small scale) to a fish of that name, more commonly called a flounder. The liver-fluke (*Distoma*) is met with in the sheep in two forms, the *larger* (*Distoma hepaticum*), or liver-fluke proper, in shape very like a small sole, full at each end of the body, which is, when full-grown, from three-quarters to an inch and a half long, and the *smaller* (*Distoma lanceolatum*), which was formerly thought to be the juvenile stage of the other, a little more than a quarter of an inch long, and tapering at each end, like a surgical lancet. They have two suckers, or mouths, at the head-end, hence the name "Distoma," or "double-mouthed." The body is soft, gelatinous, semi-transparent and somewhat white in colour. With the bile of the liver, on which they seem to feed, and the variegation of the surface, caused by the bunches of eggs at the indented edges, these flukes have been compared to small leaves. Each fluke is both male and female in itself, and more than a thousand flukes have been positively counted in one liver. It may be easily inferred how universal must be their powers of propagation by the minute yellow eggs, or spawn (two hundred of which would only measure an inch) which fill the biliary channels of the rotting liver. This organ instead of having a thin, bevelled edge is rounded off at the margin, pale, shrunken, easily torn through, somewhat greasy in tecture, and sometimes covered with a callus on the upper surface. But the most serious changes are wrought in the biliary channels, or ducts, where the flukes are found, and not in the veins as is often asserted. These ducts become enlarged and toughened, and are stuffed with flukes, and the excrement and eggs of the creature, mixed with slime. In some livers the flukes die, and an earthy callus is all that is left to show where a whole nest of them once finished their biography.

The effects of these bile-suckers upon the health of the infected animals are very striking at first; if well fed the animals put on fat rapidly, but this does not deceive the butcher who turns up the eyelid and finds it pale and dirty-looking, if not slightly yellow. The membrane of the eyelid should be ruddy and worked with veins, filled with bright red blood, and the little caruncle, or bunch of flesh, at the corner of the eye should be plump and florid. The skin, when the wool is parted, is seen to be pale, sallow, jaundiced often, and very loose upon the muscles beneath, which are wasted and unhealthy-looking. The legs become dropsical and very weak, and as the disease goes on fat disappears, the appetite fails, the bowels are either costive or very loose, and the belly eventually becomes potted full of water. The wool comes off easily, and the skin becomes mottled, bruising with the slightest blow. The actual course of the disease to death is by emaciation, varied by jaundice, general dropsy, diarrhœa, and other complications, which finish up the poor animal in from two to six months from the commencement of a disease, which, in a more elevated being, a sailor might put down for scurvy, and a rabid teetotaller as the effects of unlimited three-pennyworths of gin and brandy. In fact "heavy wet" has a good deal to do with "liver-rot" in sheep, though not all of the blame can be properly set down to this single cause. The fluke is first found in the upper part of the small gut, where the main gall-passage is found, and the creature seems to pass by some instinct up this route to the liver. After wet seasons, from November to April, the eggs of the fluke are met with in the droppings of sheep. These are brought down in the bile from the infected liver, and are capable of retaining their vitality for a long period. Flukes themselves are found under the same circumstances at all periods. Being full of myriads of eggs, they probably die, and add to the store of eggs which are the omnipresent germs of the disease. It is probable that the sheep itself is not capable of perfectly hatching these germs in its own body into full-grown flukes. Some eggs seem to be directly hatched, and the small creatures, variously described as young tadpole-like, or ciliated, make from the ditches, ponds, etc., where the sheep drink them down with the water. In other cases aquatic insects, mud-snails, etc., swallow these eggs, and partly hatch them in their minute bodies, which are eaten with the herbage by the sheep, and the creatures are further developed in the food-canals of the animal. It is probable that in healthy sheep the stomach is able to digest and destroy most of these germs, but if the food be poor, watery and too same in its character, and the sheep consequently suffer in its nourishment, these germs get the upper hand, and the animal becomes a mere nurse for these pests. It is true that the wet weather produces a direct effect on the disease by weakening and chilling the animal, and by promoting the growth of inferior herbage, such as the carnation-grass, which fails, from its watery nature, to nourish the animal. But wet weather means sunless days. The eggs or germs, or those mud-snails which harbour or hatch the germs, cannot bear strong sunlight. On those lowering dark days called "blights" the growth of aphides, bugs, and small insects of all kinds is something enormous. On the appearance of the sun they crawl for shelter to the under-surfaces of leaves, blades, etc., and a continuance of clear sunny weather cooks these eggs, or germs, or destroys these thin skinned creatures, so that with the vigour of brighter days, and the checking of the numbers and strength of these germs, the sheep escape, or fight out fairly their battle with these pests. The liver-rot is in ordinary seasons confined to wet land, does not spread in dry seasons, or during hard frosts, and seldom shows itself in dry sandy soils, except after a prolonged rainy season. Autumn and winter are the seasons in which the liver-rot prevails most, that is some time after the fluke-germs have been inoculated into the system of the infected animals. It would appear that the fluke-germs may lie dormant in some animals, until some favourable circumstances conspire to develop the active disease of the liver. The liver-rot does not seem to originate in higher lands, if well drained, although it may be conveyed there in the sheep, or by some other means. Ground much trodden down by close and overstocked feeding seems to be more liable to the disease. It is generally believed that at night, or while the dew is on the grass, the infection spreads much more than by day. It has been therefore strongly recommended that the sheep should be folded early in the evening, and not be released until the dew is gone off. Overcrowding should also be avoided, and the droppings carefully collected and burnt in cases of actual infection. The practice of allowing sheep to graze on the wayside, where rushes and other plants often indicate the damp nature of the soil, is also to be avoided. The rapidity with which sheep are tainted is very remarkable. "A farmer in the parish of Woraghy (Lincolnshire) took twenty sheep to the fair, leaving six behind in the pasture on which they had been summered. The score sent to the fair, not being sold, were driven back to join the other six left. In the course of the winter every one of the score (distinctively marked) died of the liver-rot, but ths six left behind in the field all lived and did well. The loss of the score can only be accounted for on the belief that they had gone over some infected ground." A second case is still more conclusive of infection. "A sheep, belonging to a lot of twenty, having broken its leg in Burgh fair, in Lincolnshire, the nineteen others were placed in a common at the end of the town until a cart could be got to remove the lamed animal. The nineteen all died of the liver-rot, while the one lamed remained sound." Common sense seems to suggest that, as there is proof and possibility of infection, so that no land can be kept free from the disease, whether well-drained, or well-situated on higher ground or lighter soil, the greatest care should be taken in preventing access in any way to the infection. There is no proof of contagion, that is infection, by mere contact of one diseased animal with another.

Hares, rabbits, oxen, deer, horses and asses are all liable to be attacked by liver-rot, but the disease is less virulent than in the case of the sheep. The size of the cow seems to render it less liable to suffer from the flux and irritation caused by the fluke, whilst in the case of the smaller animals, such as the hare, the struggle is more equal, and more fatal. To the question how the flukes work the destruction of the animal, it is not easy to reply. They have been supposed to excite a serous secretion from the lining of the gall-channels, which, by its amount and loss to the system, greatly impoverishes the blood. This interference with the proper formation of healthy bile, a necessary element in the assimilation of the food and the regular action of the bowels, seems enough to account for the loss of flesh and strength in the infected animal, without mentioning the permanent irritation set up in the largest organ of the belly. As preventive measures have incidentally been mentioned, such as draining, fencing of stagnant ditches, provision of pure running water, isolation, use of dry artificial food, etc., the question of what positively curative measures can be adopted only remains. That many animals will still die, even when removed to a healthy pasture, follows necessarily from the facts alluded to in the history of the fluke-disease. The thoroughly infected animals carry the enemy with them, only to flourish in the new situation, but many of them will recover. The use of salt, placed in lumps (of rock salt) where the sheep can conveniently lick it, or added to their water, or artificial food, has been attended with marked benefit. The salt seems to destroy the flukes already in the liver. The use of hyposulphite of soda, sal-ammoniac, sulpho-carbonate of soda, and other corrective or antidotal substances is also worth a trial. Of all mere physic I have most confidence in the chlorate of potash, a cheap and comparatively tasteless substance, which has been very beneficial in liver-rot. That in the mixed plants of natural and mountain pastures there are herbs of a curative influence, such as the cow-wheat, yellow rattle, buck-bean, wild liquorice, wild thyme, gentian, wild camomile, etc., which are the medicines of the grazing animal, just as grass is for the dog or cat, there can be no doubt. Whilst these plants find no favour with the farmer, who looks jealously for clover s and pure grasses, they may afford a beneficial and alterative diet to the animal. We wonder at the perversity of the cow or sheep which grabs at the leaves of the bushes in the hedgerow of the field, or the wayside, or consumes the twigs, leaves and bark of the chance-fallen tree in the pasture, but these new dishes may have their place in the modern, too much restricted diet of these animals. The hardihood of the ass is, at least, associated with some such similar promiscuous and perverse browsing on thistles, brambles, and other "unclean" feeding. The mixing of condiments, such as ginger, of drugs, such as gentian, with ground cake, and the use of "cattle-foods," "pig-spices," etc., are all plans worthy of trial. But to sit still until State-aid and red tape regulations shall have regulated away this baneful disease, which is no new thing among us, would be unworthy of the restless, enterprising, blood-resisting English yeoman. Let our cattle societies commission their standing veterinary counsel to investigate this liver-rot, ere the plague has passed away from our midst for a time, only to return again to punish indifference and relapse.

As the fluke has been found in the human liver, it is desirable that all mutton should be selected, inspected, and carefully cooked, say by thorough roasting. It is a pity, however, that any panic should seize our minds on this subject of mutton-eating. The *Lancet*, our highest medical sanitary authority in this country, says distinctly that "the flesh of sheep which have been affected with this verminous disease, cannot be said to be positively dangerous as food, though it must be greatly reduced in nutritive properties." This is meant to apply, beyond doubt, to animals greatly affected by the disease. The livers should be certainly not consumed as food, but destroyed by burning, or some other similar effective means, as they swarm with the flukes and their eggs. In fact all livers should be avoided by delicate feeders during the present epidemic.

That other forms of chill, rot, etc., are affecting grazing animals of all kinds at the present time, as the result of the past wet seasons, there can be no doubt. The disease called "ergot," or the "spurred" condition of any sort of grain, is very common in wet seasons. These black seeds result from the infection of the grain by a parasite, which in late sunless seasons happens to ripen nearer to the critical period of the growth of the corn, than in normal years. The seeds of the grasses are also affected by "ergot," and these ergotized seeds produce foot-rot, "slipping" of the young, and also certain symptoms likely to be confounded with the liver-rot, or foot-rot.

The ray-grass (commonly mis-called "rye" grass), nearly related to the darnel grass, is not always safe as a herbage. The bitter vetch, the meal of which is often mixed with pigs' food, sometimes produces "red water," but curiously enough not in sheep fed upon the meal. Darwin, in his 'Origin of Species,' 1879, page 13, makes the curious observation that white sheep are injured by feeding on certain plants and grain, whilst dark sheep escape the bad effects.

The moral of all these odds and ends of remarks upon this large subject, the well of which is deep, and I, perhaps, have little to draw up the truth from it with, is that there is much scope for study, dealing with, and, I believe, stamping out of this pest—this curse of the sheep-farmer, the liver-rot.

A METHOD FOR THE PROXIMATE ANALYSIS OF PLANTS.*

BY HENRY B. PARSONS.

At the request of my friend and former instructor, Professor Albert B. Prescott, of the University of Michigan, I have prepared the following scheme for the analysis of plants. This method will appear, in substance, in his new proximate 'Organic Analysis,' now nearly completed.

The plan submitted is the outgrowth of a quite varied experience in the proximate analysis of plants; no claim to originality is made, the sole aim being to arrange in one simple scheme those methods best suited to insure accuracy.

It must be premised that no one method is applicable in all cases, and that the operator will so modify and adapt the proposed processes as to best attain the truths he seeks. If the present scheme shall serve merely as an example, to be improved upon as discoveries multiply, it will at least have served to stimulate to the more thorough study, this side the Atlantic, of a much neglected, yet very important, branch of analysis. The American student, when first entering upon the study of plant analysis, is perplexed and disheartened, owing to the lack of any elementary treatise in which he may find directions for the quantitative estimation of the various plant constituents. The works of Rochleder and Wittstein, while giving most valuable assistance in the investigation of special constituents and their separation from large quantities of the crude herb, still fail to give clear and practicable directions for the quantitative estimation of each constituent. Von Müller's latest enlarged edition of Wittstein's 'Plant Analysis' gives a scheme, most excellent in many respects, yet cumbered with tiresome methods of extraction and manipulation, which serve to unnecessarily lengthen the time required for making the analyses without increasing the accuracy of results obtained.

Too many American analyses of plants have been summarized thus: "The plant contains gum, resin, tannin, a volatile oil, and a peculiar bitter principle, to which may be ascribed its medicinal activity." The foreign journals bring occasionally most excellent examples of accurate examinations of vegetable substances; as instances may be cited the examination of ginger, by J. C. Thresh,* and of ergot,† aloes,‡ and other articles, by Professor Dragendorff. To these sources the student must look for his best models, until a more thorough and systematic training is given American students in proximate organic analysis.

In the following plan now presented, the use of the apparatus for repercolation is strongly urged for the extractions with benzole, alcohol, and other volatile solvents. A very simple and inexpensive apparatus has been described by various American and foreign chemists.§

"In any convenient water-tight vessel is a worm of block-tin pipe, having an internal diameter of 9 mm., and a length of about 2·5 metres. The lower (external) part of this worm is fitted, by an ether-soaked velvet cork, to a glass percolator having a diameter of 4 c.m., a length of 20 c.m. to the constriction, and 5 c.m. below. Within this percolator is a smaller tube, flanged at the top and bottom, and suspended by fine platinum or copper wires. This tube has a diameter of 2·5 to 2·8 c.m., and a length of 14 c.m.; the bottom is covered by filter paper and fine washed linen,|| tied on by linen thread. The weighed sample of the finely powdered herb is placed within this tube for extraction. A light glass flask, weighing about 30 grams, is fitted by an ether-soaked cork to the outer percolator." Having introduced the solvent into this glass flask, the connections are made secure, and heat is applied, by a water-bath, to the flask. If the liquid is too slowly volatilized, the addition of a little common salt to the water in the bath serves to remove the trouble.

Next in importance is the use of a good tared filter. The form originally presented by F. A. Gooch¶ leaves little to be desired. It may be made by perforating with fine holes the bottom of an ordinary platinum crucible, and fitting it accurately to a perforation made in a large rubber cork; this cork connects it with a receiving vessel, which, in turn, is connected with a Bunsen's pump. Fine asbestos suspended in

* Reprinted from the *American Chemical Journal*, vol. i., No. 6.

* *Pharmaceutical Journal*, [3], x., 81, Aug., 1879.

† *Pharmaceutical Journal*, [3], vi., 1001, June 17, 1876.

‡ *Werthbestimmung*, 1874, p. 110.

§ B. Tollens, *Zeitsch. f. Anal. Chem.*, [17], 320, 1878; *New Remedies*, [7], 335, Nov., 1878; W. O. Attwater, *Proc. Am. Chem. Soc.*, [2], 2, p. 85; S. W. Johnson, *Am. Jour. Sci. Arts*, [13], 196; H. B. Parsons, *New Remedies*, [8], 293, Oct., 1879.

|| In place of the linen and filter paper may be substituted fine brass or platinum wire gauze. Asbestos suspended in water may then be poured in to form a fine felt. The tube can then be dried and weighed, and the amounts extracted may be found by the loss of weight of the tube and substance. A little experimentation will show the operator how to prepare and use the tube. It is but an adaptation of the Gooch's filter here recommended.

¶ 'Proc. Amer. Acad. Sci.' [13], 342, 1878; *New Remedies*, [7], 290, Oct., 1878; *American Chemical Journal*, [1], 317.

water is poured into the crucible, the air exhausted from the receiving vessel, and thus a firm thin layer of asbestos is deposited on the bottom of the crucible. After ignition and weighing, the crucible is ready for the reception of any precipitate which it is desired to separate and weigh.

The use of these two pieces of apparatus will eliminate two grave sources of error, viz., incomplete extraction of soluble matters, and inaccuracies introduced by the use of tared paper filters.

The other necessary apparatus is simple, and includes one or more platinum crucibles and evaporating dishes, accurate burettes and graduated cylinders, a good balance, sensitive to at least ·5 milligram, and the ordinary glass and porcelain ware found in all laboratories.

It is assumed that whoever attempts the analysis of a plant is informed as to the normal constituents to be sought, that he has had considerable experience in inorganic analysis, and in the identification of the principal classes of proximate constituents which he now undertakes to estimate quantitatively. Accordingly tests for identification will not be here presented; they should, however, never be omitted. The necessity of recording in detail all physical and chemical peculiarities, with every weight that is taken, is self-evident.

A Method for the Proximate Analysis of Plants.

I. *Preparation of Sample.*

The air-dry specimen should be carefully examined, and all extraneous substances removed. The entire sample should then be ground, or beaten in an iron mortar, until it will all pass through a sieve having from forty to sixty meshes to the linear inch. After thoroughly mixing this sample, take of it 100 grams, which should be further pulverized until it will all pass through a sieve having from eighty to one hundred meshes to the linear inch. From this smaller portion remove all iron, derived from mill or mortar, by use of a magnet. Then place in a clean dry bottle, which should be labelled and securely corked. This small sample is for the analysis; the larger portion should be reserved for the separation of those proximate principles which seem, from the analysis, to be worthy of more extended investigation.

II. *Estimation of Moisture.*

Dry rapidly, at 100 to 120° C., 2 or more grams of the sample; the loss of weight equals moisture, and occasionally a little volatile oil. In some cases it is best to dry at a lower temperature, and at other times the drying should be conducted in a stream of hydrogen or carbonic anhydride.

III. *Estimation of Ash.*

In a weighed crucible gently ignite 2 or more grams of the sample until nearly or quite free from carbonaceous matter; the heat should not be permitted to rise above faint redness, or loss of alkaline chlorides may occur. Weigh this residue as crude ash, and in it determine—

a. Amount soluble in Water.—This portion may contain chlorides, sulphates, phosphates, and carbonates of potassium and sodium, also slight amounts of chlorides and sulphates of calcium and magnesium.

b. Insoluble in Water; Soluble in dilute Hydrochloric Acid.—The residue from *a* should be treated with a slight excess of hydrochloric acid, and evaporated in a porcelain dish over a water-bath until all free acid has been expelled; it should then be again moistened with hydrochloric acid, water added, and be filtered from any remaining insoluble substances. This treatment removes carbonates (with decomposition) and phosphates of calcium and magnesium, sulphate of calcium, and oxides of iron and manganese.

c. Insoluble in Water; Insoluble in dilute Hydrochloric Acid; Soluble in concentrated Sodic Hydrate.—Boil the residue from *b* with a solution containing about 20 per cent. of sodic hydrate. This treatment removes combined silica of the ash. The residue still insoluble is sand and clay which adhered to the specimen; this residue should be separated, washed thoroughly, and weighed.

Always determine the amounts removed by the above treatment by weighing the dried, undissolved residues. The ash, as thus estimated, usually includes a little unconsumed carbon, together with more or less carbonic anhydride (CO_2), most, or all, of which was not originally present in the plant, but was produced by the combustion of the organic matter. For most purposes it is unnecessary to estimate and exclude from the ash this carbonic anhydride; where great accuracy is desired, a complete quantitative analysis should be made, the amount of each base and acid being determined, and in the statement of results only those should be included which existed originally in the plant. For this purpose it is necessary to burn from 20 to 100 grams of the sample; for further directions consult text-books on agricultural and inorganic analysis.

IV. *Estimation of Total Nitrogen.*

In ½ a gram or more of the sample determine total nitrogen by combustion with excess of soda-lime, as directed by Professor S. W. Johnson and E. H. Jenkins.* If later in the analysis no other nitrogenous substances are discovered, calculate the total amount of nitrogen to albuminoids by multiplying by 6·25. When other nitrogenous compounds are present, their contents of nitrogen should be determined directly or by difference; after proper deductions have been made, the remaining nitrogen should be calculated to albuminoids.

V. *Estimation of Benzol Extract.*

In a suitable apparatus for repercolation completely exhaust 5 grams of the sample with pure coal-tar benzol (sp. gr. ·85—·88, boils at 80—85° C., leaves no residue when evaporated). The extraction requires from four to six hours' continued action of the solvent. Carefully evaporate this liquid to dryness in a weighed dish, and record its weight as total benzol extract. This extract may contain volatile oils and other aromatic compounds, resins, camphors, volatile or non-volatile organic acids, wax, solid fats, fixed oils, chlorophyll, other colours, volatile or fixed alkaloids, glucosides, almost no ash.

To the weighed extract add water, again evaporate on the water-bath, and complete the drying in an air-bath at 110° C. In absence of other vaporizable substances the loss of weight approximates the amount of volatile oil. If the presence of a volatile alkaloid is suspected (from a characteristic odour or an alkaline reaction), add a drop of hydrochloric acid to prevent its volatilization. Camphors are partially dissipated by this treatment; hence, when they are present, this evaporation should be dispensed with.

Treat, now, the residue with a moderate amount of warm water, all to stand until cool, then filter through fine paper by aid of a Bunsen's pump. In half of the aqueous filtrate determine total organic matter and ash; test the remaining half for alkaloids, glucosides, and organic acids by salts of lead, silver, barium and calcium. Care must be taken not to mistake a slight amount of suspended matter, frequently resinous, for other substances actually soluble in water.

The still undissolved residue should be again removed from filters and dishes by solution in benzol, the benzol solution being again evaporated to dryness. Treat this residue with warm, very dilute hydrochloric acid, allow to cool, and filter through paper. The filtrate should be tested for alkaloids and glucosides. The amount extracted by acid, if any, may be determined by weighing the still undissolved residue. Treat this residue with several considerable portions of 80 per cent. alcohol (sp. gr. ·8483 at 15·6° C.), allowing at least an hour for each treatment. Filter through paper and determine by evaporation the matter dissolved; this usually consists of chlorophyll with one or more resins, which may sometimes be separated by use of petroleum, naphtha, chloroform, or

* 'Report Conn. Agric. Exp. Station,' 1878; *Chemical News*, July 18, 1878, p. 28; *Amer. Chem. Journ.*, 1, p. 77.

similar solvents. Purified animal charcoal removes chlorophyll and some resins from alcoholic solution, while certain other resins are not removed. If camphors were present in the plant the greater portion will be found in the alcoholic liquid.

The substances undissolved by 80 per cent. alcohol may be fixed oil, solid fat, wax, and very rarely a resin; their separation may be attempted by refrigeration and pressure, or by use of ether, chloroform, etc.

Recapitulation.

1. Loss by evaporation, with precautions : *volatile oil.*
2. Soluble in water : *alkaloids, glucosides, organic acids.*
3. { Insoluble in water. Soluble in dilute acids. } : *Alkaloids,* possibly *glucosides.*
4. { Insoluble in water. Insoluble in dilute acids. Soluble in 80 per cent. alcohol. } :
   - *a.* Removed by animal charcoal : *chlorophyll, some resins*
   - *b.* Not removed by animal charcoal: *some resins.*
5. { Insoluble in water. Insoluble in dilute acids. Insoluble in 80 per cent. alcohol. } : *wax, fats, fixed oils.*

It is frequently advantageous to extract the plant with petroleum naphtha (sp. gr. ·66–·70, boils at about 50° C., wholly volatile) before treatment with benzol; by reference to the accompanying table of comparative solubilities it will be seen that this treatment may serve to separate fixed and volatile oil and some resins and colours from certain solid fats, wax, other resins and colours.

Where benzol of sufficient purity cannot be had, pure chloroform is the best substitute. The use of ether is objectionable in this place, as its solvent properties are less distinctly marked than are those of naphtha, chloroform and benzol; in other words, more plant constituents are sparingly soluble in ether than in the above mentioned solvents. Consequently, many substances which should properly be extracted by 80 per cent. alcohol, would be sparingly dissolved if ether were used, while benzol, chloroform, and naphtha would have no perceptible solvent action upon them; tannic acids may be cited as instances illustrating this point.

TABLE OF COMPARATIVE SOLUBILITIES.

Substances.	Water.	Ab. Alcohol.	80 per cent. Alcohol.	Ab. Ether.	Chloroform	Benzol.	Pet. Naph.	10 per cent. Ammonia.	Ammonic Cupric Oxide.	$H_2SO_4.H_2O$. Sp. gr. 1·78.	Fehling's Sol.	Lead Subacetate.
Volatile oils	Sp.	Sol.	Sol.	Sol.	Sol.	Sol.	Sol.	Sol.	...	...	...	...
Fixed oils	Ins.	Ins.?	Ins.	Sol.	Sol.	Sol.	Sol.	Sol.?	...	...	...	...
Wax	Ins.	Sp.	Sp.	Sp.	Sp.	Sol.	Sp.?	Ins.?	...	...	...	...
Solid fats	Ins.	Sp.	Sp.	Sp.?	Sp.?	Sol.?	Sp.?	Ins.?	...	...	...	...
Chlorophyll	Ins.	Sol.	Sol.	Sol.	Sol.	Sol.	Sp.	Ins.	...	...	...	...
Soft resins	Ins.	Sol.	Sol.	Sol.	Sol.	Sol.	Sol.	Ins.?	...	...	...	...
Hard resins	Ins.	Sol.?	Sol.	Sol.?	Sol.?	Sol.?	Sol.?	Sol.?	...	...	...	...
Glucose	Sol.	Ins.	Sp.	Ins.	Ins.	Ins.	Ins.	Sol.	...	...	Reduced	Not prec.
Sucrose	Sol.	Ins.	Sp.	Ins.	Ins.	Ins.	Ins.	Sol.	...	...	Not Reduced†	Not prec.
Tannin	Sol.	Sol.	Sol.	Sp.	Ins.	Ins.	Ins.	Sol.	...	...	Reduced	Prec.
Glucosides	Sol.?	Sol.?	Sol.?	Sol.?	Sol.?	Sol.?	Sol.?	Sol.?	...	...	Reduced†	Not prec.
Alkaloids	Sol.?	Sol.?	Sol.?	Sol.?	Sol.?	Sol.?	Sol.?	Sol.?	...	...	...	Not prec.
Albuminoids	Sol.?	Sol.?	Sol.?	Ins.	Ins.	Ins.	Ins.	Ins.?	...	...	...	Prec.
Gums	Sol.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Sol.?	...	...	Not Reduced	Prec.
Pectin	Sol.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Sol.?	...	...	...	Prec.
Pectic acid	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Sol.	...	...	...	Prec.
Organic acids	Sol.?	Sol.?	Sol.	Ins.?	Ins.?	Ins.?	Ins.?	Sol.	...	...	...	Prec. ?
Salts of org. acid	Sol.?	Sol.?	Sol.?	Ins.?	Ins.?	Ins.?	Ins.?	Sol.?	...	...	...	Prec. ?
Starch	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	...	...	...	...
Cellulose	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Sol.	Sol.	...	...
"Para cellulose"	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.*	Sol.	...	...
"Meta cellulose"	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Sol.	...	...
"Vasculose"	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	...	...
"Extractive"	Sol.	Ins.?	Sol.?	Ins.	Ins.	Ins.	Ins.	Sol.?	...	..	Reduced ?	Not prec. ?
Colours	Sol.?	Ins.?	Sol.?	Ins.	Ins.	Ins.	Ins.	Sol.?	...	...	...	Prec. ?

* "Para cellulose" soluble in ammonia-cupric oxide after boiling with dilute HCl.
† Glucosides reduce Fehling's solution after boiling with dilute acids; same with sucrose.
An ? shows that some marked variations or exceptions occur.
Sp.=sparingly soluble. Sol.=soluble. Ins.=insoluble.

VI. *Estimation of Eighty per cent. Alcohol Extract.*

That part of the plant not dissolved by benzol should be dried at 100° C. and then completely exhausted by eighty per cent. alcohol (sp. gr. ·8483 at 15·6° C.). This requires from twelve to fourteen hours' continuous treatment with the solvent. Remove, dry, and weigh any crystals or powder that may separate upon concentrating and cooling the alcoholic percolate. Make the clear liquid to a definite volume by adding more eighty per cent. alcohol. In an aliquot part of this liquid determine *total organic matter* and *ash:* in another equal portion determine *total organic matter* and *ash soluble in water,* and, by difference, *total organic matter insoluble in water.*

The remaining clear alcoholic liquid should be evaporated carefully to dryness, pulverized, and treated with several considerable portions of absolute alcohol (sp. gr. ·7938 at 15·6°C.).

A. SOLUBLE IN ABSOLUTE ALCOHOL.

a. Soluble in water.

a[1]. *Precipitated by subacetate of lead.*

Tannin and most organic acids; some extractives; some inorganic acids of the ash. Weigh in Gooch's filter, ignite cautiously, and again weigh; loss equals organic matter precipitated.

a[2]. *Not precipitated by subacetate of lead.*

Alkaloids, glucosides, some extractives and colours.

Determine by difference between *a* and a^1.

b. Insoluble in water.

b^1. *Soluble in dilute hydrochloric acid.*
Alkaloids, glucosides (rarely), some extractives. Determine by difference between *b* and b^2.

b^2. *Insoluble in dilute hydrochloric acid.*

b^3. *Soluble in dilute ammonic hydrate.*
Most acid resins, some colours. Determine by difference between b^2 and b^4.

b^4. *Insoluble in dilute ammonic hydrate.*
Neutral resins, some colours, albuminoids (in some seeds). Redissolve in alcohol, evaporate and weigh.

B. Insoluble in Absolute Alcohol.

c. Soluble in water.

c^1. *Precipitated by subacetate of lead.*
Some colours, extractives, albuminoids (rarely), organic acids, and inorganic acids of ash. Weigh in Gooch's filter, ignite cautiously, and again weigh; loss equals organic matter precipitated.

c^2. *Not precipitated by subacetate of lead.*
Alkaloids, glucosides, sucrose, glucose, some extractives. Determine by difference between *c* and c^1. Remove Pb by H_2S, H_2SO_4, Na_2CO_3, or other means, and titrate for sucrose and glucose.

d. Insoluble in water

d^1. *Soluble in dilute hydrochloric acid.*
Some alkaloids and glucosides. Determine by difference between *d* and d^2.

d^2. *Insoluble in dilute hydrochloric acid.*
Few resins, some extractives, and colour substances. Dissolve in alcohol, evaporate and weigh in a tared dish.

In some cases it may be preferable to use the following method for analysis of the eighty per cent. alcohol extract; it is more desirable when the plant examined contains a considerable amount of sugars, tannic acid, etc.

Alcohol Extract, dilute to 200 c.c. with eighty per cent. alcohol.

1. In 20 c.c. determine total organic matter and ash.

2. In 20 c.c. determine total organic matter and ash that are soluble in water, and, by difference, total organic matter insoluble in water.

3. Evaporate the remaining 160 c.c. to dryness, treat with water, filter, and make the filtrate measure 160 c.c. Reserve the insoluble matter on the filter for examination. (10).

4. In 20 c.c. of the aqueous solution determine tannin gravimetrically by A. Carpeni's method;* precipitate by ammoniacal acetate of zinc, use a Gooch's filter, wash the precipitate with very weak ammonia, dry at 120° C., weigh, ignite cautiously, again weigh. The loss by ignition equals tannic acid, in absence of certain interfering substances.

5. Precipitate 20 c.c. by normal acetate of lead, and determine, as before described, the amount of organic matter after drying at 100—120° C. This precipitate will contain, if the substances are present in the plant, tannic, gallic, and most other organic acids, some colours, rarely albuminous substances, some extractives, and most inorganic acids of the ash. Determine, by difference, the amount not precipitated by this treatment.

6. In 20 c.c. determine in like manner the amount precipitated by basic acetate ("subacetate") of lead. This reagent precipitates a greater number of acids, colours and extractives than are precipitated by the normal acetate, hence it is frequently possible to estimate such substances by subtracting the amount precipitated by one reagent from the amount precipitated by the other. To the filtrate add a slight excess of dilute hydrochloric acid, boil gently for half an hour, and determine in the liquid total glucose by use of Fehling's solution.

7. Precipitate 20 c.c. by subacetate, exactly as in 6, and use the precipitate as a duplicate to check the amount there estimated. To the filtrate add a very slight excess of solution of carbonate of sodium, filter from the carbonate of lead, wash well with water containing a little alcohol, and in the filtrate estimate actual glucose. If the glucose thus found is appreciably less than that in 6, subtract it from that amount; this glucose may be due to the presence in the plant of sucrose or some glucoside. If due to sucrose, the amount of the latter may be found by multiplying this residual glucose by ·95; if to a glucoside, a fit subject for an extended investigation is presented. The properties, formula, and decomposition products of the newly-found glucoside should be carefully studied.

8. Precipitate 20 c.c. with subacetate of lead, as in 6 and 7, employing the precipitate as material from which to separate organic acids, after removal of lead by sulphuretted hydrogen. Acidulate the filtrate with sulphuric acid, add an equal volume of alcohol, allow to stand two hours, filter, wash the precipitate with fifty per cent. alcohol, and evaporate the filtrate until all alcohol has been dissipated. Test the acid solution for alkaloids, glucosides, sugars, extractives.

9. Reserve the remaining 40 c.c. for duplicating any unsatisfactory determination.

10. The residue mentioned in 3 as insoluble in water may contain resins, albuminoids (especially from seeds), colours, alkaloids, glucosides. Dilute acids remove alkaloids and some glucosides, dilute ammonic hydrate will remove some resins, colours and glucosides. Any still insoluble residue probably contains albuminous or resinous substances.

VII. *Estimation of Cold Water Extract.*

That part of the plant remaining insoluble after treatment with alcohol should be dried at 100° C. and completely extracted by cold water. When the plant contains considerable mucilaginous matter, this is best removed by placing the substance in a flask or graduated cylinder, and then adding a measured volume of cold water. Allow to macerate, with frequent agitation, for from six to twelve hours; then filter through fine washed linen, and evaporate an aliquot portion of the solution. In this residue determine total organic matter and ash. This residue usually contains little but gum; in analysis of fruits and fleshy roots pectin bodies, salts of organic acids, rarely a substance resembling dextrin, and small amounts of albuminous substances and colouring matter. Usually the separation of these substances is very difficult. The unevaporated liquid should be used for such qualitative reactions as are necessary to show the nature of the substances extracted. The insoluble residue should be well washed with water, transferred to a crucible, and completely dried at 110° C. This residue should be then weighed.

VIII. *Estimation of Acid Extracts.*

The dried residue insoluble in cold water should be transferred to a beaker containing 500 c.c. of water and 5 c.c. of concentrated sulphuric acid (sp. gr. 1·84). Boil for six hours, on a gauze support, adding water to keep the volume of liquid unchanged; if the substance be very starchy, a longer boiling may be necessary. This treatment will convert starch and its amorphous isomers to dextro-glucose, and will occasionally remove some salt of an organic acid, and usually traces of albuminous and indeterminate substances.

The total amount extracted may be found by washing, drying at 100° C., and weighing the yet insoluble residue, and subtracting the weight from the one taken after extracting with cold water. The amount of starch and isomers may be found by determining in a given volume of the acid filtrate the amount of glucose, using Fehling's solution; the glucose thus found multiplied by ·9 equals starch and isomers. The total extract minus starch and isomers equals acid extract not starch. This includes a small amount of ash, which may be approximately determined by evaporating and igniting a known volume of the solution.

* *Chem. News*, July 9, 1875, page 19, from *Gaz. Chim. Ital.* 1875, No. 3; *Proc. Am. Ph. Ass.*, 1875, p. 341.

Where it is wished to separate the extracted matter from the sulphuric acid, boil the liquid with an excess of powdered barium carbonate until no acid reaction remains. Filter, and evaporate to dryness. The residue consists chiefly of hydrated dextro-glucose ($C_6H_{12}O_6.H_2O$), with some ash.

IX. *Estimation of Alkali Extract.*

Wash well and dry at 110° C. the residue from treatment with acid, and record its weight. Boil this residue, for two hours, with 500 c.c. of a solution containing 20 grams of sodic hydrate to the litre. Filter through fine washed linen, and wash the residue thoroughly with hot water, alcohol and ether. Transfer it to a weighed crucible, dry at 110—120° C., and weigh the residue as crude fibre and ash; this weight subtracted from the previous one shows the total alkali extract. The extract is largely albuminous matter and various modifications of pectic acid, Fremy's "cutose," and various colouring, humus, and decomposition compounds in small amounts. Most of the extracted substances may be precipitated by excess of an acid with or without the presence of alcohol.

X. *Cellulose.*

The crude fibre from IX. should be treated with from 50 to 100 c.c. of U.S.P. solution of chlorinated soda, and allowed to stand twenty-four hours. If not then bleached white, slightly acidulate with hydrochloric acid, and set aside for another day. Filter through fine linen, or Gooch's filter, wash with hot water, dry at 110—120° C., and weigh, ash free, as cellulose. The loss of weight by this treatment state as lignose and colour.

Remarks.

It is advisable to determine always, in addition to what has already been directed, the amounts extracted directly from the sample by water, ether, alcohol of various precentages, methylic alcohol, naphtha, chloroform, carbon disulphide, etc. In each extract estimate total organic matter and ash, determine qualitatively, and quantitatively when possible, its constituents, by treating with such solvents and reagents as are indicated. Each extract being composed of certain distinct substances, it is necessary to account for them in every case.

The amounts present of some constituents may be found by subtracting the weight extracted by some one solvent extracted by some other. It will be seen that this is a method of limited applicability, which can only be applied in those cases where the difference between the solvent action of the two liquids is very sharply defined. Certain special methods for the estimation of single constituents may be used, care being taken that all interfering substances be first removed. The methods of preparation of known substances as given in Husemann's 'Pflanzenstoffe,' and to a considerable extent in Watt's 'Dictionary,' may serve as suggestions for work. Treatment with benzol, eighty per cent. alcohol, and water, removes from nearly all the plants the constituents of greatest chemical and medicinal interest, but in analyses of grain, fodder, and food materials those compounds extracted by dilute acids and alkalies have great value. There are substances in plants, seemingly isomers of starch and cellulose, which have properties more or less resembling those of cellulose, and are changed by boiling with dilute acids to glucose. In absence of an established nomenclature it has seemed best to use the terms "starch isomers," or "amylaceous cellulose" for these substances,* while those constituents, not albuminous, which are removed by dilute alkali have been termed "alkali extract." These substances have been investigated by various chemists, but no definite and authoritative nomenclature has yet been adopted. Thomsen gives the name "holz-gummi,"† *wood-gum*, to a white substance extracted from plants by dilute sodic hydrate, while Fremy regards these various compounds as modifications of pectic acid, pectin, and "cellulose bodies."* Starch also may exist in some seeds (as of sweet corn) in a form soluble in water.†

It will be seen that the field for investigation is limitless, and almost unoccupied as yet, and that there is great need for improved methods for proximate analysis. The analyst will find that a study of any common plant will require of him much more than unthinking, mechanical habits of manipulation, while every careful investigation will reveal to him some constituents deserving more full and accurate study.

* 'U. S. Dept. of Agric. Report,' 1878, p. 189.
† *Kolbe's Jour. prak. Chem.*, Band 19, p. 146.

NEW ORIGINAL FORMULAS FOR BOUQUETS.‡

BY G. DUBELLE, PH.D.

The growing importance for new perfumes has already called forth a considerable amount of formulas in publication, but all the writers fail to present the subject in a form suited to the increasing demand. It is the aim of the writer to publish occasionally new and well approved receipts for the use of our manufacturing perfumers and druggists.

Victoria Regia.

Extract of tuberose		20 fl. oz.
" jasmin		16 "
" neroli,		
" rose,		
" acacia flowers	each	4 "
" vanilla		3 "
Essence of civet		1 "
Oil of bergamot		1 "
" bitter almonds		5 drops.

Alpine Rose.

Essence bouquet		16 fl. oz.
Triple extract of rose,		
Extract of jasmin,		
" reseda	each	12 "
Essence of ambergris		4 "
" civet		2 "

H.M.S. Pinafore Bouquet.

Triple extract of rose		16 fl. oz.
Extract of violets		12 "
" neroli		8 "
" musk		1 "
Oil of bergamot		¼ "
" citron		⅛ "
" cardamom		40 drops.
" melisse		20 "
" coriander,		
" thyme	each	10 "

Flowers of Eden.

Triple extract of night blooming cereus		16 fl. oz.
" " lily of the valley		14 "
" " spring flowers,		
" " ylang-ylang,		
Eau de millefleurs	each	12 "
Essence of musk		2 "

Flowers of Love.

Triple extract of rose		16 fl. oz.
Extract of jasmin		14 "
" acacia flowers		12 "
" orange flowers,		
" tuberose,		
" hyacinth	each	4 "
" jonquil,		
" vanilla	each	2 "
Essence of ambergris		1½ "

* *Compt. Rend.*, lxxxiii., 1136; *Jour. Chem. Soc.*, 1877 p. 229.
† 'U. S. Dept. of Agric. Report,' 1878, pp. 153—155.
‡ From *New Remedies*, February, 1880.

Rose of the East.

Triple extract of rose		16 fl. oz.
Extract of mossrose		12 „
Oil of sandal,		
„ geranium rose	each	$\frac{1}{8}$ „
„ ylang-ylang		$\frac{1}{16}$ „

Floriline Bouquet.

Triple extract of rose		16 fl. oz.
Extract of tuberose,		
„ violets	each	8 „
„ heliotrope		4 „
„ orange flowers,		
verbena	each	3 „
Essence of musk,		„
„ ambergris	each	2 „
Oil of bergamot		1 „

Modjeska Bouquet.

Extract of jonquil,		
„ reseda,		
„ tuberose	each	16 fl. oz.
„ cassia flowers,		
„ violets	each	12 „
Essence of musk		2 „
Oil of bergamot,		
„ ylang-ylang	each	$\frac{1}{2}$ „
„ otto rose,		
„ lavender	each	$\frac{1}{4}$ „

WATTLES.

Of the tree known as the wattle in the colony of Victoria, there are three species, all of the genus Acacia, from which the bark used in tanning is obtained. These are :—*Acacia pycnantha*, commonly known of the "broad leaf," "golden" and "green" wattle ; *Acacia decurrens*, or black wattle ; *Acacia dealbata*, or silver wattle. The first named has a thick, glossy ovate leaf, the bark being thinner and smoother than that of either of the others. It is chiefly found in the south-western part of the colony and along the coast as far as the colony of South Australia. Its bark is generally considered superior to any other, but the habit of the tree is not so advantageous, it being of slower growth and not attaining such large dimensions as the black and silver species.

The black wattle is found over all the western district of Victoria, in the north-east, and also in the district of Gippsland. It is of vigorous, robust habit, and for commercial purposes is equal to the broad-leaf species. From the rapidity of its growth, and the ease with which it can be stripped during the proper season, the board considered that, for all practical purposes, it was desirable to cultivate this species either alone or with the broad-leaf wattle. The silver wattle, for tanning purposes, is generally discarded.

Wattles grow on almost any soil, but their growth is most rapid on loose sandy patches, or where the surface has been broken for agricultural or other purposes. Where the soil is hard or firm it is recommended that plough-furrows should be made at regular distances of five or six feet apart, into which the seed should be dropped. The outer covering of the wattle seed is peculiarly tough, hard and horny in character, thereby forming a protection which renders the seed comparatively impervious to ordinary germinating influences. It will, therefore, be found necessary to employ a more direct agency than simply covering the seeds with earth. Water of a little less than boiling temperature should be poured on them, and they should be allowed to soak until soft. As the seeds are small and ought to be sown near the surface, a very light sprinkling of earth is sufficient. For all practical purposes it would be enough to drop the seeds about one foot apart along the furrows, in which case about 7200 seeds would suffice for an acre of land. The wattle seed is cheap, and can be bought for 8*s.* or 10*s.* per pound. There are about 40,000 seeds of the black wattle to the pound. Those of the broad-leaf are one-fourth heavier, and consequently there are not more than about 30,000 to the pound. The seeds could, therefore, be dropped more plentifully with little additional expense, and the seedlings thinned out at discretion, thereby increasing the chances of a regular plantation. On loose sandy soil, on which *Acacia pycnantha* can best be raised, it might not be even necessary to break up the soil in any way; but it should be born in mind that any opening up of the surface would materially accelerate the germination of the seed and subsequent growth of the seedlings. On such open sandy soil the furrow line might be dispensed with and the seeds scattered broadcast. When the young trees attain the height of three or four feet the lower branches should be pruned off, and every effort afterwards made to keep the stems straight and clear, in order to facilitate the stripping and induce an increase in the yield of bark. In all instances where attention is paid to the cultivation of wattles as a source of income, care should be taken to replace every tree stripped by successional sowings, in order that there should be as little variation in yield as possible.

The wood of the wattle is of considerable value for industrial purposes. It can be readily utilized for cask staves, for axle spokes, for axe and pick handles, and many other articles requiring a tough and durable grain. When dried, it forms the best fire-wood known for culinary and all domestic purposes, also for ovens and furnaces. It emits a clearer and greater heat than any other firewood. The wattles may be utilized also for fencing, the trunks making top-rails of the best description. The commercial uses of the wattles are multifarious, as, in addition to the value of the bark and the wood, a good profit may be derived from the sale of the gum which exudes from the tree. Recently the price of Australian gum has increased thirty per cent. in the continental and English markets.

The character of the soil appears to affect, to some extent, the quality of the bark, this being clearly proved to the members of the board during their inspection of the North Gippsland district. A sample of bark from trees growing on a limestone formation was greatly inferior in tannin to that of bark obtained from another section of country, although the climate was in every way calculated to produce better results. From bark growing within five miles of the Buchan River, 42 per cent. of tan material was obtained, while the bark taken from the limestone formation on both sides of the stream only yielded 29 per cent. Continuing the examination still further, the board found that the samples of bark obtained from the Goulburn and western districts were about equal in point of tanning strength, both being a little inferior to the best bark obtained from Gippsland. The bark in each instance subjected to analysis was of the black or "feather" leaf species. The bark of the golden leaf or broad leaf wattle was also tested, and the result proved that its strength exceeded all the other barks by fully 5 per cent.

The size of the trees varied considerably in many districts, soil and position evidently effecting the difference. One of the largest black wattles met with in the western district gave a mean diameter of 24 inches, its age being ascertained to be eighteen years. This may be taken as the maximum size attained by this species ; and, although even larger trees may be occasionally met with, the wattle is at its prime when about ten years old, and possessing a trunk 9 or 10 inches in diameter. After that the trees lose their healthy, vigorous habit, and are usually attacked by disease and wood insects.

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THE DENTAL ACT AND REGISTRATION.

A FEELING of discontent seems still to pervade a section of the dental body, and to indicate a disposition in favour of agitation, which, we think, is scarcely suited to the position of affairs. The *Monthly Review of Dental Surgery*, in dealing with the subject of dental organization, very fairly states that up to the time of the passing of the Dentists Act the practice of dental surgery was carried on without let or hindrance by whomsoever thought fit to undertake it, with or without qualifications, and with or without competent knowledge of the subject. This state of things was permitted by the law, and though some persons sought to acquire the qualification of special knowledge to fit them for carrying on dental surgery as a profession, others practised it only as a trade. Worse than all there was no recognized distinction between the thoroughly qualified dentist and the uneducated pretender, so that the public was unable to judge as to the competence of a dental practitioner.

So long as this state of things prevailed, it was but reasonable that the better class of dental practitioners should have been dissatisfied; but now that an Act has been obtained providing means for distinguishing between the two classes by establishing a register of all persons who can rightfully take or use any of the titles recognized as designating dental practitioners, the case is altered, and there would seem to be good reason "to rest and be thankful" during such time as may be requisite for perfecting the internal organization of the dental body.

Such reason may at least be found in the consideration that a sudden change from the state of affairs depicted by the *Monthly Review* as prevailing before the passing of the Act to one more consistent with desires of thoroughly educated dentists is scarcely possible. As a necessary consequence of the previous condition, there would be numerous interests established by usage which could not be sacrificed and made away with, however little they might be entitled on other grounds to recognition. The state of the Dental Register at the outset could not be expected to be perfect; it would be almost impossible to hope for such agreement as to the "proper claims" to be placed upon the register, as would cover all cases, and from some points of view no doubt there would be many who did obtain registration while destitute of "proper claims" as they might be determined from the higher standard of professional qualification.

The remedy for such defect in the measure designed to effect the organization of the dental profession is to be looked for from lapse of time and from the efforts of those best able to promote the establishment of a satisfactory professional standard. A further reason for the exercise of patience in seeking for the attainment of this desirable end is also to be found in the fact that the requisite educational provisions for the attainment of this end have been made in a manner so satisfactory that in the opinion of Mr. ERICHSEN, the L.D.S. diploma may be considered amply sufficient as a guarantee of the professional position and competence of any man who holds it.

But, as we have already remarked, these views do not appear to be generally entertained, and even now, when the Dental Act has only been in operation for a year, there is a movement for its repeal or amendment on the part of the Association of Surgeons practising Dental Surgery. This body has presented to the Executive Committee of the General Medical Council a memorial pointing out that more than 500C persons have been registered as dentists, whilst the highest estimate formed by those who were interested in the passing of the Dentists Act was that not more than 2000 persons could be registered in Great Britain and Ireland. Reasoning upon this basis, it is urged by the memorialists that the result has not been obtained which it was the object of the Act to secure, namely, the registration of persons "specially qualified to practise as dentists," and it is inferred that the registration is deceptive because no doubt a very large proportion of the persons actually registered do not possess the qualifications indicated as being desirable by the preamble of the Act.

The view here put forward is evidently to be ascribed to the belief that those only were interested in the passing of the Dentists Act who held the most exclusive opinions as to what was necessary for being "specially qualified to practise as dentists." But however much such a belief may recommend itself to respect from a purely abstract point of view it is not acceptable from a practical point of view, for the fact is that there were many others interested in the passing of the Act and they could not be ignored though representing interests possibly of a humbler order than those which mere abstract consideration would lead one to have regard for.

The result which appears to be objected to by the Association of Surgeons practising Dental Surgery is no doubt due to the absence of any interpretation of the terms "dentisty or dental surgery" as stated in the memorial now referred to, but we must also add that it seems equally clear those terms do not at the present time admit of being so strictly interpreted as to enable the General Medical Council to remove from the register the names of persons who may not be felt to be "specially qualified" as dentists according to the estimate of those who take the highest standard of dentists' qualifications. Such a proceeding would at once be possibly productive of injustice to a numerous class of persons who have long been in the habit of extracting teeth and carrying out other dental operations of a minor character that might be held to constitute practising dentistry and to require registration.

If it be now intended that the due interpretation of the terms "engaged in the practice of dentistry or dental surgery," which is earnestly prayed for in the memorial of the association, should be one that would leave the chemist and druggist free to extract teeth and perform the operations of dentistry as heretofore, we contend that the agitation for this amendment of the Dentists Act is not well timed. The desire for this "due interpretation" is expressed either too late or too soon: too late as regards the reasons which led chemists and druggists to seek an amendment of the Dental Bill while it was before the House of Cammons, and too soon as regards that advancement of the practice of dentistry to a higher standard which may be looked for in the future.

Though the Dentists Act has nominally united the dental profession, it has by no means harmonized its discordant elements, and that probably was more than could reasonably have been expected under the circumstances; but we are far from sharing the opinion of those who regard the liberality of its provisions as a defect, though it leaves much to be done by the individual, as well as associated efforts of those who desire more thorough improvement. As is well pointed out by the editor of the *British Journal of Dental Science*, one great point has been attained by the passing of the Act, viz., that no one can henceforth assume the title of dentist without passing a certain amount of medical and technical education, tested by examination and verified by the possession of a diploma.

Meanwhile it may be well that the British Dental Association, taking a lesson from the action of the Pharmaceutical Society in carrying out the duties imposed upon it by the Legislature, should undertake the duty of investigating charges of incorrect registration and the task of bringing them before the Medical Council or some other tribunal, as the case may require. But whatever is done in this direction should be done in a liberal spirit, with a due regard, not only to the necessary internal organization and advancement of the dental body, but also to all the *bonâ fide* interests that were affected by the passing of the Act. By the maintenance of such a spirit in their proceedings we venture to think dental reformers will do more to improve the position of the body and to advance its true interests than by striving to enforce one-sided and selfish views or by taking part in "the civil war" referred to by the President of the Association of Surgeons practising Dentistry as having begun among dentists.

PERSIAN AND NATIVE OPIUM IN CHINA.

According to the report of Mr. Arthur Davenport, Her Majesty's Consul at Shanghae, Persian opium has in that district greatly interfered with the price and consumption of Malwa opium, which it much resembles in consistency, though lower in price. It appears that the greater proportion of the Persian opium imported into China in 1877 was in irregularly shaped pieces and adulterated with sugar, but since then a marked improvement has been observable, both in its manipulation and its freedom from saccharine matter. The Persian drug is said to resemble Malwa opium, not only in consistency, but in flavour when smoked, and accordingly its price has fluctuated in sympathy with that of Malwa. It is not, however, a favourite in the Shanghae local market, its largest consumption occurring in the Chinkiang and Tientsin districts. Upwards of two thousand chests were entered at the custom house during the year previous to the report, and the quantity would probably have been larger had not the drought which caused the failure of the opium crop in India extended to Persia also.

Both in Szechuen and Yunan the Chinese native crops of opium have been abundant, that in Szechuen being estimated as equal to fifty thousand chests of foreign opium and that in Yunan to fifteen thousand chests, the former amount alone equalling the yield of the entire Malwa crop when grown under the most favourable circumstances. But in other districts the laws prohibiting the cultivation of the poppy have been enforced more rigidly, though in one case where the peasants had neglected to obey an order to root up their crops of growing poppies, upon the military attempting to perform the duty they were resisted and compelled to retire.

THE EVENING MEETING.

The next Evening Meeting of the Pharmaceutical Society will be held on Wednesday, the 7th inst. The papers announced are—"The Volumetric Determination of Alkaloids," by Mr. J. C. Thresh; "The Histology of Araroba, or Goa Powder," by Mr. T. Greenish; "Experiments on Taraxacum Root," by Mr. J. B. Barnes; "The Composition of Tonga Root, a Reputed Remedy for Neuralgia," by Mr. A. W. Gerrard; and "The Action of Potassium Chlorate on Ferrous Iodide," and "The Quantitative Estimation of Syrup of Iodide of Iron," by Mr. R. H. Parker. As, however, it is not probable that there will be sufficient time on Wednesday next to read and discuss the whole of these papers, it has been arranged that the meeting at its close shall be adjourned to Wednesday, April 21st.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION

A meeting of this Association will be held on Thursday next, the 8th inst., at 8.30 p.m., when a paper will be read by Mr. C. Thompson on "Robert Boyle." A report on Physical Chemistry will be made by Dr. Senier on "The Solubility of Solids in Gases."

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The eleventh general meeting of the thirty-first session was held at the Royal Institution, on Thursday evening, March 11, the President, Dr. Symes, in the chair.

The minutes of the previous meeting were read and confirmed.

Mr. M. Conroy exhibited some so-called copaiva capsules, which, upon examination, he had found to be filled with olive oil, and did not contain a trace of the balsam. He understood that some quantities of these capsules were in the market at present, and advised pharmacists to examine their stock.

The following paper was then read, entitled—

The Estimation of Copper.

BY ARTHUR G. HADDOCK.

The estimation of copper is an operation which the analyst is frequently called upon to perform, and though apparently a simple one, it often happens that the results obtained by different analysts vary very considerably. As these discrepancies are probably due, not to want of manipulative skill, but in most instances to the employment of different methods of analysis, some of which may be faulty, and as the subject is one of great importance, I have thought that some profit and interest might be derived from a critical examination of some of the methods generally employed.

I will first describe a method, which is a very good one, for the detection of copper in articles of food, or in the stomachs and viscera of animals. Take 1000 grains of the substance, place it in a flat fire-clay dish, such as a scorifier, and heat gently until perfectly dry, then incinerate over a charcoal fire until the organic matter has completely burned away, leaving nothing but a grey or reddish-white ash. Dissolve this in nitric acid, with the aid of a gentle heat, filter from any insoluble residue which may remain, neutralize the clear solution with ammonia, supersaturate it with acetic acid, and filter again if necessary. To the acetic acid solution add a few drops of potassium ferrocyanide, when, if a trace of copper is present, the solution will assume a red colour, and if there is any appreciable amount a precipitate of a mahogany colour will be immediately formed. If this is well stirred, and left for twenty four hours, we obtain a complete separation of the copper as ferrocyanide, which may be thrown upon a weighed filter, washed, dried, and its weight ascertained. It has the composition Cu_2FeCy_6, when dried at 100° C., and contains 37·28 per cent. of its weight of copper. It is a matter of importance that the burning of the organic matter should be done over charcoal and not over a Bunsen's burner, as a sufficient amount of copper to give the reaction with ferrocyanide is invariably volatilized, or carried mechanically from the brass tube of the burner into the sample.

For the estimation of copper in ores and in manufactured products many processes have been suggested, some of which, though very ingenious, are impracticable, and others, though very convenient and expeditious, are not sufficiently accurate to be of very great use.

Lovel has proposed as a method to place the copper solution in a flask which is furnished with a very tight stopper, to supersaturate with ammonia, then place in the solution an accurately weighed slip of pure copper, fill the flask with recently boiled distilled water, and quickly replace the stopper. When the solution is quite colourless the operation is at an end, and the copper is taken out, dried, and again weighed, the loss of weight which it has sustained representing the amount of copper which was originally in the solution. The rationale of the method is that the blue cupric compound takes up another equivalent of copper to form a cuprous compound, which is colourless. If care be taken, it is possible to obtain very fair results as follow:—

Took 10 grs. $CuSO_45H_2O$ containing 2·545 grs. Cu; obtained 2·56 grs. Cu.

Took 10 grs. $CuSO_45H_2O$ containing 2·545 grs. Cu; obtained 2·565 grs. Cu.

It is imperative that the stopper should fit very tightly, and that the water should be boiled to expel all dissolved air. The objections to this process are, the time required, the necessity of removing all foreign substances which might be precipitated by metallic copper, and the extreme delicacy which is required in the manipulation.

Plessy and Moreau have published a modification of the process, which consists in boiling a weighed strip of copper with the cupric solution rendered slightly acid with hydrochloric acid, until the solution is quite colourless, and the loss of weight sustained by the copper indicates, as before, the amount of copper in the solution. I have obtained good results with this process, working with the pure chloride.

Cassaseca dissolved the ore in acids, added ammonia in excess, filtered, and determined the copper colorimetrically by comparing the tint with that given by a copper solution of known strength. This method is only applicable for spent ores, to give a rough approximation as a guide to workmen, and is valueless to analysts.

Pelouze recommended the destruction of the colour of the cupric-ammonium solution by a standard solution of sodium sulphide as a method. The copper is precipitated as sulphide, and from the quantity of sodium sulphide required to completely effect this, the amount of copper present can be calculated. Precipitated zinc sulphide may be used as an indicator of the end reaction. As the presence of other metals, as lead, zinc, bismuth, and antimony, are stated not to interfere, I thought this would prove a good process, and some years back made a number of experiments with it, but I am sorry to say with such indifferent success that I had to abandon it. My failure to obtain correct results I attribute to the difficulty of distinguishing the end of the reaction and to the fact that the blue colour rapidly reappears, owing to the absorption of oxygen by the copper sulphide.

Several methods, such as Mohr's, Fleitmann's, Terreil's and Schwartz's have been proposed, all of which are based either upon the oxidizing action of cupric salts, or the reducing action of cuprous salts. Thus Mohr's method consists in adding metallic iron to the cuprous salt, and estimating the amount of ferrous salt formed by standard solution of potassium permanganate.

Schwartz's method depends on the reduction of a ferric salt by cuprous oxide, and the amount of ferrous salt produced estimated with permanganate solution.

Terreil reduces cupric sulphate with ammonium sulphite, with the addition of a little hydrochloric acid, boils off the sulphurous acid, and oxidizes directly with potassium permanganate.

Fleitmann precipitates the copper in the metallic form with zinc, and after washing it thoroughly dissolved it in an acid solution of ferric chloride, and then titrates with permanganate solution. Care should be taken that no nitric acid is present in the solution.

The objection to all these methods is that the cuprous salts are so very unstable and readily oxidizable that they are not adapted for practical working.

But the process perhaps more generally used than any other is the one which depends upon the destruction of the colour of a cuproammonium salt by means of cyanide of potassium. The ore is dissolved in acids, supersaturated with ammonia, and a standard solution of potassium cyanide added slowly from a burette. The colour of the solution gradually fades, and finally disappears. When this occurs the operation is finished. It is usual to leave a slight blue shade in the solution, and not wholly destroy the colour, as this will disappear after the lapse of a few minutes. This method is a very convenient one in many cases, but unfortunately is open to a number of very serious objections. It is often exceedingly difficult to tell exactly when the colour is completely destroyed, and also the amount of cyanide required to produce a given effect varies according to whether it is added quickly or slowly; if run in quickly, it will take as much sometimes as ·5 c.c. less than if run in slowly, with vigorous stirring. Again, the quantity of ammoniacal salts present exercises a great influence, as also excess of ammonia. It is necessary that there should always be, as nearly as possible, the same amount of acids and ammonia added to obtain an accurate result. The presence of excess of salts makes the copper estimation too high. Also, the presence of other metals, as arsenic, zinc, lead, etc., affect the accuracy of the test, as has been shown by Mr. R. T. Thomson, in the *Chemical News*, vol. xxxiii., page 152. These must therefore be separated, and it is well known in the case of zinc, which is contained in most copper ores, that its sulphide is invariably precipitated, to a greater or less extent, along with copper sulphide, by sulphuretted hydrogen in an acid solution, and the separation of it in small quantities from a large excess of copper is a difficult operation. With regard to the uncertainty of the finishing point of the reaction M. Fleck recommends, instead of ammonia, to use carbonate of ammonium to supersaturate the acid, and to add a drop of potassium ferrocyanide solution. He states that when the operation is exactly finished, the liquid assumes a red colour. Crookes, in 'Select Methods,' mentions this improvement in the process. In the course of my experience, I have never yet been able to obtain this reaction.

The cyanide process as carried out by Steinbeck obtained the prize offered by the directors of the Mansfeld copper mines, as being the most expeditious, the most accurate, and the cheapest process (taking these qualifications combined), which was submitted to them. To avoid the interference of other metals he precipitated the copper in the metallic salt from its acid solution by means of zinc. The well-washed precipitated metal he dissolved in nitric acid, supersaturated with ammonia, and titrated with cyanide in the usual way. He states that lead does interfere with the readings. A great objection to this process is the extreme difficulty of obtaining pure zinc wherewith to precipitate the copper. This metal in the pure state seems to be commercially unknown. I have made many attempts to procure it, but without success. Dr. Steinbeck, in an elaboration of his process, admits that varying amounts of ammonium salts interfere with the accuracy of the test, and especially particularizes ammonium chloride.

Although the Mansfeld committee gave the prize to Dr. Steinbeck, they were so pleased with a process devised by M. Luckow, that they awarded him an extra premium. His method consists in the separation of the copper in the metallic state from its nitric or sulphuric acid solution by the electric current. He dissolves the ore in one or both of the acids mentioned, evaporates to dryness in a beaker and takes up the residue with nitric acid—sp. gr. 1·2 diluted with six times its volume of water—with which he half fills the beaker. A few drops of a strong solution of tartaric acid are also added to prevent peroxidation of any lead which may be present. He then places in the solution a spiral of platinum wire of such size that the convolutions of the spiral touch the sides of the beaker. He also suspends in the solution a strip of platinum foil, sufficiently broad to almost touch the spiral, and long enough to project about an inch out of the liquids. The foil has a wire attached to it which is connected with the zinc end of a Bunsen battery, and the spiral is connected with the copper end. Metallic copper immediately begins to deposit on the surface of the platinum foil, and in the course of a few hours is entirely removed from solution. In order to ascertain when the operation is finished, the solution is diluted with a little weak nitric acid, and if, after the lapse of about ten minutes no more copper is deposited on the clean part of the platinum foil, it may be assumed that a complete separation has been effected. The foil is then removed from the solution, or, as a little of the copper might redissolve in the nitric acid adhering to it when removed from the beaker, it is better to remove the solution from the foil by allowing a stream of water to displace the acid liquor in the beaker, which may run over the sides, and continuing this until the overflowing fluid is no longer acid. The foil is then disconnected from the battery, washed well with cold water, and finally with alcohol, dried at 100° C. and weighed. The copper is now removed with nitric acid, and the foil again weighed, when the difference, will, of course, be the weight of the copper.

This process yields excellent results, if carefully worked, and I think that with slight modifications in detail, it is the best which has been proposed for general work. Indeed, in brass and alloys which contain zinc, it is almost the only method by which an accurate separation and estimation of these two metals can be effected. The modifications to which I refer were given by Mr. E. W. Parnell in a paper which he read before this society about four years ago. That paper, I am sorry to say, was not published. Instead of working with a nitric acid solution, he used dilute sulphuric acid to which a few drops of nitric acid had been added, and instead of precipitating the solution contained in a beaker, upon platinum foil, he placed it, after first removing lead, in a platinum dish connected with the zinc end of a battery, and immersed in it a spiral of platinum wire connected with the other pole. The copper then deposits on the dish in a beautifully bright and coherent condition. I find the addition of the small quantity of nitric acid absolutely necessary, and it is also desirable that a weak current should be used, or the metal is apt to deposit in a pulverulent condition, in which state it is extremely difficult to wash thoroughly. Two small Bunsen elements are quite sufficient. I also find that it is almost impossible to remove the last trace of copper from solution, and when a drop taken out, and placed on a porcelain plate, gives only a slight brown coloration with sulphuretted hydrogen water, I consider it finished and remove the dish. The solution is emptied quickly from the dish after being disconnected from the battery, and the dish washed with cold water until the washings are no longer acid, rinsed finally with alcohol, dried at 100° C., until the weight remains constant and weighed. The weight of the dish alone is subtracted, and the difference is the weight of the copper. The small quantity of copper remaining in the solution is precipitated with sulphuretted hydrogen, filtered off, washed, ignited and weighed as oxide. This is calculated into metallic copper, and added to the weight of the copper in the dish.

If zinc is required to be estimated, the solution is now boiled to expel sulphuretted hydrogen, and sodium carbonate is added in excess; the precipitate filtered off, washed, ignited, and weighed as oxide. This method can, of course, only be adopted if iron is absent.

Although M. Luckow states to the contrary, it is my experience that the presence of arsenic interferes with the accuracy of the determination. It seems to be thrown down with the last portions of the copper, as an alloy with it.

An exceedingly good method for the separation of arsenic from copper is given by Abel and Field in the *Journal of the Chemical Society*, January, 1862. The alloy or metal is dissolved in acids, the solution filtered, and supersaturated with ammonia. Sulphuretted hydrogen is now passed in to complete saturation, when the copper is perfectly separated, leaving the arsenic in solution. The sulphide of copper is filtered off, well washed, and may then be dissolved in nitric acid, evaporated with sulphuric acid to separate lead, and the copper deposited by the electric current. The solution containing the arsenic is acidified, and the sulphide of arsenic which precipitates is filtered off, washed, dissolved in nitric acid, the solution supersaturated with ammonia, and magnesium mixture added. It is allowed to stand for twenty-four hours, then filtered on to a weighed filter, dried at 100° C., and weighed as $MgNH_4AsO_4.\frac{1}{2}H_2O$.

The precipitation of copper by sodium or potassium hydrate gives very good results if careful attention is paid to details. The solution should be moderately concentrated, and the sodium hydrate added when boiling hot, care being taken to avoid too great an excess. It may be done either in a beaker or a smooth porcelain dish. Stirring should be avoided, as the precipitate is liable to become so firmly attached to slight scratches on the vessel that it cannot be removed by mechanical means. After boiling for a few minutes the oxide is allowed to settle, and the supernatant fluid carefully decanted on to a filter; more hot water is then added, and the precipitate washed by decantation several times before being thrown upon the filter, as this will greatly facilitate the subsequent washing. When quite free from alkali, the filter and its contents are dried, and the oxide removed as perfectly as possible from the paper, and placed in a crucible. The filter paper is strongly ignited on a crucible lid, and when cold, a drop of nitric acid is added, and it is again ignited. The resulting oxide is then added to the main bulk in the crucible, and the whole strongly ignited, cooled under a desiccator, and weighed as oxide. This process in my hands has yielded excellent results, and in ores and substances where the amount of copper is small it is more convenient than the battery process, and I generally employ it.

The precipitation of copper as sulphide, and subsequent ignition, and weighing as oxide, is open to the objection that some sulphate may be formed, and thus make the result too high. Mr. Forbes recommends the addition of carbonate of ammonium after ignition, and states that on re-ignition the sulphuric acid is abstracted, by, I suppose, a double decomposition, leaving the oxide. This is so, no doubt, to a certain extent, but after taking all precautions, I have several times found that some sulphate has escaped decomposition.

Copper may be precipitated from solution as sulphide by means of sodium thiosulphate, and the precipitate may be dried and ignited with an equal weight of sulphur, and weighed as sub-sulphide, Cu_2S. This process gives very good results, but is rather inconvenient. In igniting the mixture of sulphide and sulphur great care must be taken to prevent its boiling over the sides of the crucible, by using at first a low heat which is afterwards increased. The ignition is better conducted in an atmosphere of hydrogen.

I will conclude by giving the processes which I find to be the most accurate and convenient for general estimation of copper.

The battery process is the most accurate, and is the one which must be employed if the solution contains zinc, and the percentage of that metal is also required.

In the case of ores containing small quantities of copper, the battery process may be conveniently substituted by precipitation with sodium hydrate, in a solution from which other metals have been removed, and weighing finally as oxide.

In testing slags it is necessary to powder them very finely, and to fuse with sodium carbonate and potassium nitrate, to get them in solution, as they often contain silicate of copper, which cannot be removed by treatment with acids.

The paper was ably discussed by the President, Messrs. T. F. Abraham, Kehlstadt, Watt and Williams.

Mr. Haddock replied to the questions raised in the discussion, and a hearty vote of thanks having been passed to the author, the meeting closed.

EDINBURGH CHEMISTS' ASSISTANTS' ASSOCIATION.

The sixth meeting of the present session was held on Wednesday, March 17, in the rooms of the North British Branch, Mr. D. Maclaren, President, in the chair.

A letter was read from Mr. Fisher, Secretary, resigning office, he having left the city. It was resolved to record in the minutes the great regret the Association felt in losing Mr. Fisher, and their high appreciation of his valuable services as Secretary during the present session. A paper was then read by Mr. C. P. Henry, entitled "Our Examinations."

The author first stated how the examinations originated, and after referring to the incorporation of the Pharmaceutical Society in 1842, and the establishment of the North British Branch in 1851, he gave a short account of the lamentable condition of the drug business at that time. Contrasting the position of the chemists and druggists of those times with the present, he thought the examinations should get the credit of being the main cause of the improvement. He next referred to the process of development which the examinations had undergone since their institution, and regretted that there was no check on the Council, or opportunity for appeal on the part of those most interested, in regard to the additions which were every now and again being made. He thought the time had now come when it should be made compulsory that the Preliminary examination should be passed before the business could be entered, and that while the Minor might remain as at present, the Major might well be abolished as "a useless burden, conferring a mere ornamental title, and serving no useful end." Referring to the examinations themselves, he thought they should be made more practical, candidates having at present to acquire a vast amount of non-essential knowledge. He regretted that the syllabus for the Minor examination was so indefinite, and suggested that it would be a great help to perplexed candidates if they had a more extended syllabus, which would let them know more definitely what knowledge to acquire. He also thought that such vague expressions as "etc." which occurred so often in the present syllabus should be abolished, and suggested that text-books might be named for the different subjects. He observed that more justice was done to the Major candidates, and still more to the Modified, the names of plants and substances requiring recognition being given without any "etc." being added. He thought that in common fairness this should be done with all the examinations. Seeing that nervousness was a great hindrance to many candidates in passing the examinations, he advocated written, as far as practicable, in preference to oral examinations, as a remedy. Other advantages of the former system would be a more equal and fair examination, and fewer examiners would be necessary, with the effect of lessening the cost and reducing the fees. He thought the clause as to age of candidates should be abolished as unnecessary and unjust. He condemned the present regulations as to passing all the subjects at one time, as it had the effect of producing "cramming," which defeated the object of the examinations, and advocated shorter hours of business to enable candidates to prepare for the examinations in such a way as that the knowledge acquired should be permanently retained.

Discussion of the paper followed, in which Messrs. Maclaren, Hutton, Robertson, Aitken and Hill took part, and in which general concurrence with the views of Mr. Henry was expressed, some gentlemen differing from him as to the age of candidates, the passing of subjects seriatim, and the abolition of the "Major," and an additional suggestion being made that the time had come when the Modified examination should be abolished.

A hearty vote of thanks was awarded to Mr. Henry for his paper, and Mr. Hill having agreed to act as interim secretary, the meeting was brought to a close.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

The anniversary meeting of this Society was held at the Society's rooms, Burlington House, on Tuesday, March 30, Mr. Warren De La Rue, President, in the chair.

The President, in his annual address, contrasted the condition of the Society during the past year with its position in 1869, when also he was President. The number of Fellows has increased from 522 to 1034, the income from £1122 to £2720, the number of papers read from 31 to 75. The Journal has also increased both in value and importance, especially in the addition of the abstracts which form such a complete compendium of the progress of chemistry. As regards the library, £500 had been spent in purchasing new books, and a card catalogue is being prepared to increase the facility for finding books. The President then referred to the rapid progress of chemistry which he had specially noticed on returning to the chair. Much of the aspect of chemical thought has changed. The elements once looked upon as most stable are now considered to be at any moment liable to be dissociated. Some months back, spectroscopic evidence was brought forward, which tended to show that the so-called elements were in reality compound bodies, and now V. Meyer has succeeded in dissociating chlorine, bromine and iodine. As regards the spectrum itself, specific functions and properties can no longer be attributed to various parts of it; for Captain Abney has shown that every part acts actinically, and holds out a prospect of producing permanent photographs of the spectrum in its natural colours. The artificial production of the diamond has also been said to have been effected, but Mr. Hannay's communication on this subject is so vague that it is impossible to pronounce any opinion upon it. The joint observations of Hannay and Hogarth on the solubility of solids in gases promise results of great interest. Remarkable observations have been made by Cailletet, Ansdell, etc., on the behaviour of various substances, mixtures, etc., under great pressure. The researches of Gladstone, Landolt and others on the refractive indices of carbon compounds have been greatly extended by Brühl. The President then alluded briefly to the great diligence of organic chemists in the investigation of carbon compounds, and especially to the elucidation of the constitution of alkaloids and the carbohydrates; the synthesis of isatin and Baezer's researches in the indigo group must, it would seem, result, ere long, in the discovery of a method for the artificial manufacture of indigo. Ladenburg has prepared atropine from tropine and tropic acid, and thus probably the first steps have been taken towards the synthesis of an alkaloid. Much light has been thrown on the constitution of the bases of the pyridine and picoline series, of the nicotine and cinchona alkaloids, and of starch. Recent facts seem to show that our present symbolic system is inadequate to represent the constitution of carbon compounds. A new element, scandium, has been separated, corresponding to Mendelejeff's ekaboron, thus verifying his sagacity and the importance of the periodic law. The President then referred to the objects and position of the Research Fund, and expressed a hope that all whose fortune allowed would contribute largely to this fund and thus promote the advancement of a science which may have contributed greatly to their own prosperity. He thanked the Drapers' and the Goldsmiths' companies for their donations to the fund. During the past year death has removed fourteen Fellows.

At the conclusion of the address, Mr. F. A. Abel proposed a vote of thanks to the President for his interesting address, and for the zeal with which he had performed the duties of President during the past year. It had been a special pleasure to see Mr. De La Rue again in the chair. Some of the older members would recall with gratitude the great exertions which had been made by Mr. De La Rue on behalf of the Society at a critical period of its history, when he was appointed Treasurer; and the present prosperous condition of the Society was in a great measure due to his efforts at that time. He hoped that the example set for a second time by the President would prove an incentive to others to subscribe liberally to the Research Fund.

Dr. Gladstone, in seconding the vote of thanks, said that he had listened with great interest to the successful *résumé* of chemical progress given by the President. The experiment of re-electing a former President for twelve months had proved a great success, and he hoped it would form a precedent. The small attendance was an indication, not only of the holiday season, but also of the peaceful prosperity which now reigned in the Society.

The President, in reply to the vote of thanks, said that as an original member he had taken great interest in the Society and had been very glad to take up the management of the finances; the prosperous career of the Society was, however, due more to its own innate life than to any efforts of his. He had returned to the chair with some sense of his own inefficiency, owing to the enormous changes which had recently taken place in chemistry. He thanked the Council, officers and the fellows of the Society for the kind way in which they had supported him during his year of office.

The Secretary read the third report of the Research Fund Committee. Grants to the amount of £495 have been made during the year. The assets consist of £4000 stock and a balance at the bankers of £152. A detailed list of the grants is given. A donation of £105 from the Drapers' Company and £100 from the President form important items in the income. The Committee point out the desirability of obtaining further additions to the fund, as without such contributions the income from investments would have been quite inadequate. Results of investigations have been published by Dr. Tilden, Professor Thorp, Dr. Wright, Mr. F. D. Brown, Dr. Armstrong, Dr. Bedson, Messrs. Hartley and Huntington. Dr. Japp has forwarded a paper which will be read at the next meeting. Preliminary reports have been received from Dr. Dupré and Messrs. Bolas, Burghardt, Jago, Shenstone and Williams.

The Secretary then read the Treasurer's report. The expenses on account of the Journal amount to £1870; on account of the library, £601; house expenses, £191; various other items, including £720 for purchase of stock and a balance of £929 at the bank, make up a total of £4684. On the other side are, balance at the bank in March last, £1964; subscriptions, etc., £2151; sale of Journal, £295; dividends, £217. The assets consist of £6988 stock; balance at the bank, £927; cash in hand, £2.

Votes of thanks were then passed to the Treasurer, the Auditors, the Officers and Council and the Editor, Sub-Editor and Abstractors of the Journal. A ballot was then held for the election of Officers and Council. Messrs. Grosjean and Kingzett being appointed Scrutators. The following were elected:—President, H. E. Roscoe; Vice-Presidents, F. A. Abel, C.B., B. C. Brodie, Warren De La Rue, E. Frankland, J. H. Gladstone, A. W. Hofmann, W. Odling, Lyon Playfair, A. W. Williamson, J. Dewar, J. H. Gilbert, N. S. Maskelyne, V. Harcourt, R. Angus Smith, J. Young; Secretaries, W. H. Perkin, H. E. Armstrong; Foreign Secretary, Hugo Müller; Treasurer, W. J. Russell. Other members of the Council M. Carteighe, C. Graham, C. W. Heaton, H. McLeod, E. J. Mills, J. M. Thomson, W. C. Roberts, W. A. Tilden, W. Thorp, T. E. Thorpe, J. L. Thudichum, R. Warington.

A special meeting was then held, at which the by-law relating to the number of members required to be present for the election of Fellows was altered; the number 32 being substituted (by-laws page 12, line 4) for 40.

SOCIETY OF ARTS.

The Chemistry of Bread-Making.*

BY PROFESSOR GRAHAM, D.SC.

Lecture I.

Some six years ago I had the honour of addressing an audience in this room upon a subject closely allied to that which will engage our attention on this and each succeeding Monday evening before the great festival of the Christian year. I refer to the course delivered by me on

* Cantor Lectures: Delivered November and December, 1879. Reprinted from the *Journal of the Society of Arts.*

the "Chemistry of Brewing." The Council of the Society of Arts has again honoured me by a request to give a Cantor course on some application of science to the arts, and in selecting the chemistry of bread-making I have been guided by a consideration of the vital necessity of food to the existence of man. As cereals are, of all the fruits of nature, the most important to man for their invaluable store of flesh-forming and heat-giving principles, the right method of preparing these for his use is one well worthy of the most attentive study. Although the cultivation of the cereals is beyond our present province, which is limited to the study of the phenomena of bread-making, I shall incidentally have to refer to the effect of climate—and more especially to the influence of the weather at the ripening and harvesting periods—on the character of the wheat garnered; and I shall show that unfavourable climatic conditions not only seriously affect the quantity, but also the quality of the grain.

It may be thought by some that there is little need for a scientific study of bread-making, since man has already attained a considerable degree of excellence in its manufacture. This is true, but much remains to be done ere all inferior productions shall have given way to the loaf of unsurpassable excellence, and it is chiefly to science that we must look for a rapid development. It is true that in London we can, if we search for it, obtain bread of excellent quality, yet we all know there is much that is inferior throughout the country; nor can our average of wheaten bread equal the average wheaten bread of France and Germany. This is, doubtless, partly due to the more favourable climatic conditions of those countries, but inasmuch as we import the best qualities of wheat from some of the most favoured countries of the Old and New Worlds, the inferiority of our average bread cannot arise chiefly from our less favourable harvesting conditions, but rather from the less skill and knowledge possessed by many of our millers and bakers.

A fuller knowledge of the chemical phenomena of bread-making must not only be of great value to the baker, but also to the consumer of bread. In this respect we are all interested in the phenomena of fermentation, and later in this course I propose to direct your attention to the digestion of bread, which is a process of fermentation, and to the conditions requisite for its due fulfilment.

The historic aspect of our subject is lost in obscurity. Probably, soon after man learned to till the earth, and reaped a rich cereal harvest from his toil, the grinding of corn, and its admixture with water and salt, and then its heating, would be resorted to. Thus unleavened bread is made, and the earliest attempt to prepare ground cereals for man's use has not ceased to be practised. The oatcake of Scotland, and her peas and barley bannocks, the Passover bread of the Jews, the damper of the Australian shepherd, the American corn bread, are existing examples of that method of bread-making. In many parts of Spain wheat flour is simply mixed with water and baked, not even salt being added. There, not only the most primitive of all methods of bread-making is still pursued, but even the separation of the grain from the straw is carried out, as in Biblical times, by the treading out of the corn in the fields by oxen; and although the bread is deficient in salt, it is rich enough in fine, gritty sand.

The next step, and the most important one in the history of bread-making, whereby leaven was employed to lighten the product, is also of considerable antiquity. It is probable the Chinese may have been the first to make leavened bread. Be this as it may, we know that the Egyptians, in the time of Moses, understood the art, and from them the Greeks acquired the secret, and through the Greeks the Romans spread the knowledge wherever their all-conquering and colonizing armies went. Leaven, although a great improvement on unfermented bread, acts slowly, and gives rise to so much of high-coloured products that it has, to a great extent, been replaced by yeast. The introduction of this important factor in bread-making probably took place soon after the art of making beer had obtained some degree of success, because the evolution of gas in the leavening process must have suggested the trial of yeast, which also evolves gas in the conversion of saccharine matter into beer. I have, however, been unable to find any authentic statement of its introduction in place of leaven. The preparation of leaven is still practised, and thus we have the unleavened, the leavened and the yeast-fermented breads of the present day. But it is chiefly yeast-fermented breads which will occupy out attention throughout the course, although, incidentally, the spontaneous ferments of the leaven process will be considered.

Before we proceed to study the phenomena of bread-making, it will be needful to consider the constituents of the chief cereals, and to compare them, not only amongst themselves, but also with the more important articles of food employed by man. In the following table you will find a statement of the component parts of these cereals, wheat, barley, oats, rye, maize and rice:—

Average Composition of the Grain of Cereals.

	Old Wheat.	Barley.	Oats.	Rye.	Maize.	Rice.
Water	11·1	12·	14·2	14·3	11·5	10·8
Starch	62·3	52·7	56·1	54·9	54·8	78·8
Fat	1·2	2·6	4·6	2·0	4·7	0·1
Cellulose	8·3	11·5	1·0	6·4	14·9	0·2
Gum and Sugar	3·8	4·2	5·7	11·3	2·9	1·6
Albuminoids	10·9	13·2	16·0	8·8	8·9	7·2
Ash	1·6	2·8	2·2	1·8	1·6	0·9
Loss, etc.	0·8	1·0	0·2	0·5	0·7	0·4
	100·00	100·00	100·00	100·00	100·00	100·00

Bearing some of these numbers in mind, if we take the following table, prepared by Messrs. Lawes and Gilbert, with reference to the articles of food most used by man, we find that the ratio of carbon to nitrogen, in the case of flour, is 38 to 1·7, in meat as 30 to 2, in potatoes as 11 to ·3. We therefore notice that in the case of these cereals we have a considerable quantity of flesh-forming albuminoid matters, more especially in the case of wheat. I shall have again to refer to the subject of diet at a later period of the course.

Average Composition of Articles of Food. (Lawes and Gilbert.)

Foods.	Dry Substance.	Carbon.	Nitrogen.	Nitrogen to 100 Carbon.
Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Meat (fresh)	45·0	30·0	2·0	6·6
Bacon (dried)	85·0	61·0	1·4	2·3
Butter	85·0	68·0	0·0	...
Milk	10·0	5·4	0·5	9·3
Cheese	60·0	36·0	4·5	12·5
Flour (wheaten)	85·0	38·0	1·72	4·5
Bread	64·0	28·5	1·29	4·5
Maize	87·0	40·0	1·75	4·4
Oatmeal	85·0	40·0	2·0	5·0
Rice	87·0	39·0	1·0	2·56
Potatoes	25·0	11·0	0·35	3·3
Vegetables (succulent)	15·0	6·0	0·2	3·3
Peas	85·0	39·0	3·65	9·4
Sugar	95·0	40·0	0·0	...

We may conveniently divide the constituents of the cereals into three great classes. In the first place, those constituents which, by being burnt up in the system, produce heat. They are the materials that we call carbohydrates: the starch, the gums and the sugars; it is from the oxidation of these carbohydrates, and also from the fat in our food, that the greater portion of the force that man exerts is derived. The next great division it will be convenient to take is the albuminoids, or flesh-forming elements of the cereals; and lastly, the ash, which, although not great in quantity, is still most important in its bearing on the physiological phenomena which go on in the cells of animal life, and also because it is from the mineral matter of the ash that the bone structure of man is built up. Now, the mineral matter of the ash of wheat has been the subject of very lengthened investigations by numerous chemists. The series which, perhaps, on the whole, are most complete and trustworthy, are those made by Messrs. Lawes and Gilbert and those by Messrs. Way and Ogston.

Composition of Wheat Grain Ash.

	Lawes and Gilbert.	Way and Ogston.
Phosphoric acid	49·68	45·01
Phosphate of iron	2·36	0·82
Potash	29·35	31·44
Soda	1·12	2·71
Magnesia	10·70	12·36
Lime	3·40	3·52
Sulphuric acid	...	0·34
Carbonic acid	...	0·02
Chlorine	0·13	0·13
Silica, etc.	2·47	3·67
	99·21	100·03

We find from the former chemists' statements that the ash of wheat contains, in 100 parts, 49 of phosphoric acid; Way and Ogston say 45, so that nearly one-half consists of phosphoric acid. There is also a small quantity of phosphate of iron, but the next important constituent concerned is potash. That amounts to about 30 per cent. Lawes and Gilbert state, as the average of nine analyses, that they have found it to be 29·35; whereas the average of twenty-six analyses of various samples of wheat, by Way and Ogston, gives 31·44 of potash Thus phosphoric acid amounts to nearly one-half, and potash one-third of the whole of the ash. The next important constituent is magnesia, amounting, according to Lawes and Gilbert, to 10·7, and to Way and Ogston, to 12·3. Lime, soda, and a small quantity of silica make up the remainder of the 100 parts. Phosphoric acid, a small quantity of iron, potash and magnesia, are the characteristic constituents of the ash of wheat.

I will now proceed to examine somewhat fully the chief chemical and physical properties of the organic constituents of cereals, beginning with starch. I have here a table that indicates in our chemical language the composition of what we term the carbohydrates.

Formulæ of Carbohydrates.

$$\left.\begin{array}{l}\text{Starch}\\\text{and}\\\text{Dextrin}\end{array}\right\} = (C_{12}H_{20}O_{10})_n$$

$$\left.\begin{array}{l}\text{Cane Sugar}\\\text{and}\\\text{Maltose}\end{array}\right\} = (C_{12}H_{22}O_{11})_n$$

$$\left.\begin{array}{l}\text{Dextrose}\\\text{Lævulose}\end{array}\right\} = (C_{12}H_{24}O_{12})_n$$

We use that expression in order to indicate that hydrogen and oxygen are found in the carbohydrates, in precisely the same ratio as they occur in water. These two elements, hydrogen and oxygen, do not exist in starch or sugar as water, but they exist in the same proportion as they do in water, and that expression has been applied to all these bodies. In the case of starch and dextrin you will notice the formula given here ($C_{12}H_{20}O_{10}$) has a small "n" added outside of it. The simplest formula which would represent our knowledge of the centesimal ratio of the carbon, hydrogen and oxygen would be $C_6H_{10}O_5$, but we shall hereafter see so small a formula is insufficient to explain a number of reactions we know of in reference to starch. The formula of starch must, therefore, be written $(C_6H_{10}O_5)_n$. I have thought the formula $(C_{12}H_{20}O_{10})_n$—in which even the value of n is probably high—would best express to those not well conversant with chemical science the correlation of the various carbohydrates in the table.

The next subdivision of this important class of bodies embraces cane sugar and maltose; indeed, I might also have included sugar of milk.

They are isomeric, that is to say, that they have precisely the same ratio of carbon, hydrogen and oxygen in their molecular composition, but they differ from the previous sub-groups in having one of oxygen and two of hydrogen more in the formula given. The last subdivision of this group embraces the glucoses, the simplest formula expressing their molecular composition being $C_{12}H_{24}O_{12}$. Here also, we notice an increase of two of hydrogen and one of oxygen over the cane sugar group, which differs from the starch group in the same manner.

It is to the first on our list of the carbohydrates that I have now to direct your attention. Starch is found in various vegetable structures, and for much the same purpose as fat is stored up in animals, for the future use of the organism.

It is thus found in pith. The sago of commerce is obtained by cutting down the sago plant and rasping the pith, and from that extracting the starch. It also occurs in bulbs, in tubers, such as the potato, in rhizomes, and in roots; and it also occurs in seeds, either in what is called by the botanist the albumen of the seed, although it is not albumen from a chemical point of view, but it is called so because it is convenient to consider the stored-up starch in ordinary grain by that name. If you take the caryopsis of wheat, the small embryo will be found at the bottom, surrounded by a large mass of starchy matter. It contains, not merely starch, but also albuminoid bodies, and this, in botany, is called the albumen of the seed, for the reason that in the case of an ordinary hen's egg, the white of the egg surrounding the embryo is called albumen, and in both cases the albumen serves for the future growth of the young embryo. Starch is also found very largely in the fleshy cotyledons of some seeds, as, for instance, the ordinary bean, horse-chestnut, or pea, where practically the whole mass is made up of the two thick fleshy leaves that constitute the two halves of the whole seed, the young embryo being at the bottom. We see, therefore, that in all structures that are intended for the future growth of the plant, or, as in the case of seeds, for the reproduction of the new plant, that we have stored-up starch.

(*To be continued.*)

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the above, on Wednesday, March 17, Mr. F. W. Branson in the chair, a paper was read by Mr. Stewart Hardwick, on "Assimilation in Plants." The author first proceeded to notice the movement of water in the tissues, and explained the manner in which the ash constituents were taken up by the roots. The laws governing transpiration were next alluded to, and evaporation shown to take place from the external surface of the cell walls, which in their turn removed water by imbibition from the cell sap. The elements necessary for plant life were enumerated, and the processes of assimilation and metastasis reviewed. In conclusion, the author described the movements of food material in the tissues, and proved there could be no such thing as a continuous uniform motion of the so-called nutritive cell-sap.

After an interesting discussion, a vote of thanks having been proposed by Mr. Naylor, seconded by Mr. Wallis and carried, the meeting terminated.

Review.

THE RISE AND DEVELOPMENT OF ORGANIC CHEMISTRY. By C. SCHLORLEMMER, F.R.S., Professor of Organic Chemistry in the Owens College, Manchester. Manchester: J. E. Cornish. London: Simpkin, Marshall and Co. 1879.

"This little work" is a *résumé* of past achievements in a science of which its author is an acknowledged master. It consists of twelve chapters.

The opening chapter contains an account of the organic processes and compounds known in ancient times; such as acetic acid and some acetates, the use of paper steeped in infusion of galls as a test for green vitriol, the distillation of turpentine, soap making, and the fermentation of grape juice. The origin of the word chemistry is then discussed and the rise of alchemy and iatro-chemistry traced until Boyle rescued chemistry from being simply the tool of the alchemist and physician and placed it as a separate and independent science. The theory of phlogiston, the discoveries of Scheele, and the work of that circle of chemists which we associate with the name of Lavoisier are briefly explained.

Thus at the commencement of the present century chemistry had reached a stage when it became evident more and more that a distinction should be made between the chemical processes involved only in vegetable and animal life and those which take place in the mineral kingdom. This led to the theory of vital force, and thus Berzelius, in 1827, says "that the elements present in living bodies obey laws totally different from those which rule inanimate nature." The brilliant series of discoveries commencing with the synthesis of urea by Wöhler, in 1828, which have completely overthrown the vital force theory, are then fully considered. Although, however, the great distinction between inorganic and organic chemistry was thus broken down, still it has always been found convenient to treat nearly all carbon compounds as a separate branch of chemical science; moreover, it is shown in a later chapter that carbon possesses properties peculiar to itself which amply justify this separation.

The announcement by Wöhler and Liebig in 1837, that in a number of reactions, in the case of benzoic acid, oil of almonds and allied bodies, there always remained intact a certain group of atoms which they termed a "compound element" or radical, is discussed and its important bearings pointed out. This compound element they named benzoyl. The discovery of radicals, afterwards called residues by Laurent, was then only a matter of time, and Liebig at a later date even proposed that organic chemistry be defined as "the chemistry of compound radicals." The quotation from Liebig on pp. 20 and 21 respecting the characters essential for recognition as a compound radical is very valuable and, as Professor Schlorlemmer points out, it holds good at the present day.

The "empirical law of substitution" of Dumas, and the modifications urged by Laurent and afterwards adopted by Dumas, are then explained. We presume that when the author, in view of Laurent's discoveries, says on p. 23 "thus Dumas's third law did not hold good," he means that the whole of Dumas's law requires modification, because the third part is but a qualification of the first and second parts. It was held by the French chemists that in cases of substitution the place occupied by the element substituted was a more important matter than the particular element employed in deciding the characters of the resulting compound. This gave rise to the "theory of types" of Dumas, which was attacked by Berzelius and afterwards by Liebig. The march of discovery, however, soon convinced the latter of the correctness of the views of the French chemists, and these views were much advanced by the researches of Bunsen, Kolbe and Frankland, Hofmann and others.

The next great step was the idea of the introduction of radicals into the types, after which the compound ammonias were discovered by Wurtz and Hofmann, types were extended by Williamson, Gerhardt and Kekulé, and the theory of valency began to be perceived.

In chapter v., the author points out the properties of carbon which distinguish it from all other elements, and leads up to his definition of organic chemistry as "the chemistry of the hydrocarbons and their derivatives." Organic analysis is dealt with in chapter vi., also the calculations of empirical formulæ, the determination of molecular weights, etc. There are many hints in this chapter of considerable value, and which are, at least, not easily accessible elsewhere.

The "law of the linking of atoms," or more correctly, we should think, the theory of the linking of atoms, developed by Kekulé and independently by Couper, is then explained, so far as it relates to the paraffins. The methods employed for determining the constitution of compounds is illustrated by the "history of lactic acid," and the present views respecting isomerism are discussed.

In chapter ix., an account is given of the views of Kekulé, Körner and Ladenburg, respecting the probable arrangement of the carbon atoms in the benzene molecule. These are illustrated by drawings of glyptic formulæ. The reply of Kekulé to some objections urged against his theory is illustrated, when it is shown that the objections apply rather to a fault in the usual method of expressing his idea graphically, than to a fault in the idea itself. He shows, taking into consideration the probable motion of atoms, that the double carbon attractions, as they are usually illustrated graphically by double lines, while they express the state of things during a first moment of time do not express the condition during a second moment. During the second moment they change places with the single carbon attractions, while during the third moment the original state is again resumed, and so on.

Chapters x. to xii. are devoted to very interesting explanations of organic synthesis. Amongst the bodies included are:—paraffins, fats, vegetable acids, benzene, benzoic acid, salicylic acid, vanillin, alizarin and indigo.

It may be worth while to point out a few of the little errors which we have observed:—"Berzrlius" p. 25, for "Berzelius"; p. 41, "hydroyl" for "hydroxyl"; p. 42, "C_2H_4O" for "C_2H_6O," and "Gerhalt" for "Gerhardt"; p. 44, the words "like the" in the third line from the top are superfluous; p. 61, "formulæ of fatty acids" for "formula of fatty acids," and again, lower down, "general formulæ" for "general formula;" p. 64, "hudrogen" for "hydrogen"; p. 72, "oxyproponic acid" for "oxypropionic acid"; p. 73, "H_2O" in equation for "$2H_2O$"; p. 86, "normal iodine" and "butyl iodine" for "normal iodide" and "butyl iodide;" p. 90, reference note "Ber. dent. cheas. Ges." for "Ber. deut. chem. Ges.," and "Journ. Cheas. Soc." for "Journ. Chem. Soc.; p. 120, "isation" for "isatin;" and p. 112, "quininone" for "quinone."

We have derived considerable pleasure from the perusal of this book and believe that, as its quality requires no praise, its usefulness will be equally well appreciated by chemists. It will be found of greatest value to those who take an interest in theoretical chemistry and to those who desire to study the various methods of reasoning which have directed, supplemented, and even anticipated experiment, and have thus so powerfully contributed to the science of organic chemistry as we know it to-day. To those engaged in organic research, especially in the case of beginners, it will be found most useful, and finally to those whose interest is entirely of a technical nature, it will be of value as containing the latest methods of synthesis of substances having pharmaceutical and industrial utility.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE SALE OF DRUGS BY UNREGISTERED PERSONS.

Sir,—Such a crisis has arrived that it behoves the chemists and druggists throughout the land to be up and doing, or else their legitimate business will no longer yield th em a livelihood, and it is a question whether it would not be for their best interests to allow the recent decision in the case of the Pharmaceutical Society *v.* the Provincial Supply Association to rest without an appeal to the House of Lords, and at once to commence an agitation for an amendment and extension of the Pharmacy Act, so as to make it compulsory for any shopkeeper who sells drugs to keep a qualified person for the purpose, and that his shop should be registered for the sale of drugs, not poisonous, within the meaning of the present Act, the permit to be obtainable from the Pharmaceutical Society.

Such establishments would be entirely distinct from those of the registered and pharmaceutical chemists, inasmuch as they would not be allowed to compound medicine, but merely to sell drugs not poisonous.

Moreover, the sale of patent medicines should be restricted to the establishments of registered chemists and druggists, pharmaceutical chemists, and establishments registered for the sale of drugs.

In my opinion, the public require no less protection than that the sale of drugs should only be entrusted into the hands of men qualified by their education to judge of their quality and understand their doses and modes of administration.

I feel sure that the great body of registered chemists would join heart and hand with their pharmaceutical brethren, and, with the Council of the Society at their head, a Bill might be framed which would not infringe upon the principles of free trade and yet give to the chemist a better reward than he now has for performing his responsible duties, and at the same time satisfy the public that their safety is more cared for under the new regulations than it ever has been before.

6, *Belgrave Terrace,* FRANK TEBBUTT.
North Croydon.

PHYSICIANS AND THEIR MANUALS OF DOMESTIC MEDICINES.

Sir,—Your correspondent, Mr. Austin, has done good service in directing attention to the character of the information imparted to the public by so-called "Manuals of Domestic Medicine."

As an illustration of the conscientious motives which inspire the compilers of these works, it may be of interest to your readers to state that I not long since received a letter from an M.D., L.R.C.P., and Fellow of several learned societies, besides author of numerous medical treatises, informing me of his intention to publish a book on the treatment of certain complaints. "His attention had been called to certain pharmaceutical preparations bearing my name," and he was prepared "to give an extended notice of them" in his forthcoming work—for which, by the bye, he predicted a vast circulation—if I would, in return, confer upon him a trifling *solatium* in the shape of a ten pound note.

The preparations referred to were as much adapted for the diseases his book was to describe as for making door mats; but that of course was a trifle of no consequence.

His generous proposal, I need scarcely say, is still "awaiting my reply."

Surely those who have any influence in maintaining the decencies of medical literature will not suffer these "Domestic Manuals" to run riot with the good name of the profession. The practice of advertising somebody's wares, under the guise of genuine information, has so long been regarded as the distinguishing feature of the "religious" journals, whose special mission it seems to be to combine piety and puffing, that it will ill become the dignity of medical authorship if it seeks to appropriate it.

73, *Highbury Hill, N.* F. W. FLETCHER.

THE SALE OF PATENT MEDICINES.

Sir,—Upon reading the letter of "Ferrum" in a recent week's issue, one cannot help but endorse his references with regard to the "patent medicine farce" now being pushed with such vigour and enticing rewards. It is a deplorable fact that many who call themselves "chemists and druggists," either through incompetence or "wilful neglect" recommend some of the "thousand and one" dubious remedies, costing them from 6*s.* to 9*s.*, etc., per dozen, about whose composition they know nothing, whilst they (with a little knowledge and forethought), might put forward something of their own preparing with greater confidence, and probably with far better results.

There are obvious reasons why this should be done, viz., if a person asks you to recommend something, say in the way of "liver pills," if you recommend Cockle's or King's, your customers find that they can procure these, not only at a rival chemist's, but also at the "co-op." or your bookseller's, whereas, if they have found benefit from your own compounds, they must needs re-apply to you for them, thereby ensuring their regular patronage. If this were done we should soon relieve our cases and shelves of a large amount of "riff-raff," increase our takings and raise our profession in the estimation of the general public.

J. ROBERTS THOMPSON.

DR. CLARK'S PAPER ON DIALYSED IRON.

Sir,—In my remarks on Dr. Clark's paper on Dialysed Iron, in Journal, p. 784, I am made to say that "Dr. Clark was not quite satisfied with the absolute *accuracy* of his results." As this word is fitted to imply *inaccuracy* in work on his part, will you allow me to say that I had not such an idea when I spoke. My only allusion being to a remark which Dr. Clark had made as to the *inconclusiveness* of the results on the question before us.

ALEX. NAPIER.

Socius.—*Helleborus fœtidus.*

G. D. Druce.—(1) *Leskea sericea*, of Wils. Bry. Brit. (2) *Dicranum majus.* (3) *Funaria hygrometrica.* (4) *Hypnum squarrosum.* (5) *Anomodon viticulosus.* (6) *Hypnum cuspidatum.* (7) *Tortula subulata.* (8) *Tortula ambigua.* (9) *Hypnum striatum.* (10) *Hypnum pumilum.*

Amicus.—*Syrupus Tussilaginis.*—The following formula is given in the Codex:—"Dried coltsfoot flowers, 100; boiling water, 1000; white sugar, q.s. Pour the boiling water on the petals, macerate during six hours in a closed vessel, strain, press and filter. Add the sugar in the proportion of 190 parts to each 100 of the infusion, and make a syrup by simple solution in a covered water-bath.

J. R. Y.—Your question seems to indicate a confusion of terms. If you refer to concentrated preparations, the process of percolation is usually employed, which does not involve the application of heat.

"*Azote.*"—The provision in the Weights and Measures Act relating to the sale of drugs by "apothecaries' weight" is only permissive, and there is no doubt that the use of the avoirdupois weight for the purpose is legal. As to the interpretation of symbols used in prescriptions see a letter from Professor Redwood, in vol. viii., p. 477 of the present series of this Journal.

Inquirer.—The use of methylated spirit in making such a preparation, which is capable of being used internally as a medicine, or the sale of a preparation so made, would, under the 29 and 30 Vict. cap. 64, sect. 8, render you liable to a penalty of £100.

Erratum.—On p. 788, vol. i., line 30 from bottom, for "tubular" read "tabular;" line 27, for "tent" read "teat;" line 21, for "bark" read "back;" line 16, for "venation" read "vernation."

"*Alpha.*"—The formula for syrupus calcis lactophosphatis approved by the Paris Society will be found in vol. vii. of the present series of this Journal, p. 1041. Several other formulæ have also been given at various times.

"*Chemist and Druggist.*"—Carbolic acid is not included in the Schedule of Poisons.

Sigma. — Ringer's 'Handbook of Therapeutics,' or Naphey's 'Modern Medical Therapeutics," would probably best suit your purpose.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Mee, Mackay, Dranbridge, Jacque, Junior, K., C. L. S.

VOLUMETRIC DETERMINATION OF ALKALOIDS BY SOLUTION OF THE IODIDES OF BISMUTH AND POTASSIUM.*

BY J. C. THRESH, F.C.S.

So far as I am aware, the only solution hitherto employed for volumetric determination of alkaloids is that proposed by Mayer (*Am. Journ. Pharm.*, xxxv., 28), consisting of a solution of mercuric chloride and potassium iodide, but the results obtained by use of this reagent are only approximately accurate when the solutions are of a certain strength, and in the absence of ammonia, acetic acid, and many other substances.

From the known want of some reliable mode of estimating alkaloids volumetrically, and from observations of the character of the precipitates produced in solutions of alkaloids by the iodide of bismuth and potassium reagent, and the exceeding delicacy of the test, I have been led to make a series of experiments to ascertain the applicability of such a solution for alkaloidal determinations, and the circumstances under which its action is reliable.

M. Yvon (*Répertoire de Pharm.*, ii., 335, Abs. Y. B. P., 1874, 232), who published a form for preparing a solution of iodide of bismuth and potassium for detection of alkaloids, at the conclusion of his paper says that "since the nature of the precipitate produced by the reagent varies and the composition of the reagent itself also changes that it will be impossible to use the double iodide as a volumetric test." As, however, M. Yvon's experiments did not appear to me to be conclusive on this point, and as only in one case, afterwards to be referred to, did any attempt appear to have been made to determine the nature or composition of the precipitate produced by this double iodide when added to an alkaloidal solution, it was determined to clear up, if possible, both these points.

The results I now have the pleasure of laying before this meeting, and although the experiments have not led up to a method of volumetrically estimating alkaloids applicable under all circumstances, yet there are special cases in which the method may prove to be of considerable service. But apart from this as an account of the examination of an hitherto unexplored domain, it is hoped that the paper will not be altogether without interest.

In the first experiments, a solution of bismuthic chloride, to which excess of potassium iodide had been added, and containing 2 milligrams of bismuth in each cubic centimetre, was employed. Solutions containing strychnine, quinine, morphia and cinchonine, were prepared, each containing, in 1 c.c., 2 milligrams of alkaloid.

When the bismuth solution was run in to measured quantities of solution of quinine, it was found that at a certain point the fluid became tinted by the reagent, but that the clear supernatant fluid became cloudy upon addition of more bismuth solution. When filtered it also precipitated upon addition of quinine. Reading off from the instant when the fluid became of a decided orange tint, results very concordant were obtained. Readings taken by running the alkaloid into the bismuth solution, so long as a distinct precipitate (not a mere turbidity) was produced, gave nearly the same results. The mean of five experiments showed that 210 bismuth precipitated 140 quinine. The molecular weight of quinine, $C_{20}H_{24}N_2O_2$, being 324, the above ratio corresponds to a double iodide, containing 7 molecules of Bi I_3 to 3 of $C_{20}H_{24}N_2O_2.HI$, or—

$$7\,(BiI_3)\,3\,(\bar{Q}HI).$$

This formula requiring 139 parts of quinine to 210 of bismuth.

With cinchonine also very approximate results were obtained, the mean quantity of this alkaloid precipitated by 210 of bismuth being 210. The formula—

$$3\,(BiI_3)\,2\,(C_{20}H_{24}N_2OHI)$$

requires 205 of alkaloid to 210 of bismuth. When the cinchonine was run into the bismuth solution, the results were not so concordant, and agreed with no simple formula. With strychnia, the mean quantity corresponding to an atom of bismuth (in milligrams) was 466 milligrams. This would apply most nearly to a formula—

$$3\,(BiI_3)\,4\,(C_{21}H_{22}N_2O_2HI),$$

which requires 445 of alkaloid to the atom of bismuth.

When it was attempted to titrate the solution of morphia, it was found that the fluid became coloured long before it ceased to precipitate with the reagent, and the results obtained were not to be depended upon.

Next a volumetric solution containing 10·5 milligrams of Bi (and excess of KI) in each c.c. was prepared, and with this results corresponding closely amongst themselves, but differing totally from the previous ones, were obtained. Now 4 atoms of bismuth almost exactly precipitated 3 molecules of quinia. With a solution of bismuth oxide and potassium iodide in dilute hydriodic acid the same proportions were found to hold.

A portion of the quinine and bismuth precipitate was then collected for analysis, but upon attempting to wash it, it so readily decomposed that it was obvious the results could not be satisfactory. After the supernatant fluid has been removed from the precipitate, and water has been placed upon it, the latter, although it remains uncoloured, is found to contain hydriodic acid and quinine, but no bismuth, and by continued washing the salt becomes paler and paler in colour until ultimately very little besides oxide of bismuth is left behind.

A solution containing ·162 gram quinia was found to be entirely precipitated by bismuth reagent corresponding to ·135 gram bismuth. The filtrate was tested in various ways and found to contain the merest trace of bismuth and no alkaloid. The precipitate was collected upon a tared filter, rapidly washed with a little cold water by aid of a filter pump, dried at 212° and weighed. The compound weighed ·750 gram, and when heated to about 250° fused into a transparent ruby fluid, but the weight remained constant. In a second experiment ·519 gram bismuth and ·606 quinia yielded 2·922 grams of the orange coloured compound. Calculated into percentages we have—

	1.	(2)
Bi.	18·07	17·8
$\bar{Q}$	21·6	20·75
I	60·33	61·45

The formula

$$4(BiI_3)\,3(\bar{Q}HI)\,8HI$$

requires—		
	Bi	17·7
	Q	20·6
	I	61·7

* Read at the Evening Meeting of the Pharmaceutical Society, April 7, 1880.

A number of similar determinations were made with solutions of different strengths and containing various amounts of potassium iodide, and it was found that by varying the amount of this latter salt, orange coloured compounds containing most varied proportions of bismuth, quinine, and iodine were obtainable. One such compound agreed most closely with the formula

$$5(BiI_3)\ 4(\bar{Q}HI)\ 3HI$$

and in every case the molecule contained more or less HI. Evidently these precipitates are mixtures of definite compounds of simpler constitution, but still complex, as is shown by the facility with which they suffer decomposition. In colour they vary from a pale brick red to a deep and beautiful scarlet, the greater the proportion of iodine the deeper the colour.

Seeing that Mr. F. W. Fletcher, at the British Pharmaceutical Conference, in 1878, had given

$$(BiI_3)_2\ C_{20}H_{24}\quad .HI$$

as the formula of a double iodide prepared by him, I attempted to arrange the strengths of my solutions so as to precipitate this compound. Mr. Fletcher having informed me that he obtained the iodide by mixing together solutions of potassium iodide, bismuthic nitrate, and quinine, in the proportions calculated from the formula, I mixed together solutions of bismuth and quinine in the above proportions, and then ran in the iodide from a burette, but found invariably that more iodide was required to completely precipitate the bismuth and alkaloid than the formula indicated, no matter what was the state of dilution or whether the iodide was added slowly or at once. The mean of two determinations, (volumetric and gravimetric) gave

Bi	23·8
$\bar{Q}$	18·4
I	57·8
	100·

which is almost absolutely identical with that required by the formula

$$(Bi\ I_3)_2\ (\bar{Q}HI)\ HI.$$

A specimen of Mr. Fletcher's compound, kindly furnished me by that gentleman I found exhibited instantaneously signs of decomposition when agitated with cold water, the filtrate precipitating freely with silver nitrate and with alkaloidal reagents. Most likely the salt when freshly precipitated has the formula above given, but upon washing, the proportions of HI and $\bar{Q}$ are decreased and its composition will approximate to that given by Mr. Fletcher.

To ascertain what proportion of potassium iodide to bismuth would give the best results, volumetric solutions containing the two in various proportions were tried and the results proved that the following solution gave in the majority of cases the most reliable indications and was most convenient for use:—

Bismuthic Oxide	4·68 grams.
Potassium Iodide	20· „
Hydrochloric Acid (B.P.)	80· c.c.
Water add to	1 litre.

The bismuth oxide is dissolved in the acid, diluted to 300 c.c., and the iodide of potassium dissolved in sufficient water to measure 700 c.c. mixed with it. If the iodide is added to the strong acid solution, a precipitate of bismuthic iodide falls upon the addition of the water, and if too much water is added first oxychloride is precipitated. Made as above directed the fluid is perfectly bright, of a rich dark orange colour, and is apparently permanent, but whether it retains its strength unimpaired for a length of time I cannot yet say. Half a c.c. added to 100 c.c. of water containing a trace of potassium iodide gives a perfectly bright pale orange tinted fluid. The tint is of such depth that when a few drops of the liquid are drawn into a glass tube 2 mm. in diameter, the colour is readily perceptible.

When the reagent is dropped into pure water a distinct turbidity is at once produced, the fluid remaining colourless until a certain amount has been added, but singularly enough the presence of ·1 per cent of potassium iodide entirely prevents this decomposition.

The following are the results of my experiments with this solution. In all cases, unless otherwise stated, the alkaloids were first dissolved in slight excess of hydrochloric acid:—

Solutions of Quinine. $C_{20}H_{24}N_2O_2$.

Quantity taken in grams.	Dilution, etc.	c.c. of Bi. Sol.	Mol. bi. / Mol. alk.	Quinia calculated from results.
·065	10 c.c. Water, temp. 49° .	15·	1·5	·065 gram.
·130	20 c.c. Water	29·5	1·475	·128 „
·130	20 c.c. Water	30·	1·5	·130 „
·130	50 c.c. Water, temp. 65° .	31·	1·55	·134 „
·086	13 c.c. Water	19·5	1·48	·084 „
·130	20 c.c. Water and excess of HCl . .	29·	1·45	·125 „
·130	100 c.c. Water and excess of HCl . .	32·	1·6	·138 „
·194	50 c.c. Water and excess of H_2SO_4 .	47·2	1·57	·204 „
·097	15 c.c. Water and excess of acetic acid . . .	22·5	1·5	·097 „
·131	40 c.c. Water and excess of acetic acid . . .	31·5	1·56	·136 „
·065	10 c.c. Water and excess of HNO_3 .	14·5	1·45	·063 „

The point read off was that at which the reagent ceased to give a distinct precipitate with a drop of the fluid filtered through paper. The precipitates in nearly all cases, it may here be remarked, are flocculent and settle somewhat rapidly, especially towards the end of the reaction, and as a consequence the use of filter paper may generally be dispensed with, by substituting a very small pipette having its contracted extremity plugged with a little cotton wool. A few drops of the supernatant fluid are drawn by careful suction into the tube, and are thus completely filtered by the wool. If the point to be read off is that at which the fluid becomes tinted, this is ascertained without further trouble. When the end of the reaction is that at which further addition of reagent ceases to cause a precipitate, the few drops of fluid are transferred (by blowing) to a small test-tube, and a single drop or fraction of a drop of the bismuth solution dropped in from the pipette. The tube and pipette are rapidly rinsed with a little water. I prefer a small test-tube to a watch glass, because a slight opalescence is frequently produced long after excess of the reagent has been added, and this is more readily distinguished in the tube from the slight but distinct precipitate produced towards the end of the reaction.

When free acetic acid is present from 1 to 2 c.c. of the bismuth solution is decolorized; this may be prevented by adding a little potassium iodide to the alkaloidal solution previous to running in the reagent, but it is apparently unnecessary. Within certain limits the state of dilution of the quinine solutions does not materially affect the results, neither does the presence of excess* of hydrochloric or nitric acids. Excess of sulphuric acid causes the readings to be somewhat too high.

The mean value of the ratio, $\frac{Bi}{Alk}$ is $\frac{16 \cdot 635}{11} = 1 \cdot 51$, and the results in the fifth column are calculated from the formula—

$$3(BiI_3)\,2(\overline{Q}HI)\,x(HI).$$

Solution of Strychnia.

Strychnia.	Dilution.	c.c. of Bi. Sol.	$\frac{Bi.}{St.}$	Result.
·167	25 c.c. Water . .	20·	·8	·160
·134	40 „ . .	16·5	·825	·132
·067	10 „ . .	8·3	·83	·067
·200	100 „ and excess of nitric acid	26·	·86	·208

The mean value of the ratio $\frac{Bi}{St}$ is $\frac{3 \cdot 315}{4} = \cdot 83$, corresponding to—

$$5(BiI_3)\,6(\overline{St}HI),$$

from which formula the results are calculated.

Solution of Cinchonine.

Alkaloid.	Dilution.	$\frac{Bi.}{Alk.}$	c.c. Bi. Sol.	Results.
·071	11 c.c. Water . .	1·5	16·5	·071
·129	20 „ . .	1·475	29·5	·127
·129	50 „ with excess of H_2SO_4	1·53	30·7	·132
·258	150 c.c. Water with excess of acetic acid	1·57	63·	·270
·039	10 c.c. Water with excess of acetic acid	1·5	9·	·039

The mean value of $\frac{Bi}{Alk}$ is $\frac{7 \cdot 575}{5} = 1 \cdot 515$, and the results are therefore taken from the formula—

$$3(BiI_3)\,2(\overline{C}HI)\,xHI.$$

Cinchonidine. $C_{20}H_{24}N_2O$.

Quantity.	Dilution.	Bi. Sol.	Ratio.	Results.
·062	10 c.c. water	15·5	1·55	·064
·123	20 „	32·	1·6	·131
·154	50 „	43·	1·72	·176
·062	10 „ and little KI.	15·5	1·55	·064

Mean value of $\frac{Bi}{Alk} = 1 \cdot 6$.

In these determinations it was noticed that when the readings were taken at the point where the fluid becomes coloured, the ratio $\frac{Bi}{Alk}$ was almost exactly 1·5. Thus in the fourth determination the liquid acquired an orange tint with the 15th c.c. of the bismuth solution, but another ½ c.c. was required to complete the precipitation. Most probably the formula is—

$$3\,(BiI_3),\ 2\,(\text{Cinchonidine HI}).$$

Quinidine Solution.

Quantity.	Dilution.	Bi. Sol.	$\frac{Bi}{Alk}$	Results.
·072	10 c-c. water	14·5	1·45	·070
·072	10 „	14·	1·4	·067
·144	50 „	28·	1·4	·134

Mean value of ratio $\frac{Bi}{Alk} = 1 \cdot 42$.

Results calculated from formula,

$$3\,(BiI_3),\ 2\,(\text{Quinidine HI}).$$

It was afterwards noticed that the crystals of quinidine employed were slightly effloresced, hence probably the cause of the results appearing uniformly too low. The molecular weight was taken as 360 ($C_{20}H_{24}N_2O_2 + 2\,H_2O$).

Morphia Solution.

Alkaloid.	Dilution.	$\frac{Bi}{Alk}$	c.c. Bi. Sol.	Results.
·057	10 c.c. water	1·1	9	·051
·114	20 „	1·	20	·114
·114	40 „	1·	20	·114
·108	50 „	·95	18	·103
·091	30 „ with excess of H_2SO_4.	1·06	17	·097

The end of the reaction is in this case more difficult to hit, since the fluid after it becomes coloured continues for some time to precipitate copiously with each further addition of the bismuth solution. The value $\frac{Bi}{Alk} = \frac{5 \cdot 11}{5} = 1 \cdot 02$ indicates that the formula of the precipitate corresponds to

$$(BiI_3)\ (\overline{M}HI).$$

Solution of Atropia. ($C_{17}H_{23}NO_3$).

Quantity.	Dilution.	$\frac{Bi}{Alk}$	Bi. Sol.	Results.
·060	10 c.c. water	1·06	11·	·064
·119	30 „ with little H_2SO_4. .	1·03	21·5	·124

Taking the atomic weight of atropia as 289, the formula of the precipitate is probably

$$(Bi\,I_3)\ (\overline{At}\,HI),$$

since the ratio $\frac{Bi}{Alk} = 1 \cdot 045$ is nearly unity.

Brucia.

Quantity.	Dilution.	c.c. Bi Sol.	$\frac{Bi}{Alk}$	Results.
·093	20 c.c. water	9·	·9	·093
·139	30 „ with excess of acid. .	13·	·89	·135

The results are calculated from the somewhat improbable formula—

$$9\,(BiI_3),\ 10\,(\overline{Br}\,HI).$$

Aconitia. ($C_{54}H_{40}NO_2$.) (734.)

	Quantity.	Dilution.	c.c. Bi Sol.	$\frac{Bi}{Alk}$	Results.
English	·050	20 c.c. water	5·	1·47	·049
Foreign	·090	40 „	9·	1·47	·088

* In the experiments quoted, 1 c.c. strong H_2SO_4 was added to the 50 c.c. quinine solution, ½ c.c. HNO_3 to 10 c.c., and ½ c.c. HCl to the 20 c.c.

Results calculated from the formula—

3 (BiI_3), 2 ($\overline{A}$HI).

The end of the reaction was easily read, no precipitate being produced after appearance of colour.

Emetine. $(C_{30}H_{44}N_2O_8.)$

·084	20 c.c. water	12 c.c.	1·6	·089

3 (BiI_3) 2 ($\overline{E}$HI).

No turbidity after appearance of colour.

Codeia. $C_{18}H_{21}NO_3$, H_2O. (317.)

·118	20 c.c. water	19	1·02	·120
·165	30 „	25	·96	·159

Became coloured long before it ceased to precipitate.

Results calculated from formula—

(BiI_3) (Codeia. HI).

Apomorphia. $(C_{17}H_{17}NO_2.)$

·100 (as hydrochlorate).	50 c.c. water	16·	·97	·097

Precipitated long after production of colour. Flocculæ very large, and settling rapidly.

Formula—

(BiI_3) (Apomorphia HI).

Narcotine. $(C_{22}H_{23}NO_7.)$ (413.)

·059	20 c.c. water	7·	·98	·058
·088	30 „	10·	·94	·083

No precipitation after fluid became tinted.

Formula of precipitate, and from which results are calculated—

(BiI_3) ($\overline{Nt}$HI).

Narceia. $(C_{23}H_{29}NO_9.)$ (463.)

·116	20 c.c. water	11·5	·99	·115
·169	50 „	16·	·94	·160

The values ·99 and ·94 are calculated on the assumption that the crystals of narceia contain two molecules of H_2O.

Formula of precipitate—

(BiI_3) ($\overline{Nc}$HI).

Became coloured about 1 c.c. before it ceased to precipitate.

Theine. $(C_8H_{10}N_4O_2$, 2 $H_2O.)$ (202.)

·136	20 c.c. water	31 c.c.	·92	·125
·068	10 „	16 „	·95	·066

Caffeine. (As Citrate ?)

·103 (citrate).	20 c.c. water	23 c.c.	1·15

The value 1·15 is found upon assumption that this so-called citrate has the formula :—

$3(C_8H_{10}N_4O_2)$, $(C_6H_8O_7)$, (774).

The theine and caffeine precipitates differed entirely from those of the other alkaloid in being pulverulent, dense, and settling almost instantaneously towards the end of the reaction. In both cases the fluid became coloured some time before a precipitate ceased to form on addition of more of the reagent.

Bebeeria Sulphate.

·144 gram required 22 c.c. of the bismuth solution for complete precipitation. The precipitate did not settle so as to leave the supernatant fluid clear, and was of a dull lemon-yellow colour, quite different from that produced by any other alkaloid. Assuming the molecular weight of the sulphate—

$(C_{28}H_{42}N_2O_6.\ H_2SO_4)$

to be 720, the ratio $\frac{Bi}{Alk} = 2·9$, a much higher number than was found in any other case.

The concordance of these results leave in most cases little to be desired, and are more trustworthy than those obtainable by any gravimetric method. In every case it was observed that at a certain point, varying with the alkaloid and in a lesser degree with the state of dilution, the fluid being titrated assumed an orange tint, and at this stage precipitated upon the addition either of more reagent or of an alkaloidal solution. By continuing the addition of the *titre*, however, ultimately no further precipitate is produced by it. This stage, at which both alkaloid and reagent produce precipitates, appears to vary with the solubility of the alkaloid and bismuth compound. Thus in solutions of quinine in which the bismuth and potassium iodide will produce a distinct turbidity when the fluid contains only 1 of alkaloid in 200,000 ; the points at which the colour first appears and at which the reagent ceases to precipitate differ only by ·5 to 1 c.c. according to dilution of fluid. With morphia, however, which in solution can only be detected by the reagent when more than 1 in 40,000 is present, the two points may differ by several c.c.

To ascertain the applicability of the method the following experiments with cinchona barks and preparations of quinine were conducted, the volumetric solution employed being a little stronger than that previously used and standardized by aid of pure quinine disulphate, with the followng results, the end of the reaction being taken as that at which an orange tint was assumed by the fluid.

Quinine Disulph.	Bi. sulph.	Quantity of Disulph. precipitated by 1 c.c.
·089 gram	14 c.c.	6·36 mm.
·226 „	36 „	6·28 „
·178 „	28 „	6·36 „

Mean quantity of disulphate, represented by 1 c.c. of the reagent = 6·33 mm.

·470 gram ferri et quiniæ cit. B.P. was dissolved in 50 c.c. of water, acidulated with hydrochloric acid and titrated. 14 c.c. of the bismuth solution were required, corresponding to ·065 grm or 13·83 per cent. of anhydrous quinia. A solution of ·313 gram in 50 c.c. of acidulated water required the addition of 9 c.c. bismuth solution to precipitate the alkaloid. This represents ·042 or 13·42 per cent. quinia.

A dilute tincture of quinia when titrated gave results much too high ; another portion, 2 drachms, was therefore placed on the water-bath until all the spirit had evaporated, diluted with acidulated water and filtered ; 22·5 c.c. of the reagent were required to effect complete precipitation, and represent 2·2 grains of quinine disulphate.

One fluid ounce of vin. quinæ was then similarly treated, but without filtration, and required 11 c.c. of bismuth solution to tint the fluid. This corresponds to 1·08 grain of quinine disulphate.

Two fluid drachms of a so-called concentrated decoction of cinchona, when diluted, were precipitated by 7 c.c. of the reagent. A similar quantity of the decoction to which ·1 gram of quinine disulphate had been added, required 23·5 c.c. (23·5—7 = ·104 disulphate).

To an acidulated solution containing about 1 gram of citrate of iron and ammonia, ·1 gram of the quinine salt was added, and the mixture titrated.

15 c.c. of reagent were used, corresponding to ·096 quinine.

In all these cases there was little difficulty in reading off to ½ a c.c., the point at which the orange tint appeared in the fluid. In the dark coloured citrate of iron solution, the brown colour disappeared gradually upon addition of the reagent, until when excess of the latter had been added, the characteristic tint was readily discernible. In all the solutions containing iron the precipitates were finally of a dull, dark red colour, and subsided very slowly.

Messrs. Woolley, Sons and Co., having placed at my disposal several samples of assayed cinchona barks, attempts were made to determine the alkaloids volumetrically. In devising methods for assaying drugs, however, the chemist has two distinct processes to work out. First, a method for thoroughly extracting all the active principle of the drug, and, second, for obtaining or measuring the amount of this principle in a state of purity.

When to the acid decoction of cinchona bark, obtained by boiling the bark in acidulated water, the bismuth solution was added, the results were obviously much too high, and the character of the precipitate was somewhat changed, refusing to settle even after standing some time. When, however, the barks were exhausted by De Vrij's process, the titration could be readily effected, and the results obtained agree very closely with the results obtained gravimetrically.

In each case the finely powdered bark was mixed with ¼ part of slaked lime and 2·5 parts of water, and the whole thoroughly dried upon the water-bath. The residue was then heated to ebullition with 10 parts of alcohol (sp. gr. ·795), and when cold the supernatant fluid filtered, and successive quantities of alcohol percolated through the residue until in all 20 parts of tincture were obtained. The filtrate was finally acidulated with very dilute sulphuric acid, the spirit distilled off, the residual fluid filtered when cold, diluted by washing with acidulated water to 50 c.c., and titrated.

Red cinchona bark, labelled, "total alkaloid 4·75 per cent."—3·13 grams of this bark gave ·134 alkaloids equal to 4·28 per cent.

Pale cinchona bark, labelled, "total alkaloids, 3·48 per cent."—5 grams required for complete precipitation bismuth solution corresponding to ·180 cinchona alkaloids, or 3·62 per cent.

Yellow cinchona bark, labelled, total alkaloids 1·95 per cent., quinia, ·77 per cent. The fluid extract of 5 grams contained, as determined by titration, ·098 alkaloids, corresponding to 1·96 per cent. The extract of other 5 grams was rendered alkaline, and shaken with successive small quantities of ether, then acidified, and warmed to expel the ether dissolved. The alkaloids insoluble in ether = ·043 gram or ·86 per cent.

Yellow cinchona bark, labelled, total alkaloids 2·55 per cent., quinia 2·28 per cent. Total alkaloids as determined in 5 grams corresponded to 2·44 per cent. The extract from other 5 grams after treatment with ether, gave ·006 alkaloids insoluble in ether, equal to ·12 per cent. The ethereal solution was evaporated to remove the ether and the residue dissolved in acidulated water, and titrated. The quinine thus determined corresponded to 2·36 per cent. of the bark used.

Another solution of bismuth and potassium iodide was then made for morphimetric purposes. Standardized with a sample of hydrochlorate of morphia, the mean of three experiments gave 1 c.c. = 5·93 mgs. of hydrochlorate or 4·78 mgs. of pure alkaloid.

			Mlgrs. of salt precip. by 1 c.c.
·171 morp. hyd.	required	29 c.c.	5·9
·106 "	"	18 "	5·9
·159 "	"	26·5 "	6·

Whilst attempting to devise a process for volumetrically determining the morphia in opium the following notes were taken.

Small quantities of the common inorganic salts ($NaCl$, Na_2SO_4, etc.), had no influence upon the results. Large excess, however, causes the results to be too high, a solution of 6 grams $NaCl$ and ·088 gram morphia not giving a permanent precipitate until 11 c.c. of the *titre* had been added.

The presence of mucilaginous matter also entirely vitiates the results.

To obtain most concordant results, the determination should be conducted as rapidly as possible after the fluid has become tinted, and to the small portions removed by filtration to ascertain the end of the reaction only a very small drop of the reagent must be added. When this filtrate is mixed with an equal quantity of the *titre* (after excess of the latter has been previously added) a slight turbidity slowly forms.

A number of preparations of aconite root were next examined, and in all cases the determinations were easily and rapidly made, and when repeated with the same preparations, the results were closely concordant. By extracting the coarsely powdered roots of aconite and belladonna with alcohol, removing the spirit by evaporation, dissolving the residue in acidulated water, filtering and titrating the filtrate, the amount of alkaloid was readily found. This would prove a very simple method of ascertaining the quality of these drugs and of the preparations made therefrom.

Whilst experimenting with the alkaloids it was though desirable to ascertain the delicacy of the reagent with each. The results are tabulated below. It was found that a strong solution when treated with the bismuth solution, and afterwards diluted, exhibited a very evident turbidity long after a similarly dilute solution to which the reagent was directly added. Thus a solution containing 1 part of quinine in 100,000, when diluted after addition of a few drops of the reagent until 500,000 parts contained 1 of alkaloid, was sensibly as turbid as a solution of 1 in 200,000 to which the bismuth was added directly; moreover not the slighest opalescence could be detected in a solution of 1 in 500,000 when the reagent was dropped into it. It is essential in all cases to add to the fluid* to be examined a drop or two of potassium iodide solution and of dilute acid, otherwise the test solution may suffer decomposition and lead to erroneous conclusions.

With solutions of the strength indicated below the turbidity was such as to be evident in 1 c.c. of the fluid held in a test-tube, and viewed by reflected light.

Quinine	1 in 200,000
Strychnine	1 " 250,000
Cinchonidine	1 " 125,000
Morphia	1 " 20,000
Atropia	1 " 25,000

* About 10 c.c. In very dilute solutions an excess of KI or HCl entirely prevents the formation of a precipitate.

Brucia	1 in	40,000
Quinidia	1 ,,	150,000
Aconitine (E. and F.)	1 ,,	40,000
Codeia	1 ,,	17,500
Apomorphia	1 ,,	12,500
Narcotine	1 ,,	50,000
Narceia	1 ,,	20,000
Bebeerine	1 ,,	6,000
Theine	1 ,,	4,000
Caffeine	1 ,,	3,000

In all cases, except with theine and caffeine, the opalescence appears immediately upon the addition of the reagent. With theine and caffeine the precipitate does not make its appearance for a minute or so; in appearance, however, it is quite characteristic.

Infusions of hemlock, tobacco, and other substances containing volatile alkaloids, are freely precipitated, but no quantitative experiments have as yet been made with them or with any of the volatile alkaloids.

I have only to add three notes :—

1st. That for the four cinchona alkaloids the ratio BiI_3 : Alk. HI is $\frac{3}{2}$, for the opium alkaloids unity, and for the nux vomica alkaloids less than unity. This possibly indicates some analogy in structure of the individual members of each group.

2nd. That the amount of alkaloid in any organic substance (tinctures, extracts, roots, etc., in all the experiments I have hitherto made, and many of which are not recorded in the paper) was readily determined in the acidulated aqueous solution of the alcoholic extract. Such a solution is devoid of all mucilaginous substances, containing only those matters soluble in both alcohol and water.

3rd. That the recorded experiments were purposely made with small quantities of alkaloids, as a volumetric method of estimating such expensive compounds, to be of practical value, must yield good results when working with very small quantities.

[*The discussion on this paper is printed at p.* 825].

THE HISTOLOGY OF ARAROBA OR GOA POWDER.*

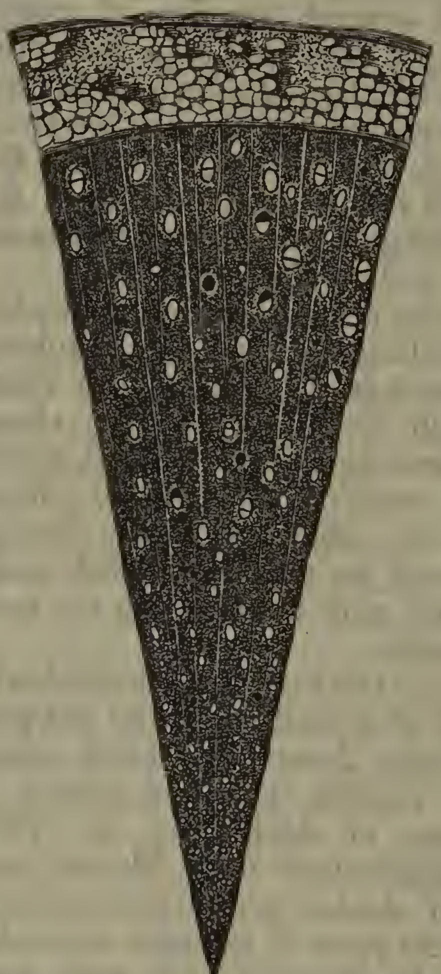
BY THOMAS GREENISH, F.C.S.

Within the last few years much interest has attached to a drug imported from Brazil, and to which the native name "Araroba" is applied, and sometimes also "Goa" powder, from Goa, a Portuguese possession of that name on the Malabar Coast, through which it was imported into British India.

Its chemistry has been investigated by Professor Attfield and subsequently by Liebermann, the botanical characters of the tree whence it is produced have been described and illustrated, and so much of its history as has reached this country can be gathered from various papers in the *Pharmaceutical Journals* of the last five years.

The object of this paper is to deal with the histology of araroba, a substance at the present time employed chiefly, if not exclusively, for the production of chrysophanic acid.

As met with in commerce araroba is in the form of a powder more or less agglomerated; mixed with it, and covered by it, are splinters of the wood in which this substance originates. The powder has an intensely bitter taste, and somewhat of a resinous adhesion to the fingers; it is said that the colour is originally of a fine yellow, resembling sulphur, and that this by exposure gradually changes to a rhubarb colour, and then darkens to that of aloes. Occasionally in the commercial powder lumps are met with, which, when broken, show internally a canary colour, whilst the external parts are dark brown. A sample dried at 100° to 110° C. lost 1·98 per cent.



No. 1.—Segment of Araroba.

The drawing No. 1 represents a segment of a transverse section of the wood yielding araroba, from an authentic specimen deposited in the Society's Museum, and the fragments of wood found in the powder, from sections of which the other drawings were made, correspond with this in structure.

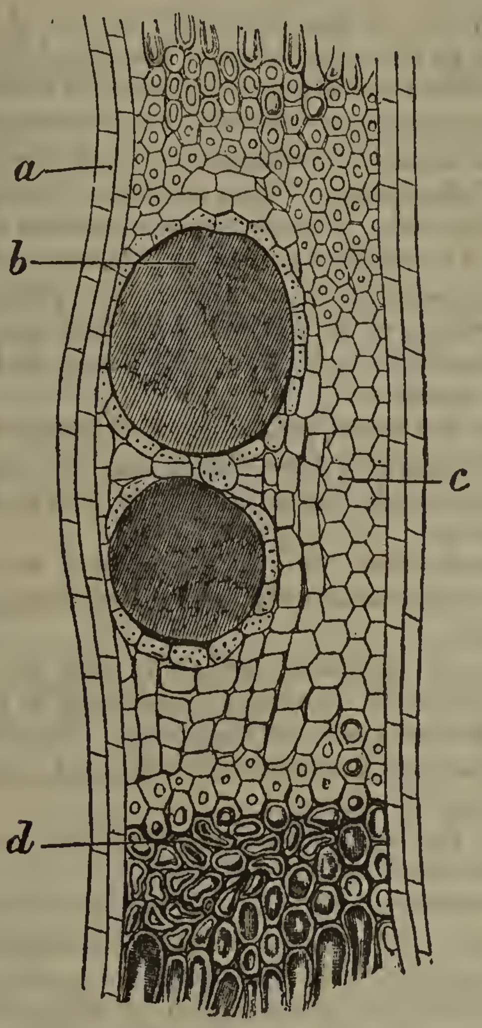
The bark externally is more or less covered with lichen, which gives it a somewhat grey and black patchy appearance. The epidermal tissue is for the most part thrown off by a suberous layer composed of a large number of cork cells compressed together and forming a layer of dense tissue; within this is a cellular tissue containing starch grains, and amongst these cells are sprinkled sclerogen or stone cells—cells much thickened by secondary deposit, and therefore, equally with the cork cells, capable of great resistance to external or internal destructive influences. The granular protuberances seen in a section of the bark are due to these sclerogen cells being left intact, whilst those containing the starch grains have to some extent given way.

With reference to the bark little need be said, as it does not appear to enter into the composition of araroba. Within the bark is the woody column traversed from the medulla to the bark by narrow medullary rays coloured by the araroba, and the round spots show the porous vessels, most of them also filled with the same substance.

The drawing No. 2 shows a small part only of the woody column of this segment, enlarged as seen

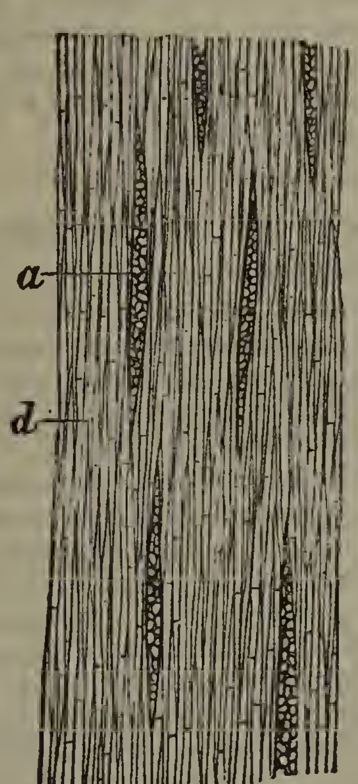
* Read at the Evening Meeting of the Pharmaceutical Society, April 7, 1880.

under the microscope and bounded on either side by the medullary rays. The whole segment of No. 1



No. 2.—Transverse section of Araroba, enlarged.—*a*, medullary rays; *b*, porous vessels; *c*, parenchyma of wood; *d*, libriform cells.

being only a repetition of this section, an explanation therefore of the cellular structure of this portion will give the cells comprising the whole. It exhibits four distinct forms of cells. There are the medullary rays *a*, on either side; they are usually two cells wide, narrow, thin walled, and elongated in a radial direction. *b* represents porous vessels, surrounded by the parenchyma *c* of the woody tissue, having some of its cells thickened and dotted, and *d* the libriform cells. This comprises the whole of the cell tissue of the wood yielding araroba.



No. 3.

The drawing No. 3 is a longitudinal section through the medullary and libriform cells, showing the latter disposed in their length as elongated pointed cells; the several cells composing these tissues were isolated and identified.

The first question that presented itself was, what tissues are involved in the formation of araroba? Under the microscope, either alone or in any fluid that does not change its nature, araroba presents the character of an amorphous powder; by heating it in a test-tube in a solution of caustic alkali, which dissolves about 80 per cent., it was hoped that some indication would be obtained, in the deposit, of cell tissues, but the result was not satisfactory. Recourse was then had to boiling in repeated portions of benzol, but with no better success. Adopting, however, the microchemical method, allowing the caustic alkali to run under a cover glass on the slide of moistened araroba, whilst under the microscope, and by this means dissolving away gradually the soluble portion of the powder, fragments of those cells just referred to as composing the several tissues were found and identified without difficulty.

In this manner broken portions of libriform cells and of porous vessels, also of cells of the parenchyma of the wood were discovered. Those of the medullary rays were too fragmentary to be distinguished satisfactorily; being a very delicate tissue it was scarcely expected otherwise. In no single instance were cork cells present or any of the sclerogen cells before referred to as forming part of the bark; starch, although found in the cells of the parenchyma of the bark, has not been detected in any sample of araroba examined. It is fair to infer, therefore, that the bark does not form any portion of the araroba, although in some samples of it pieces may be found just in the same manner as pieces of the wood; also that from the fragments of the cells in the araroba which were obtained by the process just mentioned a conclusion may be arrived at that the whole of the cell tissue, comprising the woody column, from within the bark to the medulla, is involved in the decomposition which results in the formation of araroba.

The next question that occurred was, what was the physical condition of this substance immediately resulting from the destruction of tissue? The araroba was found to have permeated more or less and imbued with colour all the tissues, even those which retained their form, but it filled many of the porous vessels, as shown in No. 2, and whilst examining under a high power the deposit in one of these vessels remains of cell tissue were visible, so disposed as to convey the impression that the deposit must have once been in a fluid condition; and subsequent examination of sections from different pieces of wood, taken at random from a parcel of powder, presented other indications leading to the same conclusion.

It will be observed that the libriform cells *d* on one part of the section, pressing closely upon each other, are in their outline sharply polygonal, whilst at the other they are separating, and show indications of having been subjected to some solvent action; the cells have lost their polygonal outline and are gradually becoming loose and shapeless, and this is seen rather on the outside in contact with the powder than in the interior of the wood. It is difficult also to understand how the porous vessels in the interior of the wood could have been so densly filled, unless the araroba had been in a fluid or semi-fluid condition. That its presence in these porous vessels is not due to decomposition of the vessels themselves is evident from the fact that when the contents are removed by solution and the cell wall examined it is found to be intact. Did the araroba consist of finely comminuted cell tissue the action of caustic alkali would little affect it; but the solution of about 80 per cent. proves that the cell tissue has been changed to some other substance soluble in caustic alkali. So far as these investigations go they point to a fluid condition of araroba, whilst its presence in the clefts and hollow places of the wood, and the fact of more being found in old trees than in younger ones, must dispose at once of the idea of its being a secretion.

The most interesting point of the inquiry next suggested itself, the cause of this formation. On this point there is no satisfactory evidence; but araroba has its analogies in the gums and resins, and to the student of materia medica these obscure changes in plant organism are of especial interest. Kützing first observed structure in tragacanth, but erred in considering it to be a fungoid growth. Mohl confirmed Kützing's observations that it possessed structure, but proved that the gum was due to a metamorphosis of the cell membrane, and the remains of cell tissue may very readily be seen under the microscope.

From the investigations of Wigand, Karsten and Wiesner, most of the natural resin which exudes from the coniferæ is due to a similar change in the starch and the cell membrane. The gums of which gum arabic may be taken as typical owe their origin to a similar change from an obscure cause in the interior of the tree. In one instance the medulla and medullary rays with the starch are involved and in another the bast cells of the bark.

This change has sometimes been called a degradation of cell tissue, but the word, restricted to its application in geology, is not a suitable term. If this had been a degradation, or rubbing down, of cell tissue the result would be nothing more or less than a mass of cell *débris*; but this is a disorganization or destruction of organic structure, resulting in the formation of a substance of a totally different character.

Last autumn in the forest of Thuringia resin was seen exuding from a large number of coniferæ and also gum from the cherry trees. A specimen which was brought home well illustrates a natural exudation of the cherry gum, and there seems little doubt but that the same natural law which governs the changes resulting in the formation of gums and resins governs also those which result in the formation of araroba, and that this substance was, equally with those named, originally in a fluid condition.

While engaged in the investigation of this subject, a new edition of the 'Commentary on the Austrian Pharmacopœia' was sent to the Society by the author, that eminent histologist who has done so much in the examination and illustration of the materia medica of this and other countries, Professor Vogl, of Vienna, and I found that he had been engaged in the examination of araroba, and had arrived at the conclusion that the change to a fluid form, which had taken place in this instance, was the same as that occurring in another of the tropical leguminosæ, *Ferreira spectabilis*, which he had several years previously examined, a tree that furnishes the resinous substance termed pedra-harz.

[*The discussion on this paper is printed at p.* 825].

NOTE ON THE FRUIT OF ADANSONIA DIGITATA.*

BY F. L. SLOCUM.

A short notice of the so-called "cream of tartar fruit" is contained in the *Amer. Journ. Pharm.*, 1877, p. 254, and it is there stated to be probably distinct from the fruit of the Baobab, *Adansonia digitata*. Opportunity was afforded by Professor Maisch to examine some of the pulp covering the seeds of the latter. When examined under the microscope, the dry pulp is seen to be destitute of crystalline structure. It readily falls to a yellowish-white powder, and has a pleasant acidulous taste. The pulp of the cream of tartar fruit is of a darker colour and more acid taste. The pulp is soluble in hot or cold water, and the solution has an acid reaction.

Examined for bases, potassium was found, and probably traces of calcium and phosphates, the two latter requiring confirmation, which, for want of time, had to be postponed for the present.

The examination for acids resulted in proving the presence of malic acid only, combined as an acid malate of potassium.

The aqueous solution, agitated with six volumes of strong alcohol, gives a copious precipitate of pectin, which forms the largest part of the pulp. The pectin, when dissolved in strong hot hydrochloric acid, yields a bright magenta-coloured solution.

Distilling the aqueous solution with water, ether and alcohol gave no volatile compounds.

The concentrated aqueous solution left in the still, had, in each case, a dark brown colour, and deposited a white amorphous powder. On agitating this residue with ether, it was dissolved; on evaporation of the ether, it either separates as white, silky needles, or as a white amorphous mass. After the removal of pectin and after the evaporation of the alcohol, the remaining solution yields, with alkaline solution of copper, a very copious precipitate of cuprous oxide, showing a large percentage of grape sugar. No traces of tartaric acid were found.

Summing up the constituents, we have pectin, grape sugar, malic acid and potassium as acid potassium malate, a crystalline principle not further investigated, and probably traces of calcium and of phosphates.

AN IMPROVED NITRATE OF SILVER CAUSTIC.†

Dr. Sawostizki called the attention of the Moscow Surgical Society to an improvement in the preparation of sticks of nitrate of silver. It consists in melting together five parts of nitrate of silver with one part of nitrate of lead, forming an argentum plumbo-nitricum. Sticks formed of this are preferable to those of the ordinary nitrate, as they are not easily broken and can be pointed just like a lead pencil.

A NEW METHOD OF ADMINISTERING KOOSSO.‡

Of all the remedies for tape-worm none is more certain or efficient than koosso, and many efforts have been made to bring it into such pharmaceutical shape that, while its properties as a tænicide remain unimpaired, it might be administered without repugnance. Dr. Corre, some years ago, proposed the following method, which has been successfully used in many cases:—One half ounce of fresh powdered koosso is treated with 1 ounce of hot castor oil, and afterwards with 2 ounces of boiling water by displacement; express, and by means of the yolk of an egg combine the two percolates into an emulsion, and add 40 drops of sulphuric ether, flavouring with some aromatic oil.

This is to be taken at one dose early in the morning, after a previous fast of about eighteen hours. The worm is usually expelled dead after six or eight hours.

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* From the *American Journal of Pharmacy*, March, 1880.

† *St. Petersb. Med. Woch.*, March, 25.

‡ *Buffalo Med. and Surg. Jour.*, January.

The Pharmaceutical Journal.

SATURDAY, APRIL 10, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SALE OF PATENT MEDICINES CONTAINING POISONS.

THE appearance of a denunciatory letter in one or more of the daily journals respecting the sale of poison, marked on the one hand by a laudable solicitude for the public health and on the other by confused and erroneous notions as to the law on the point, has now become a frequently recurring phenomenon. Efforts have been repeatedly made by persons acquainted with the subject to correct the numerous erroneous assumptions and misstatements put forth in such letters, but these have generally provoked their reiteration in a more dogmatic form, so that it has almost become question whether it would not be wiser in future to leave them uncontradicted and trust that the excitement temporarily produced will follow the usual rule as to nine days' wonders. But there is after all so much reality in the evil upon which these maladroit attacks are made, and the interests of the public and of chemists are so closely in accord as to its removal, that we feel warranted in alluding to the latest epistolatory outburst in the hope that it may be utilized in helping to form a correct public opinion on the subject and so facilitate the attainment of a most desirable end.

In a letter that appeared in the *Standard* and the *Daily Telegraph* of Wednesday last, Dr. HUBBARD, of Notting Hill, states that a summons to a deathbed on one day and on the next to an inquest where the verdict returned was "Death from an overdose of chloral taken through misadventure," added to previous similar experiences, induced him to put to the test the laws regulating the sale of poisonous drugs in this country. What those laws require, according to Dr. HUBBARD's impression at the time of writing the letter, is indicated by the statement that no chemist and druggist or vendor of drugs of a poisonous nature can sell such to any person not known to him, unless that person be introduced by some one known to the vendor, and then under specified conditions which, in fact, are those applicable only to substances included in Part 1 of the Poison Schedule. Dr. HUBBARD does not seem to have been aware that all "drugs of a poisonous nature" are not poisons according to law, and that some which are so do not come under the more stringent regulations, whilst the whole of them are entirely exempt from regulation if sold under the guise of a patent medicine. It is not, however, with this misapprehension that we propose now to deal,—in fact it was ably corrected in one of the newspapers on the following day,—it is rather to the experience of Dr. HUBBARD that we would here refer.

Dr. HUBBARD states that he took one of his daughters, a child under twelve years, and sent her, by herself, into the shops of different chemists and grocers carrying on business in his neighbourhood, telling her to ask for a bottle of solution of chloral and a bottle of chlorodyne, and that these articles were supplied to the child by each of the shopkeepers without question or the slightest hesitation, with one exception, when a grocer not having the solution of chloral in stock was anxious to be allowed to procure it on the child's order by the evening. The result was that a quantity of poison was thus easily obtained sufficient, in Dr. HUBBARD's opinion, to poison fifty people.

Such is Dr. HUBBARD's experience, and apart from certain moralizings upon it with which the remainder of his letter is occupied it is certainly a striking one and we think might be turned to account. But one of the first essentials is that much prevalent misconception and mystification should be cleared away, and that it should be clearly understood that nothing appears to have been done, according to the foregoing statement, which is not allowed by the present law. One of the "poisons" obtained stands revealed by its name as a well-known "patent medicine," and we have reason to believe that the other belongs to the same category, and as long as the clause in the sixteenth section of the Pharmacy Act, 1868, which exempts the making and dealing in patent medicines from the provisions contained in the previous part of the Act, remains the law of the land, so long will it be legal for the grocer, or the huckster, or the bookseller, or anyone else, to sell such patent medicines containing powerful poisons in whatever quantities and to whomsover he may please.

There is no doubt a growing force of public opinion that would be favourable to the repeal of this provision, and this every now and then becomes manifest in an outburst of indignation directed against the body of chemists and druggists which is in no wise responsible for the evil and is powerless to act in the removal of it except with the aid of that public opinion which, influenced by uninformed leaders, frequently imputes to the body a desire to perpetuate it from interested motives. It is well known that the subject has long been under the consideration of the Council of the Pharmaceutical Society, and there is little doubt that the Council would cheerfully take its part when an opportune moment shall arrive in assisting to remedy the present anomalous state of the law relating to the sale of poisons. It must not be lost sight of, however, that there are many conflicting interests involved in this question, all of which would have to be carefully considered, and cannot be lightly over-ridden even in the public interest. Nevertheless, it must be conceded by any impartial person that it is high time the inconsistency should be abolished which demands, that before a chemist shall be allowed to sell or dispense poisons under their recognized names he shall become qualified after a long and expensive training, whilst any ignorant person may sell the same poisons under a fancy designation that reveals little or nothing of their nature or the danger involved in using them, provided that they be covered by the magic stamp supplied by the Inland Revenue authorities.

It is almost disheartening that whilst so much depends upon the public mind being correctly informed upon this subject, some of those who in the public press assume to themselves this function seem to be even more than usually liable to err when they attempt to descant upon it. Their lamentable errors provoke the time-honoured query, *Quis custodes ipsos custodiet?* Thus, strange as it may seem to the writer of an editorial article in the *Daily Telegraph*, having for its subject Dr. HUBBARD's letter, it is not a fact that "highly necessary "and valuable laws are shirked in the instance of "certain patent medicines and seductive drugs," the fact being that there is no law to shirk except that which requires that the package shall be covered by a stamp of the proper amount, a provision that the revenue authorities may be trusted to see carried out, and which it is not pretended there is any attempt to evade. We assert again, that in the sales of the "poisons" referred to by Dr. HUBBARD the grocers and others effecting them were acting strictly within the limits of their rights, and lamentable on public grounds as the recent enormous development of this traffic may be, there is nothing in it that is at present illegal.

We are sure that the chemists and druggists throughout the country would welcome the help of the public press in an effort to place the law relating to the sale of patent medicines containing poisons on a more satisfactory footing. But in order that real help may be rendered it will be necessary that writers should inform themselves of the real facts of the case. They will not find that there is either law or custom necessitating the enclosing of poisons "in "phials of a distinctive colour, and in the case of "white liquids tinging them with some coloured "ingredient." But they will find that the sale and dispensing of scheduled poisons is carried on by chemists and druggists throughout the country with scrupulous adherence to the rather stringent provisions of the Pharmacy Act, whilst side by side with this trade there has grown up an enormous traffic, fostered by competing "stores" and tradesmen of every description, by which these same poisons are scattered broadcast, and the existing legislation on the subject has been rendered almost useless.

SECRET ALLIANCES.

PRESCRIPTIONS written by medical men in such a fashion as to be intelligible only to a certain few dispensers possessing the key to the terminology adopted are not unknown in this country and have frequently furnished subject for inquiry and comment in this Journal. Although various more or less plausible attempts have been made to justify their existence, it has generally been assumed that they are the outcome of certain beneficiary arrangements made between the medical men who write them and the dispensers who make them up, and the practice has been frequently and strongly denounced as unfair to the pharmaceutical body and dangerous to the public. Across the Atlantic the same opinion obtains, and we learn from *New Remedies* that an attempt is being made by the Californian Pharmaceutical Society to put a stop, by legislative enactment, to the custom of payment by apothecaries to physicians of a percentage on prescriptions. A Bill has been for this purpose introduced into the Legislature, which, if passed, would make any agreement between an apothecary and a physician to give or receive any money or other reward in consideration of an order to procure medicine only of such apothecary a misdemeanour punishable by a fine of not less than fifty dollars. A fine of fifty dollars would also be imposed upon any physician who made use of arbitrary signs, names, or numbers, or who wrote his prescription in such a manner as not to be intelligible to any competent pharmacist. Further, a like fine would be imposed upon any pharmacist who refused to give to another competent pharmacist, upon application, the name of any preparation so designated. The Bill appears to have aroused some opposition, and some of the medical journals have spoken adversely respecting it.

THE CASE OF THE LONDON AND PROVINCIAL SUPPLY ASSOCIATION.

IT will be seen with satisfaction, from the report of the General Purposes Committee, presented to the Council at its meeting on Wednesday last, that there has been no delay in seeking a reversal of the judgment recently pronounced in the case of *The Pharmaceutical Society* v. *The London and Provincial Supply Association*, the Solicitor to the Society having taken immediate steps for appealing to the House of Lords from the decision of the Court of Appeal.

ALLEGED POISONOUS VIOLET POWDER.

AT an inquest held before Mr. PAYNE, in Southwark, on Tuesday last, medical evidence was given to the effect that the death of a child had been caused by blood poisoning consequent upon the application of so-called violet powder which contained a very large percentage of sulphate of lime. The jury returned a verdict in accordance with this view, and added an opinion "that these powders "ought not to be sold without being analysed before-"hand, and then under proper supervision."

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, April 7, 1880.

MR. GEORGE WEBB SANDFORD, PRESIDENT.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT.

Present—Messrs. Atkins, Bottle, Churchill, Frazer, Greenish, Hampson, Hills, Mackay, Rimmington, Robbins, Savage, Shaw, Squire, Symes, Williams and Woolley.

The minutes of the previous meeting were read and confirmed.

WEIGHTS AND MEASURES ACT.

The PRESIDENT read the reply from the Board of Trade to the communication sent from the Council, which had been received since the last meeting, and which has already been published in the Journal, p. 713. He said he thought it was very satisfactory as far as it went, and the diagram which had accompanied it would be engraved and also published. He understood that the fee for verifying measures bearing not more than fifty graduations would be 4*d*.

Mr. SYMES drew attention to the last paragraph in the letter just read. At the previous meeting he argued as a reason why the Council should not press the matter further that the Act was more or less permissive, when he was contradicted, and told that the Act was not at all permissive. He took it that the last clause of this letter distinctly stated that the local authorities might not at present deem it necessary to get these standards.

The PRESIDENT said he should be sorry for an idea to go forth that the Act was permissive. It was not permissive, but compulsory on all persons in the kingdom to use a certain description of weights and measures. Whether it was permissive or not so far as procuring standards was another matter; but the Act did not allow anyone to use in his business a measure which had not been verified by authority. It would be misleading, therefore, to say that the Act was permissive.

Mr. BOTTLE drew attention to a previous paragraph in the letter, which said that the Board of Trade could give no authoritative opinion on the legal construction of the Act.

The VICE-PRESIDENT thought that rather showed that the Council had better leave the matter where it was.

Mr. SAVAGE remarked that while local authorities might receive the standards, it was optional with them whether they would use them or not. At Brighton the local authority had applied for the standards, and afterwards decided not to use them.

The PRESIDENT said the Act was compulsory on traders, and the magistrates at Brighton or anywhere else might at any moment put it in force.

Mr. MACKAY said it was perfectly certain that all chemists came under this Act of Parliament, and he should be sorry if the publication of Mr. Symes's remarks led any chemists to suppose that they might go on with their old measures, whereas at any moment the local authority might go in and test the accuracy of those measures.

Mr. SYMES said he had evidently been misunderstood. He never suggested that the Act was permissive; all he said was that according to the information that had as yet been obtained, the local authorities were not compelled to obtain standards, and that he still adhered to.

Mr. HAMPSON said he supposed the local authorities would employ inspectors to see whether weights and measures were stamped. The position of Mr. Symes was perfectly tenable; if the local authorities did not use the standards, and did not employ inspectors, certainly the Act would not be in operation.

Mr. ATKINS thought no inspector would go round to inspect weights and measures under the new Act unless he had the standards in his possession and used them, and no magistrate would convict otherwise. The first thing would be for the local authorities to adopt the Act; up to that point it was permissive. The standards having been obtained, after a certain time the inspector would go round and give notice that he was prepared to test the weights and measures; but until that preliminary step had been taken, he was quite sure that no magistrate would convict.

Mr. GREENISH took it that whether local inspectors were appointed in Dover, Brighton, or elsewhere, it would be incumbent on every chemist using dispensing measures to see that they were verified.

Mr. RIMMINGTON did not think Mr. Greenish was quite correct. Unless notice had been given that the Act would be put into operation there was no likelihood of anyone being interfered with.

Mr. WOOLLEY said that in Manchester the inspector of weights and measures told him that no action would be taken in Manchester until the trade had been all properly advised beforehand.

Mr. MACKAY said the inspector in Edinburgh was to give the Local Secretary information when he was prepared to verify, but he looked to the Local Secretary to advise chemists and druggists as to the fact. No inspector would undertake to give information to every one.

Mr. FRAZER said in Glasgow the inspector was going to send a printed notice to every chemist and druggist when he was prepared to verify the weights and measures.

The PRESIDENT said that was probably by private arrangement. The law was published and was binding on every one without further notice. He would also state that measures could now be bought verified. The Westminster inspector had been for a week or two prepared to verify the measures. The Marylebone inspector had also called on him, saying that he was in a position to do so. What was legal in one district would be legal in another, and he hoped all chemists would prepare themselves to obey the Act.

Mr. SHAW said there was a great deal of uncertainty with regard to the character of this Act. A short time ago he saw that an Alderman of Bath had moved a resolution in the town council that it was not desirable to procure standards for the verification of apothecaries' weights and measures. If such a resolution were passed it would seem to imply that no action would be taken, but at the same time the sellers might be liable if any one thought fit to prosecute them for using measures not verified. He produced patterns of stencil plates which were about to be used in Liverpool for marking measures.

Mr. SYMES proposed moving that it was not expedient to take any further action in this matter.

The PRESIDENT remarked that no one proposed to take any. The Council had simply to pass on to the next business.

NOMINATIONS FOR COUNCIL AND AUDITORS.

The Secretary reported that there had been *thirty-seven* nominations to fill the fourteen vacant seats on the Council, and the following *nineteen* nominees had signified their willingness to accept office if elected:—

Andrews, Frederick, 23, Leinster Terrace, Hyde Park, W.
Atkins, Samuel Ralph, Market Place, Salisbury.
Butt, Edward Northway, 13, Curzon Street, Mayfair, W.
Frazer, Daniel, 113, Buchanan Street, Glasgow.
Gostling, Thomas Preston, Market Hill, Diss.
Greenish, Thomas, 20, New Street, Dorset Square, N.W.
Hampson, Robert, 205, St. John Street Road, E.C.
Hills, Thomas Hyde, 338, Oxford Street, W.
Mackay, John, 119, George Street, Edinburgh.
Postans, Arthur William, 35, Baker Street, W.
Radley, William Valentine, 7, Hampton Road, Southport.
Sandford, George Webb, 47, Piccadilly, W.
Savage, William Dawson, 4, Park Road East, Brighton.
Schacht, George Frederick, 7, Regent St., Clifton, Bristol.
Shepperley, George, Long Row, Nottingham.
Spink, Harry N. B. 3, Marsham St., Westminster, S.W.
Squire, Peter Wyatt, 277, Oxford Street, W.
Symes, Charles, 14, Hardman Street, Liverpool.
Wills, Geo. S. V., 116, St. George's Rd., Southwark, S.E.

Six nominations for Auditors had been received, and the following *five* had signified their willingness to accept office if elected:—

Hodgkinson, William, 127, Aldersgate St., London, E.C.
Lescher, Frank Harwood, 60, Bartholomew Close, London, E.C.
Stacey, Samuel Lloyd, 300, High Holborn, London, W.C.
Thompson, Henry Ayscough, 22, Worship Street, London, E.C.
Watts, William Manning, 32, Lower Whitecross Street, London, E.C.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Amoore, Lewis Perigoe ....Twickenham.
Arnfield, John Cash ....Shrewsbury.
Goodall, William Anthony ......London.
Howse, Charles Turk ....London.
Remfry, Samuel Alfred ....London.
Williams, Thomas Henry ......Yeovil.
Wise, Joseph Norman ....Stanwix.

Chemists and Druggists.

The following registered Chemists and Druggists, who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Kay, James Petrie ....Aberdeen.
Potts, Robert Alfred ....London.
Stacy, Frederick ....Upper Norwood.
Venables, George ....Pussellawa, Ceylon.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Barnes, Edward......................Godalming.
Crowther, William Fearne ......London.
De Carle, Horace Edward ......London.
Evison, William ....Waltham, Grimsby.
Homes, Joseph Peter ....Oldbury.
Howell, William ....King's Lynn.
Jepson, Alfred ....Pontypridd.
Jones, Charles ....Loughborough.
McConnal, Alan ....Dudley.
Marsden, William...................Manchester.
Ratcliffe, George ....Waterloo.
Smith, Joseph ....Weymouth.
Stephenson, Robert ....Bradford.
Street, Walter Charles............Louth.
Thomas, Thomas Gratton ......Bagillt.
Thompson, Harry...................Bedford.
Whitlamsmith, Walter............Preston.
Wise, James ....St. Neots.

Modified.

Parkin, Charles.....................Doncaster.

ASSOCIATES.

The following, having passed their respective examinations, and tendered their subscriptions for the current year, were elected "Associates" of the Society:—

Carruthers, Robert ....Dumfries.
Coleman, Edward ....Kidsgrove.
Davies, John ....Haverfordwest.
Hay, Henry Scott...................Insch.
Hutcheon, William ....Montrose.
Knott, Henry Archer ....Walthamstow.
Lonnon, Frederick ....Plymouth.
Parker, William Marris ....Walcot.
Pigott, Samuel ....Manchester.
Price, Frederick ....Liverpool.
Pringle, George......................Pathhead.
Thornley, Frederick ....Devizes.
Webb, William Henry............Hereford.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Bates, Edward ....Bicester.
Brown, Ernest Ansell ....Margate.
Burton, Edmund ....Totnes.
Chaston, Alfred Edward ....Winchester.
Clark, Harry ....London.
Davies, Edward Charles James..London.
Davies, Rees ....Swansea.
Farquhar, Robert Forbes.........Aberdeen.
Hamnett, Thomas ....London.
Maillard, William Job............Brecon.
Neve, Annie ....London.
Nichol, Henry Walter ....Bedford.
Pearce, Thomas Ellery............Tavistock.
Rees, Rice William ....Swansea.
Skyrme, Henry Edward ....Cardiff.
Smyth, Thomas Spring............London.
Thompson, Arthur ....Buxton.
Tupholme, Frank ....London.
Wright, George Cornelius W....Leeds.

RESTORATION TO THE REGISTER.

The name of the following person, who had made the required declaration and paid a fine of one guinea, was restored to the Register of Chemists and Druggists:—

John Thomas Watts, High Street, Hampton Wick, Middlesex

ADDITION TO THE REGISTER.

The Registrar reported that—

John Bennett, 10, King Street, Derby,

having made the statutory declaration that he was in business before the passing of the Pharmacy Act, 1868, and the declaration having been supported by a duly qualified medical practitioner, his name had been placed on the Register.

HONORARY MEMBERS.

The Council went into committee to select names for election next month as Honorary Members. One name was selected and ordered to be exhibited in the Library until the next meeting of Council.

REPORTS OF COMMITTEES.

FINANCE.

The report of this Committee was read, and sundry accounts recommended for payment. An application for a subscription to the Parochial Schools Building Fund had been made, but the Committee had decided not to recommend it being granted, the Vice-President stating that the view taken by the Committee was that benevolent objects did not come within the proper scope of the Society's expenditure.

The report and recommendations of the Committee were received and adopted.

PAYMENT FOR PAPERS READ AT EVENING MEETINGS.

Mr. MACKAY desired to make some remarks on one of the items of expenditure just passed, viz., "Contributions to the Journal." There was a considerable amount of "haze" about this subject still in the north, as would appear from some correspondence he would read between a gentleman who had read a paper at a meeting of the North British Branch and the Editor of the Journal. From this it appeared that the Editor looked upon papers read before the Society as part of the Society's Transactions, the publication of which was one of the objects of the Journal, and that he never thought of paying for such papers when published in the Journal. Now that seemed scarcely consistent with the fact that six papers were announced to be read that evening downstairs; for which payment would be made in the ordinary way. What he was desirous the Council should do, if possible, was to lay down some general rule. It was not consistent that payment should be refused for a paper which showed a considerable amount of research, and which had been obtained in order to render an evening meeting in Edinburgh more attractive, simply because it had been read there, and yet similar papers should be paid for if read in London. Having referred to the discussions which took place in January and February, 1879, he again expressed his desire that some intelligible and consistent rule should be laid down.

Mr. Symes was about to address the Council, when

Mr. Hampson suggested that it was desirable some motion should be proposed before any further discussion took place.

Mr. Williams thought this question ought not to be settled by any vote of the Council without consultation with the Editor. It would be better to refer it to the Library, Museum and Laboratory Committee to confer with the Editor and report.

Mr. Greenish said Mr. Mackay's complaint was that there was a difference made between papers read at the North British Branch and those read in London. He would ask if the Editor had any option with regard to papers read at the North British Branch, or whether he was not obliged to publish them as part of the Transactions.

Mr. Mackay said this was one of the mysteries which he could not understand. In Edinburgh, they could not tell where the papers were to go, or how they were to be judged. In London there was a committee to consider papers submitted, but there was no such committee in Edinburgh. If it were thoroughly understood that all papers must be submitted to the London committee if they were to be paid for, well and good; but it was felt by gentlemen in the north that their labour was not recognized in the same way as that of other persons who provided material for the Evening Meetings in London. A further question was whether the Council should go beyond the North British Branch, and extend the same rule to provincial societies. The Journal was now going on very well, and he thought could well afford to pay for what was deemed worthy of appearing in its columns.

Mr. Symes hoped this question would be considered from a wider point of view than that of Edinburgh only, and include papers read at provincial meetings. Those who had to obtain papers for provincial societies ought to be able to offer to gentlemen who took pains and trouble the same recompense which those in London received.

Mr. Mackay said he would move that the whole matter be referred to the Library, Museum and Laboratory Committee.

Mr. Shaw said he claimed the same privilege for Liverpool, Manchester and other places in the country as was claimed for Edinburgh.

The President said the two matters were quite distinct. A paper read before the Society became the property of the Society, but papers read before provincial associations were not the property of the Pharmaceutical Society, and the Editor was not bound to publish them, or even at liberty to do so, unless sent by the authors. It was quite within the discretion of the Editor when he received a paper from Liverpool, for instance, to accept it and pay for it; but according to his, the Editor's, view he was debarred paying for a paper read in Edinburgh, because it was the property of the Society already.

Mr. Mackay also pointed out the distinction between provincial associations and the branch in Edinburgh, which was really part of the Society.

Mr. Greenish remarked that all papers read in London had to be previously approved by the Committee, but the Committee had no control over either the length or quality of the papers read before the North British Branch. He should like to see this matter settled once for all, for it was by no means encouraging to members of Council to bring forward papers at the Evening Meetings if there were these constant discussions raised about the payment. He could only say that any payment allotted for a small paper he was about to read would hardly pay him for the expense out of pocket in preparing it, to say nothing of the time.

Mr. Mackay then moved and Mr. Williams seconded—

"That the Library, Museum and Laboratory Committee be requested to consider the desirability of payment for papers read at the Evening Meetings of the Society in Edinburgh when published in the Society's Journal, as contributions thereto."

The Vice-President thought it would be better to refer the whole matter to the Committee, including payment for papers read at provincial associations. There was a strange muddle about the whole arrangement, under which there was a pretence that no payment was made for providing papers for the Evening Meetings in London, though in some way the authors were always paid. He had always contended that it was a legitimate expense in connection with the Evening Meetings, and did not approve of charging it on the Journal.

The President said there was another motion being prepared which would deal with the question of papers read at provincial meetings.

Mr. Mackay again explained the difference between Edinburgh and other provincial towns.

Mr. Symes said there was no doubt a difference, but he did not agree that it was quite so wide as had been represented. The provincial associations were more or less connected with the Society, and the Council should do all they could to encourage that connection.

The motion was then carried unanimously.

Mr. Symes moved and Mr. Shaw seconded—

"That the Library, Museum and Laboratory Committee be requested to consider the desirability of payment for papers read before provincial associations when published in the Society's Journal, as contributions thereto."

The motion was agreed to unanimously.

Reports of Committees—*continued.*

BENEVOLENT FUND.

The report of this Committee included a recommendation and the following grants:—

£5 to a registered chemist and druggists, formerly in business.

£10 to a registered chemist and druggist, suffering from paralysis induced by a stroke of lightning. Applicant had a grant of £10 in September last.

£5 to the widow of a pharmaceutical chemist and member, who has had two previous grants, amounting to £25.

£5 to the widow of an annuitant, and an unsuccessful candidate at the last election. She has had several previous grants.

£5 to a registered chemist and druggist (subject to the approval of a member of the Society resident in the locality).

£10 to the widow of a late member (subject to similar conditions as above).

£10 to the daughter of a late member. She has received twelve previous grants of £10 each.

£15 to the widow of a recently deceased registered chemist and druggist.

Some applications stood over in consequence of grants having been recently made to the applicants, and in the case of an annuitant whose conduct had more than once been under consideration, and who had refused to comply with the requirements of the Council, it was recommended that the annuity be suspended.

The Council went into committee to consider some of the cases mentioned in the report. On resuming, the report and recommendations of the Committee were unanimously adopted.

Benevolent Fund, 1879.

The Secretary presented the following statistics with regard to the Benevolent Fund:—

		£	s.	d.	
161 subscribers	at 2s. 6d. =	20	2	6	
839 „	5s. =	209	15	0	
74 „	10s. =	37	0	0	
798 „	10s. 6d. =	418	19	0	
344 „	21s. =	361	4	0	
33 „	42s. =	69	6	0	
4 „	63s. =	12	12	0	
5 „	105s. =	26	5	0	
30 „	odd amounts =	44	19	2	
					£1200 2 8

Sources from whence the Subscriptions were received.	Total.	Number who do not subscribe.	Number who do subscribe.	Amount. £ s. d.
Members Pharmaceutical Chemists	1983	1162	821	477 14 10
Members—Chemists and Druggists	814	465	349	165 11 6
Associates in Business	966	700	266	98 11 6
Associates not in Business	827	733	94	27 6 6
Registered Chemists and Druggists (exclusive of those connected with the Society	8961	8432	529	205 18 4
Firms				105 0 6
The Chemists' Ball				31 10 0
Other sources				88 9 6
	13551	11492 who do not subscribe.	2059	1200 2 8

Temporary Aid granted during 1879.	No. of Cases	Amount. £ s. d.	Total of each Class. No.	Total of each Class. Amount. £ s. d.
Connected with the Society:—				
Members	11	135 0 0		
Associates	1	10 0 0		
Orphans of Members (5 children)	2	60 0 0		
Widows of Members	7	80 0 0		
Widows of Associates	2	20 0 0		
Widows of Annuitants	2	40 0 0		
To promote the Election of Children to Orphan Asylums	1	31 10 0	26	376 10 0
Not Connected with the Society:—				
Registered Chemists and Druggists	10	130 0 0		
Widows of ditto	16	182 0 0		
Orphans of ditto (4 children)	1	10 0 0	27	322 0 0
			53	698 10 0
Annuities paid during 1879			19	945 15 0
			72	1644 5 0

LIBRARY, MUSEUM AND LABORATORY.

The Librarian's report had been received and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
February	Day	336	22	9	14
	Evening	198	14	6	10 nearly.

Circulation of books.	Town.	Country.	Total
No. of entries	141	93	234

Carriage paid . . . . . . £1 14s. 1d.

The following donations to the Library had been reported, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Madsen, H. P., Sur la Solubilité des Calculs Urinaires dans les Solutions de Benzoate de Lithium et de Boro-citrate de Magnésium, 1879.
From the Author.

American Pharmaceutical Association, Committee on the Revision of the United States Pharmacopœia, Report by C. Rice, Chairman, 1880.
From Mr. Charles Rice.

Royal Society of New South Wales, Journal and Proceedings, 1878, vol. 12.

New South Wales, Department of Mines, Annual Report for 1877.
From the Royal Society of New South Wales.

Hogg, J., Arsenic and Arsenical Domestic Poisoning, 1879.

Carr, H., Poisons in Domestic Fabrics in Relation to Trade and Art, 1880.

Our Water Supply: A Discussion for and Against the Fitness of Thames and River Water for Domestic Use, 1880.
From Mr. Jabez Hogg.

Flückiger, F. A., Pharmacognostische Notizen aus Alexander Trallianus, 1880.
From the Author.

Boe, F. de le, Practice of Physick, 2nd ed., 1717.

Royal College of Physicians of London, Pharmacopœia, Translated by T. Healde, 3rd ed., 1788.
From Mr. C. Biddiscombe.

Wernitz, I., Über die Wirkung der Antiseptica auf ungeformte Fermente, 1880.
From Professor Dragendorff.

The Librarian had also reported that one of the missing books had been returned to the Library, viz.:—

Bloxam, C. L., Metals, 2nd ed., 1871.

The Committee recommended the purchase of the following works for the Library:—

Russian Pharmacopœia, 3rd ed., 1880.
Monatshefte für Chemie, etc.
La Farmacia Moderna, Rivista Bimestrale.
Cooley, A. J., Cyclopædia of Practical Receipts, 1880. (A second copy for reference.)
Frankland, E., Water Analysis, 1880.
Schorlemmer, C., Rise and Development of Organic Chemistry, 1879.
Schmidt, E., Ausführliches Lehrbuch der pharmaceutischen Chemie, 1879-80. Bd. 1. Bd. 2 when published.
Schwanert, H., Lehrbuch der pharmaceutischen Chemie, 1880. Bd. 1. Bd. 2-3 when published.

The Curator had reported the average attendance in the Museum to have been:—Morning, 14; Evening, 3.

The following donations to the Museum had been received:—

Specimens of Loxa Bark unusually rich in quinine.
From Messrs. Benton and Schloss, through Dr. Paul.

Fruits of the Cotton Tree.
From the North British Branch.

Mikania Guaco, Tayuya Root and Baycuru Root.
From Dr. Symes.

A Mounted Gourd and Bombilla used in drinking Paraguay Tea.
From Messrs. T. Christy and Co.

Herbarium Specimens of *Mentha Canadensis*.
From Professor Asa Gray.

Specimens of *Adonis vernalis*.

From Messrs. Corbyn, Stacey and Co.

Specimens of Nux Vomica Bark, Chiquiqui Bark and Pods of *Cassia moschata*.

From Messrs. Morson and Son.

Bark of *Cinchona officinalis*, var. *pubescens*, and "China cuprea."

From Mr. J. E. Howard, F.R.S.

The Professors had attended the Committee and reported on their respective classes.

Professor Redwood had submitted for inspection some proof sheets of the 'Progress of Pharmacy.'

A proof copy of the Journal Index had been submitted, and the Committee recommended that one thousand copies be bound similar to the Calendar, and that the price to non-subscribers be 2*s.* 6*d.*

At an adjourned meeting the draft annual report had been considered, and ordered to be printed for the use of the Council.

A letter from the Professors had also been read suggesting certain alterations in the mode of teaching, but its consideration had been deferred.

The Secretary had reported that the Catalogue of the Library was nearly completed, and the Committee recommended that the published price be fixed at 2*s.* 6*d.*

Several letters had been received with reference to the exhibition of apparatus and preparations at the approaching Annual Meeting.

Mr. Symes said it occurred to him that there were many people who would be willing to send articles of interest to pharmacists, who might not see the Journal, to whom a special circular should be sent.

The Secretary said he had received two applications besides those mentioned in the report of the Committee.

Mr. Greenish thought that in so far as the number of applications received was a test, the exhibition seemed likely to be a failure, and the Committee felt much discouraged with regard to it.

Mr. Churchill thought if a circular were sent to manufacturers of chemical apparatus there was no reason why it should be a failure.

Mr. Squire thought the principal question was whether there would be any time to see these things.

Mr. Symes said that point had been already decided, and it was no use to try to throw cold water on the scheme now. It might succeed or it might not, and the Council would judge by what took place whether it should be repeated. He did not think it necessary to send circulars out, and probably other applications would come in during the present month.

Mr. Greenish said he had no desire to throw cold water on the scheme, he only reported the feeling of the Committee, arising from the small number of applications received from persons desirous of having space. It appeared to him there was no such thing as pharmaceutical apparatus; each individual obtained what suited his own requirements.

Mr. Woolley said there had been a very valuable arrangement of pharmaceutical apparatus exhibited at Manchester, sent from London. Each pharmacist had different requirements, but still they liked to see various apparatus, in order to be able to make a selection.

Mr. Robbins hoped it would be convenient to Mr. Symes to attend the next meeting of the Committee. There were many difficulties in the way, and he did not like sending out circulars to manufacturers inviting them to send apparatus, at considerable expense, when there might be very little opportunity of inspecting what was sent. He hoped it would not be supposed that the Committee were not doing their best in the matter.

The Vice-President said the only plan hitherto adopted for enlisting interest amongst manufacturers was an advertisement in the *Pharmaceutical Journal*; but that evidently had not been sufficient, and he saw no reason why an application should not be made to persons who had things to exhibit. It might be true to say that there was no apparatus specially used in pharmacy, but there was apparatus used in pharmacy extensively if not exclusively. He was in monthly receipt of a circular from a maker of gas-heating apparatus, which was very interesting, and such as he had purchased thoroughly answered the purpose designed. He should be glad to see the various articles which such an ingenious man manufactured. He thought with a little judgment a circular might be prepared and sent to some dozen or twenty persons, which would result in a very useful exhibition.

Mr. Hampson thought that as the Committee had this matter in hand it should do its best to make the exhibition a success; and he was anxious it should be so, because he believed it would be the forerunner of many successes. The credit of the Society was at stake in this matter, and he believed if the least encouragement were offered to exhibitors there would be many applications for space.

Mr. Savage said it was quite right of Mr. Greenish to state the facts, but these should rather be a stimulus to greater effort. The suggestion of a circular seemed a very good one, but the question of the time when the articles should be exhibited was of importance.

Mr. Williams said the Committee had no wish to do anything but forward this matter as far as possible. All the members of it felt that if they were to have an exhibition at all it ought to be one creditable to the Society, but when they came to look at the matter there were many difficulties in the way. The greatest difficulty of all was the question of time; if there were going to be an evening meeting, when the members could meet and inspect the things, it would be very simple, but the evening of the Annual Meeting was devoted to South Kensington and the previous evening to the dinner and, therefore, he feared the whole thing would fall through. There would be no objection to leaving the things on view for several days, but the question was, would there be any one to see them. It seemed to him doubtful whether it was fair to call on manufacturers to go to the expense of sending apparatus or pharmaceutical products, when really there would be no opportunity of their being properly and efficiently exhibited. Everything sent would be displayed in the best possible way, but it would not be right, in his view, to send round a circular specially inviting exhibits when they knew there would be but a scant opportunity of their being properly examined.

Mr. Atkins asked what amount of time there would really be for this exhibition, and also what space.

The President said the Museum table was allotted for the purpose.

Mr. Atkins said if the Committee issued many circulars there might be a sort of white elephant sent in the shape of some large piece of apparatus which there would be no means of exhibiting. Although he hesitated at the time, yet when the resolution was passed he felt all ought to be done that was possible to make it a success, and although the exhibition might be a comparatively small one, it might be made the starting point of more important ones in the future. Still it would be absurd to send out circulars to a large number of manufacturers, unless the Committee were prepared with adequate accommodation. But, after all, the great point seemed to be the time. A few days ago he attended a conversazione, and in one large room there was a very large audience listening to some beautiful music, whilst in an adjoining room, where some scientific apparatus was exhibited, some of which had been brought a considerable distance, and great trouble taken, there were not half-a-dozen people present the whole time.

Mr. Greenish said he hoped it would not be thought that he desired to throw cold water on the exhibition, for it was his intention to exhibit some apparatus himself.

Mr. Symes was very glad to hear this, for it did seem to him that the Committee had somewhat exceeded its duty. It was requested to consider the best means of carrying out this exhibition, not the worst; but it seemed to him it had rather reconsidered the desirability of carrying it out at all. He was astonished to hear Mr. Greenish say there was no pharmaceutical apparatus. If he had said that he (Mr. Symes) did not exist, he might believe him; but he could not believe that there was no pharmaceutical apparatus, for it was only by means of such things that he existed himself. He was not on this Committee, but should be very glad to assist in any way he could with a view to making the exhibition a success. It must not be supposed that it was for his special benefit; the resolution was carried by the Council for the benefit of the whole trade. He presumed the advertisement would be continued in the Journal and also in any other journal relating to pharmacy sufficiently important to attract the attention of manufacturers who did not take in the Journal of the Society, and if it pleased the Council to decide that circulars should be sent out, he should be glad to give the Secretary the names of half-a-dozen persons to whom one might be sent. The Council was told, on the one hand, that the exhibition would be so meagre there would be nothing to be seen, and on the other, that the house might be filled with white elephants. All he asked was that the Committee should make an effort to get a small but efficient exhibition of apparatus which would be interesting to pharmacists. He believed it would be inspected by many of the members, some of whom would no doubt prefer doing so to listening to the speeches at the Annual Meeting. He admitted the time was rather short, but there was no reason why the exhibition should not be open the day before, when the Trade Association held its annual meeting and a great number of chemists were in town.

Mr. Frazer thought the instance mentioned by Mr. Atkins was hardly appropriate, because at a conversazione all sorts of people were collected together, but here they would be all pharmacists, and he apprehended the exhibition would be specially interesting to them.

The President said the advertisement would continue to appear, and the Committee at its meeting next week would no doubt do its best in other ways to get together a good collection.

The report and recommendations of the Committee were received and adopted.

The Council then went into committee to consider the draft annual report, and after a few amendments it was remitted to the Committee to add anything which might appear necessary before the next Council meeting.

Local Secretaries.

On the motion of Mr. Savage, seconded by Mr. Bottle, Mr. J. R. Gwatkin was appointed Local Secretary for Brighton, in place of Mr. Gwatkin, deceased, and Mr. Frank Adams for Stoke-on-Trent, in place of Mr. A. F. Adams, retired.

House.

The report of this Committee was received and adopted.

Conversazione.

This Committee reported that it had held two meetings during the month, and interviews and correspondence had been had with the authorities of the South Kensington Museum. A letter had been received from the Lords of the Committee of Council for Education, granting the use of the Museum for the purpose of holding a Conversazione. The Committee also reported terms which the contractor was willing to accept so that refreshments might, on this occasion, be supplied at the expense of the Society, and which it was recommended should be accepted. The report and recommendations were unanimously adopted.

General Purposes.

The Committee reported that it had received reports from Professors Redwood and Bentley as to the prize examinations at the end of the first course.

Professor Redwood had reported that thirteen students in his class had competed, six of whom had obtained sufficient marks to entitle them to recognition.

Professor Bentley had reported that fourteen students in his class had competed, to five of whom he recommended the award of some distinction.

The Committee having opened the envelopes marked with the mottoes named by the Professors, in order to ascertain the names of the competitors, recommended that the following awards be made:—

Chemistry and Pharmacy.

Bronze Medal	William Elborne.
Certificate of Merit ...	Robert Wright.
" "	David Hooper.
" "	James Williams.
" "	William Fowler.

One student, Mr. E. C. J. Davies, recommended by the Professor for a certificate, being third on the list, was ineligible, not being an apprentice or student of the Society.

Botany and Materia Medica.

Bronze Medal	David Hooper.
Certificate of Merit ...	Robert Wright.
" "	William Elborne.
" "	William Fowler.
" "	John Thomas.

The report also included the usual report from the Solicitor with regard to cases placed in his hands, and enclosed a cheque for the amount of penalty and costs paid in two cases.

Another case of alleged infringement had been reported, and the Committee recommended that the Solicitor be instructed to take proceedings.

The Society v. the London and Provincial Supply Association.

The Solicitor also had stated that he had taken immediate steps for appealing to the House of Lords from the decision of the Court of Appeal in the case of the Society *v.* The London and Provincial Supply Association.

The report and recommendations were received and adopted.

The President drew attention to a set of apothecaries' weights which had been purchased for the Society, from ½ grain to 10 oz., and which Mr. Chaney, of the Standards Office, Westminster, had kindly verified.

Mr. Williams moved—

"That the thanks of the Council be given to H. J. Chaney, Esq., of the Standards Department, Board of Trade, for verifying and stamping a set of apothecaries' weights for the Society."

Mr. Squire seconded the motion, which was carried unanimously.

The Sale of Patent Medicines containing Poisons.

The President read a communication which had been received from the Stockport Chemists and Druggists' Association, enclosing a resolution to the effect that the Association desired to press on the Council of the Pharmaceutical Society the necessity of obtaining powers so that licences for the sale of patent or proprietary medicines should be only granted to persons on the register of the Pharmaceutical Society.

PHARMACEUTICAL MEETING.

Wednesday, April 7, 1880.

MR. GEORGE WEBB SANDFORD, PRESIDENT, IN THE CHAIR.

The minutes of the previous meeting having been read and confirmed,—

The President drew attention to various specimens of drugs and preparations which were placed on the table, and suggested that, as there were several papers to be read, Mr. Holmes should give any information about them which might be desired at the close of the meeting. There was one matter which Mr. Williams would mention relating to poison bottles.

Mr. WILLIAMS said the bottles on the table had been invented or suggested for general use by Dr. Brushfield, of Brookwood Asylum, Surrey. The doctor stated that he found in practice that nurses who had been using fomentations, and persons with hard hands, did not always readily detect in the dark the feel of the ordinary fluted poison bottles. These now exhibited were conical in shape, and could not possibly be mistaken, even in the dark, for an ordinary bottle containing medicine for internal use.

At the request of the Chairman, Professor Attfield gave an abstract of a paper on—

THE VOLUMETRIC ESTIMATION OF ALKALOIDS BY SOLUTION OF THE IODIDES OF BISMUTH AND POTASSIUM.

BY J. C. THRESH, F.C.S.

The paper is printed at p. 809, and gave rise to the following discussion—

Mr. LUFF wished Mr. Thresh were present to answer some questions he should like to put to him, but perhaps Professor Attfield, who had evidently given his attention to the paper, might be able to dispel some of the illusions which had arisen in his own mind. He was not quite sure whether the object of the paper was to determine the compositions of the various precipitates produced by a solution of iodide of bismuth with the alkaloid, so that from their formulæ a process might be devised for estimating alkaloids volumetrically, or whether it was simply intended to show that very accurate results might be obtained by starting with known quantities of pure alkaloids. The paper seemed to start with the former object, and then to turn off and terminate with the latter. If the process were to be of general utility, and no doubt such a one was much wanted, the formulæ of the precipitates must be accurately known in order that the quantity of alkaloids could be calculated from them. As far as he could make out, in only one instance had Mr. Thresh made an analysis of the precipitate, the double iodide of bismuth and hydriodate of quinine; but in his estimations of the different samples of quinine, he abandoned that formula altogether, and selected an entirely different one, for what purpose he could not imagine, but was loth to suppose it was because it was the only one which would agree with his results. Again, one of the formulæ given, from which he calculated results, contained "x" number of molecules of hydriodic acid. He did not know what that meant, unless it were that any number could be taken which would agree with the results obtained. Towards the conclusion he mentioned that assays of various preparations might be made by means of the solution, and particularly stated that the strength of different preparations of aconite might be determined. In order to do this, he mentioned that he had made various experiments with different aconitine preparations, and had also made two assays of samples of aconitine. These two were remarkably exact, only erring in the third place of decimals; but unfortunately they were calculated from a formula which was entirely wrong, it being given as $C_{54}H_{40}NO_2$, whereas the true formula of aconitine was $C_{33}H_{43}NO_{12}$. The molecular weight used also was 734, instead of 645, and yet with a molecular weight nearly 100 too high he got results which only erred in the third place of decimals. If Mr. Thresh would not think it impertinent, he would advise him to make careful quantitative analyses of these various precipitates, for in that way he would lay a basis on which he could construct a process, which there was no doubt was much wanted for volumetrically determining alkaloids.

Professor ATTFIELD said as far as he could see Mr. Thresh had not proposed to himself to do what Mr. Luff fancied. The author had not primarily set himself the task of ascertaining the composition of the various precipitates which were obtained on adding the volumetric reagents to solutions of alkaloids. In the earlier part of the paper it was clearly stated that the precipitates first obtained were not constant in composition, because varying quantities of reagent were required for constant quantities of alkaloid. From the fact that solutions of known composition had been used, both as regarded bismuth reagent and the quinine, the author thought he could approximately give the composition of the precipitates obtained. That was all. The precipitates did, no doubt, vary from each other considerably, according to the varying conditions of precipitation. But the author said he thought he had arrived at such conditions of experiment that one variety of precipitate was constant in composition; at all events, he got constant quantities of the reagent used for constant quantities of pure salt employed; and that being so, he considered he could recommend the use of the liquid as a volumetric reagent for the precipitation of alkaloids generally. That seemed to be the primary object of the experiments. Then Mr. Thresh went on to confirm these results by applying his reagent to solutions of cinchona bark and other drugs which had been examined gravimetrically, and found the volumetric solution gave figures corresponding fairly closely with those previously obtained by recognized methods of analysis. Hence the inference that the reagent would be valuable in estimating the alkaloidal strength of those drugs. He (Professor Attfield) did not understand that the author pretended to go further that that. No doubt he could go very much further, and possibly when he had read Mr. Luff's remarks he would be induced to continue the investigation, for obviously the chemistry of this matter was one of great interest.

Mr. MOSS said Mr. Luff had already said a good deal which had occurred to himself, but he did not quite come to the conclusion that Mr. Thresh intended these formulæ to represent definitively the precipitate obtained by the process he had described. He thought he put them down as representing approximately the composition of the precipitate which would be produced, using that preparation of volumetric solution and of alkaloid. It was perhaps rather a pity that he had published these formulæ, because they could not be in many instances correct, and the one to which Mr. Luff referred where he put "xHI" puzzled him a good deal. Of course they knew that x meant an unknown quantity, and when he went on to say that from that formula he calculated results, his speculation rose into wonder. If he could get results on which he could depend from data which he did not know, it would often be extremely useful. But whatever opinion might be entertained as to the merits of the paper, and he believed there was great merit in it, there could be no difference of opinion that Mr. Thresh had occupied himself usefully and industriously, and had put a great deal of work into it. He had shown that a certain quantity of the volumetric solution corresponded to a definite quantity of alkaloid; and he might prosecute his researches further and perhaps evolve a process which would enable them to determine the quantity of alkaloids in all kinds of vegetable solutions and infusions.

A vote of thanks was passed to Mr. Thresh for his paper.

The next paper read was on—

THE HISTORY OF ARAROBA.

BY THOMAS GREENISH, F.C.S.

The paper is printed at p. 814.

Previous to the discussion the CHAIRMAN read the following extract from a letter that had been received from Professor Thisleton Dyer on the subject of the paper:—

"The paper on Goa powder is an illustration of a very curious and interesting class of phenomena. The mode of formation of the very curious body known as *eagle wood* appears to me to be analogous. I do not myself see any great objection to the use of the term 'degradation,' for the introduction of which I believe I am partially responsible. The conversion of the cellulose walls of the cells of the medullary rays of *Astragalus* into mucilaginous tragacanth involves a complete destruction of the organic structure of the tissues concerned and their replacement by a substance which is incapable of playing any part in the vital economy of the plant, but which, on the contrary, by its disruptive effects, is positively injurious. The formation of tragacanth, like that of cork and gum, implies the death, and is the commencement of the decay of the tissue involved."

Mr. Greenish also read the following passage in a letter from Professor Bentley:—

"Is not 'araroba' one of the secondary products of metastasis rather than an ordinary degradation product? The term degradation is certainly a bad term, owing to the poverty of our language as compared with the German, but surely even in our language it means something more 'than a rubbing down of cell tissue.' Of course, what is intended is that which you have stated, a change in the organized structure of the plant, so that the substances thus produced can never be reconverted into materials capable of forming cells, walls or protoplasm, or in other words, '*constructive materials.*'"

Mr. Balmanno Squire said he could not discuss this subject pharmaceutically, but he was interested in the therapeutics of chrysophanic acid, and was indebted to the Society for nearly all the information he had about it. A little while ago it was only a quack or secret remedy in India, but owing to the researches of Professor Attfield it was discovered that chrysophanic acid was the proper name for its chief constituent; Mr. Holmes had shown its botanic origin, and now they had an explanation of how it came to exist in the tree to which Mr. Holmes and some Portuguese physician had traced it. It was formerly used in India for ringworm, for which it was now scarcely used at all, being now employed for a disease of another character entirely. It had now attained a world-wide reputation, chiefly through the light thrown upon it by the Society, for he had lately received a very excellent paper upon it from Australia. Dr. Neumann, of Vienna, said it was one of the most valuable remedies which had been introduced during the last ten years, and through the increased demand for it its price had been much reduced, for formerly it was sold for about 10*s.* 6*d.* an ounce. It was originally attributed to Africa, but now it turned out to belong to America, and to be due to a degradation of tissue; so he supposed it had come almost to its last legs, and its popularity might perhaps begin to wane. In Vienna of late, and also in Paris, pyrogallic acid, which had a nearly allied composition, had been tried as a substitute. It had much the same therapeutic effect, but was not so active nor valuable, though it produced the same irritant effect on the skin. Another attempt had been made by Dr. James Thomson, in Scotland, and also in Vienna, by Dr. Jarrisch, to use alizarine for the same purpose, but not so successfully. One fact connected with the use of pyrogallic acid was rather discouraging, however. A German physician rubbed a patient suffering from psoriasis all over on one side with chrysophanic acid and on the other with pyrogallic acid, the result being that the patient died; this the physician attributed to the powerful deoxidizing effect of the pyrogallic acid on the tissues in the presence of an alkali; his theory being that when it got absorbed into the blood, the patient became asphyxiated, as the blood could not be oxygenated in the lungs. This was the only fatal case on record. Chrysophanic acid had no drawback of that kind, and the researches of Mr. Ashburton Thomson established that it was by no means a dangerous drug taken internally. He had administered it in two or three hundred cases, and found that it only acted as an emetic and purge, and to produce these effects it required to be given in fairly large doses—10 to 20 grains.

Mr. Symes said he had brought several samples of araroba as it occurred in commerce, one being rather interesting as it was an old specimen, and yet being light in colour. He had it in the paper in which it came from the brokers, which was dated May 20, 1847, and yet it was not so dark as the others, tending to show that exposure to the air was necessary in order to produce the dark colour. He had not noticed the bitterness which Mr. Greenish had referred to, but it was rather a dangerous thing to taste, as it tended to produce sore throat. The amount of moisture was stated at 1·98, but he had never met with any containing so little, unless it had been kept in a very dry place. On the contrary, it was remarkable how much moistnre it would contain, and yet remain in a tolerably dry substance; he found it on arrival contain from 5 to 30 per cent. The paper gave an excellent *résumé* of the histology of araroba; and not only with regard to it, but many other substances they were certainly in comparative ignorance of the manner of production and the physiological influences which were at work. Mr. Greenish considered it was due to a metamorphosis of tissue, a breaking up of the cell, and had found cell tissue in the araroba. He (Mr. Symes) had taken lumps of chrysorobin which were deposited in the plant, and, when free from all exterior powder, had never found in the interior of them any cell tissue. Mr. Greenish also said that it must originally have been in the fluid condition, and he believed that was so; he had sliced and mounted sections of the wood, and in one he could see that the whole plant was thoroughly infiltrated with this fluid; but then they had to assume that that whole structure broke up into a fluid which had to traverse from one part of the plant to the other. First they were told that it was a breaking up of cell tissue, and secondly that it was a fluid which deposited itself in a cell tissue, and he could scarcely reconcile the two together. He thoroughly believed it had been in a fluid state, and that it deposited in something more than cells was quite clear, because masses of the comparatively pure substance could not possibly deposit in cells, and that was the form in which it was obtained. These lumps were not wood, they were masses deposited he believed in intercellular spaces in the plant. He had found Mr. Greenish's method of applying a solution of potash to the sections under the microscope very good, but as solution of potash darkened them considerably the structure was not well made out, and as the chrysarobin was very soluble in glacical acetic acid, he found subsequent treatment with that acid would dissolve out a further portion of the araroba, and leave the section more transparent, and the structure more distinguishable. Professor Attfield had made an exceedingly elaborate analysis of the araroba, and first separated what he called chrysophanic acid, but which was now known as chrysarobin. Benzole dissolved out from the pure substance about 80 per cent. of a bright yellow powder, but Liebermann and Seidler had further investigated this substance, and said it was not chrysophanic acid, but chrysarobin, and gave a process for preparing chrysophanic acid from it. He had a specimen there of the pure acid, which was obtained by putting chrysarobin in a solution of potash, and passing a current of air through it. It took about forty-eight hours to dissolve, and was then precipitated by hydrochloric acid, washed, dissolved and reprecipitated and crystallized out again from alcohol. The characteristics were perfectly distinct. He had prepared about one ounce of it, and sent some to one of the skin hospitals with the desire that they would compare its results with those of chrysarobin. They knew very well that the latter produced certain effects, and the question was whether pure chrysophanic acid would produce the same. He should be very pleased to hand over what he had there to Mr. Squire if he would kindly experiment with it. The distinctions given by Liebermann and Seidler were that strong sulphuric acid dissolved chrysarobin with a yellowish-brown colour, whilst the chrysophanic acid on the other hand dissolved with a bright red colour; but after a short exposure to the air they both became red so that that test was not very satisfactory. They also stated that in a weak solution of potash chrysarobin was comparatively insoluble, whilst chrysophanic acid dissolved with a red colour. That was a more marked test, but that was not quite satisfactory either, as after a short time there would be a reddish solution in both cases. He found that a more decided test was strong nitric acid. This dissolved very little chrysarobin, giving a brown colour, whilst the chrysophanic acid dissolved very largely with a bright canary colour.

Mr. HOLMES thought Mr. Greenish was probably correct in saying that the araroba appeared at first to be a fluid secretion. They all knew that the descending sap, which contained active principles or matters which had been formed by the plant, descended through the inner bark, and passed along the medullary rays, and from them to the porous vessels, and was so distributed in the surrounding tissue of the duramen. He had examined Dr. Symes's section of the wood, and had observed that the walls of the porous vessels and of the parenchymatous tissue immediately surrounding these vessels, which in a transverse section of the stem appeared as yellow dots from the quantity of araroba they contained, were not all disintegrated. He supposed, therefore, that the descending sap which contained the elements of araroba passed along the medullary rays and filled the porous vessels and surrounding tissue, and that the cause of there being large lumps of araroba in the wood was simply due to the same reason that balsam of copaiba would collect in enormous quantities in the trunk of the copaiba tree. It was well known that large cavities were often formed in trees by the pressure of liquid within them, and he had read that travellers had occasionally heard loud reports like a cannon caused by the fluid in the trunk bursting open trees; the solid lumps of araroba, one or two inches across, were, he imagined, formed in that way, from the fluid after a time becoming solid. He agreed with Dr. Symes that these solid lumps, as far as he had been able to observe, contained no sign of cellular tissue at all. With regard to the old specimen, which Dr. Symes showed, he had found that if araroba were at all moist it appeared to absorb ammonia from the air, and the slight trace of alkali thus obtained caused it to develop the purple colour, which alkalies always produced in this drug. He imagined that this old specimen was, in the first place, exceedingly dry, and not being exposed to air and moisture, had not absorbed ammonia, and so retained its colour.

Mr. WILLIAMS said the araroba which now came into the market appeared to contain a great deal more water than it formerly did. He remembered when 5 per cent. used to be considered quite sufficient, but he was sorry to say that the last he purchased contained 38 per cent. of moisture. A small sample dried incautiously at rather an elevated temperature, though far below that of boiling water, was very much darkened, and the chrysophanic acid yielded was so dark that it had to be reworked once or twice before it was fit for sale.

Mr. MOSS could not see any objection to the use of the term "degradation" in the way Professor Dyer would use it. Surely, in the English language, at all events, the meaning of a word depended, to a considerable extent, on the connection in which it was used, and in his mind "degradation" as applied to the rubbing down of rocks, and the breaking up and impoverishment of cell tissues, conveyed two very different ideas, which were, he thought, quite correct in each case.

Mr. POSTANS thought the meeting was much indebted to Mr. Greenish for this paper, and also for the beautiful diagrams by which it was illustrated. It was a curious thing that this Goa powder should have had so many names; even in India where it had been known for many years, and formerly sold at an enormous price, it had several appellations. The extended use of this drug was largely due to the excellent paper of Professor Attfield, which had been already alluded to. In that paper, however, he spoke of chrysophanic acid as a natural constituent of Goa powder, whereas it would appear evident now that it was an oxidation product. This could be seen by referring to the 'Year-Book of Pharmacy' for 1879, p. 62.

Mr. GERRARD said that in accordance with the suggestion made by Professor Attfield he had worked a considerable quantity of the residue of araroba after the chrysophanic acid had been removed for alkaloid, but, applying the usual reagents, he found no trace whatever of any alkaloid.

Mr. HANBURY said it might be worth mentioning that care should be taken by those who had occasion either to sift or powder araroba, for some time ago one of the men employed by his firm who was engaged in grinding a quantity had such an attack of inflammation of the eyes that for nearly two days his sight was in danger.

Professor ATTFIELD said there could be little doubt that the substance called Goa powder when first produced in the wood contained no chrysophanic acid as such, but that this acid was produced by the action of the air, and probably of moisture, on a substance which might be called chrysorabin, or which might be termed potential chrysophanic acid. It might be that Goa powder, as Mr. Squire hinted, might cease after a time to be popular, and it might be that the question of the mode of formation of the substance might also lose interest. But the interest attaching to the formation of such things in plants could not subside, and he thought that no class of men could better investigate this question than pharmacists,—whether they did so on this wood, or any other, whether they had to go to the Malabar coast or to Brazil, or found it amongst their forests at home—because it seemed to him to involve a knowledge of chemistry, microscopy and structural botany such as pharmacists commonly possessed. If pharmacists, especially those who had been educated during the last thirty years, would turn their attention to this matter, surely the question of formation—whether conversion of one tissue into another, or the production of a secretion, or the conversion of a fluid like honey into a granular substance like solid honey—might shortly be set at rest. He might add that of the different samples of Goa powder he had examined since Mr. Kemp of Bombay first put the article into his hands, some chiefly contained chrysophanic acid, others potential chrysophanic acid.

Mr. GREENISH, in reply, said his view of "degradation" was this, that when degradation applied to a sandstone rock he should find minute pieces of that rock as a deposit, and examining that under the microscope each particle would be a particle of the sandstone. Such was not the case with this; it was a total disorganization of the structure, and soluble in caustic alkali, whereas cell tissue was not. Dr. Symes assumed that he took the rough powder for examination, but that was a mistake; he used the interior portion of the lumps which Dr. Symes mentioned, and he had always found cell tissue. Mr. Holmes seemed to suppose that he believed the araroba of commerce to be deposited in the cells he had shown in the drawing, but that was not the case. The whole wood would be saturated with it, and the cell tissue more or less disorganized, but the lumps known to commerce were really found in clefts in the trees. When the tree was sawn asunder, and split up it was found in clefts and hollow places, not in cells. Still its being found in the cells was a curious feature, and was an argument in favour of its having been originally in a fluid form, for in no other way could it find its way into the centre of the wood. He did not think it was due to fungi, although in one sample he found in some of the sections a mycelium of fungus running through the medullary rays. His idea was that the starchy matters in the medullary rays first underwent decomposition, and the result following that was the fungus. He hoped some day to be able to separate that fungus from its means of nutrition, and force it into fructification, and then to be able to identify the fungus. With regard to the name, he believed it had the same derivation as arrowroot, which some authorities give as derived from an Indian word, "ara," meaning mealy or flowery, arrowroot meaning a mealy root. In the same way he believed the same native word "ara" was applied to the mealy part of the interior of the araroba plant.

A vote of thanks having been passed to Mr. Greenish for his paper, the Chairman said it was too late to take another paper that evening, but an extra meeting would be held on the 21st.

Mr. HOLMES called attention to one or two samples on the table, in particular to some Chian turpentine, which had been recently recommended in the *Lancet* by Dr. Clay, of Birmingham, as a remedy for cancer, in which disease it was given in conjunction with sulphur. In an editorial article in a subsequent number of the same journal it was stated that Chian turpentine was a honey-like liquid at first, and that it was difficult to procure. Several samples had been brought to him (the Curator) during the past few days for identification, and two of these he had found to be Venice turpentine. He thought it might interest some of the gentlemen present to see genuine specimens of the true Chian turpentine side by side with the false drug. The Venice turpentine was more honey-like in appearance than the Chian, and he believed that possibly some persons might have been misled by the article in the *Lancet*, which mentioned this character as distinctive of Chian turpentine. He also drew attention to the drug called "tonga," which has been recommended for neuralgia, and a specimen of which had been presented by Mr. A. W. Gerrard. Mr. Holmes said that he had been asked by that gentleman to examine it. He had done so, and had come to the conclusion that the active ingredient was the stem of a plant of the Arum family, belonging to the genus *Raphidophora*, and probably *R. pertusa*, var. *vitiensis*. He hoped to lay the details of his examination of this drug before them on a future occasion. There was also a specimen of Japanese belladonna root, concerning which he wished to mention that in preparing the note upon it which appeared in the Journal he had overlooked the fact that *Scopolia japonica* had been investigated in the University of Tokio, Japan, and found to contain solanine, and not atropine.

The meeting was then adjourned.

NORTH BRITISH BRANCH.

The sixth meeting of the session was held in the Society's rooms, 119A, George Street, Edinburgh, on the evening of Wednesday, March 24, Mr. J. B. Stephenson in the chair.

The minutes of the former meeting were read and confirmed.

The Honorary Secretary announced the following donations:—

To the Library:—*The Chemist and Druggist* with *Australasian Supplement*; 'First Report of the Pharmacy Board of Victoria'; 'The Pharmaceutical Register for 1879,' from the Pharmacy Board of Victoria; *The Journal of the Chemical Society* for March, from Mr. Mackay.

Dr. F. W. Moinet then read a paper entitled "Food and Work," which he illustrated by diagrams, and at the close of his lecture he received a hearty vote of thanks.

It is intended to print Dr. Moinet's paper in the next number of this Journal.

Parliamentary and Law Proceedings.

THE SALE OF FOREIGN PROPRIETARY MEDICINES.—PROSECUTION BY THE INLAND REVENUE AUTHORITIES.

On Wednesday last, at Marlborough Street Police Court, before Mr. Newton, Mr. Augustus Leamont, French chemist, of Wardour Street, was summoned by the Inland Revenue authorities, for selling foreign medicines without having a wrapper with the stamp provided by the Commissioners of Inland Revenue. A gentleman from the Solicitor's Office of the Inland Revenue Department prosecuted, and in opening the case said the proceedings were taken under the 52 Geo. III., cap. 150, for selling a bottle of foreign medicine and a box of foreign pills without having a proper stamp affixed, by which he had incurred two penalties of £10 each, the object of the prosecution being to warn chemists against selling foreign medicines without the stamps to which they were liable.

Mr. George Crisp Farmer, an officer of the Inland Revenue, proved purchasing a bottle of medicine at the defendant's shop, for which he paid 5*s*., and subsequently a box of pills, neither of the medicines bearing stamps.

The defendant said the medicines were sold by his new clerk by mistake without stamps.

Mr. Newton said if that were so the sooner the defendant changed his clerk the better.

The solicitor said that about a year and a half ago the Commissioners had their attention called to the fact that a large quantity of foreign medicines were being sold without stamps, and the medicines in question were bought as tests.

Mr. Newton said the defendant was responsible for the acts of his clerk. As the two purchases were made so near to each other he was afraid the defendant was in the habit of committing this offence. He should order him to pay 40*s*. and costs in one case, and 2*s*. costs in the other.—*Times*.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE SALE OF DRUGS BY UNREGISTERED PERSONS.

Sir,—I fear that Mr. Tebbutt's hope of an extended and amended Pharmacy Act has very little prospect of realization when we find one of the judges in the late appeal case saying that the general feeling is against restriction, and rather suggesting that everyone should do what is right in his own eyes. To my mind there is more likelihood of the final appeal being heard at Tottenham Court Road, the legal reasoning in the late case, if thoroughly followed out, tending to the formation of an Universal Supply Association where the legal affairs of a nation of shopkeepers will be managed by those who know not the law. Nay, more, though the voice of the country is now against the Conservative Government, its members need not be long out of employment, as some Civil Service Store may be found willing to undertake the duties of the Foreign and other offices, and no doubt, sir, the former would be glad to engage the service of some nobleman of high political standing.

But, seriously, why do not the shopkeepers change this? It is said that one Conservative candidate owed his defeat in no small measure to a report that his printing had been done by the "stores," whilst in another quarter political capital has been made out of a statement that an eminent Conservative nobleman is a director of a Civil Service Store, so that I think the point should be for the "nation of shopkeepers" to unite and vote only for candidates who insist that civil servants shall do a fair day's work for their fair day's pay, and that their hours of business shall be at least as many as those of the majority of the traders who help to pay them. If they do not like this they had better live by shopkeeping at stores prices.

ALPHA.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Moore, White, Stokes, Walker, Brown, Elliman, Euretes, Scilla, No Surrender, A. J. S., A. Y. Z.

THE ALKALOIDS OF POMEGRANATE BARK.*

BY C. TANRET.

In March, 1879,† the author announced that in pursuing his chemical investigation of pomegranate bark he had established the fact that pelletierine, the alkaloid previously isolated by him, is accompanied in the bark by three other alkaloids, two of which, like pelletierine, are liquid and one is crystallizable, all four being volatile. In the present communication the author describes the principal properties of these alkaloids and the method adopted by him for their separation.

In the first place a mixture of the salts of the alkaloids is prepared by mixing the powdered bark with a milk of lime, exhausting with water, shaking the resulting liquor with chloroform and neutralizing the latter with dilute acid. A solution of the mixed alkaloids is thus obtained in which one or other of them predominates, according to the source of the bark. Two of the four alkaloids are displaced from their salts by bicarbonate of soda and two are not. This solution is therefore treated with an excess of bicarbonate of soda and shaken with chloroform, and this in its turn is agitated with dilute sulphuric acid. The resulting solution contains the sulphates of two alkaloids to which the names of "methylpelletierine" and "pseudopelletierine" have been given. Caustic potash is then added to the first liquor, and upon repeating the treatment with chloroform and acid, there is obtained a solution of the sulphates of "pelletierine" and "isopelletierine."

Methylpelletierine.—In isolating this alkaloid the author has adopted a method of fractional saturations. The mixture of sulphates obtained by treatment with bicarbonate of soda is partially decomposed by an alkali, then shaken with chloroform and this afterwards with an acid. The methylpelletierine is concentrated in the first portion set free, and after this treatment has been sufficiently repeated a point is reached at which the rotatory (dextro) power of the product is no longer augmented, and the salt so produced the author considers to be pure. To obtain free methylpelletierine a concentrated solution of one of its salts is decomposed by an alkali, and the alkaloid liberated is dehydrated over fragments of potash and distilled in a current of hydrogen.

This alkaloid is liquid. Analysis of its hydrochlorate, which has a rotatory power of $\alpha_D = +22°$, gave results corresponding with the formula $C_{18}H_{34}N_2O_2$. It dissolves in twenty-five times its weight of water at 12° C., is very soluble in alcohol, ether and chloroform, and boils at 215° C.

The salts of methylpelletierine are extremely hygrometric.

Pseudopelletierine is a crystalline alkaloid, and is obtained by concentrating the liquid from which the methylpelletierine has been removed, treating it with caustic potash, and shaking with ether. Upon evaporation of the solvent crystals are left, which can be obtained quite pure by repeated recrystallization. The composition of this alkaloid is represented by the formula $C_{18}H_{30}N_2O_2$.

Pelletierine.—The solution of sulphates obtained by the action of caustic alkali is evaporated over sulphuric acid, and when the residual mass is dry it is exposed to the air upon folds of blotting paper. It soon partially deliquesces, leaving on the surface of the paper scarcely hygrometric crystals, consisting of sulphate of pelletierine. The salt which penetrates the paper, and which if care be taken at the time to prevent its exposure to the air has no rotatory power, is the sulphate of isopelletierine.

The pure alkaloid is obtained by the same process as methylpelletierine, the precaution being used of distilling at a low pressure, ebullition at the ordinary temperature altering it rapidly.

Pelletierine is a liquid and colourless alkaloid when just obtained in a current of hydrogen, but it is remarkable for the rapidity with which it absorbs oxygen and resinifies. Its density at zero is 0·988. Analyses of its chloroplatinate and hydrochlorate lead the author to assign to it the formula $C_{16}H_{30}N_2O_2$. The alkaloid is soluble in the cold in twenty times its weight of water, of which it dissolves its own weight. It is soluble in all proportions of ether, alcohol and chloroform. At the ordinary pressure it boils at 195° C., distilling then with partial decomposition. Under a pressure of 10 centimetres the boiling point is lowered to 125° C.

Sulphate of pelletierine has a rotatory power of $\alpha_D = -30°$. If the free alkaloid be heated to 100° the rotatory power disappears.

Salts of pelletierine lose a portion of the base when heated either dry or in solution.

Isopelletierine is isolated in the manner just described. It is a liquid alkaloid, without action upon polarized light. Analysis of the hydrochlorate gave results corresponding to the same formula as pelletierine, of which it may be considered an isomer. Its density, solubility in water, and boiling point are the same as those of pelletierine.

* Comptes Rendus, vol. xc., p. 695.

† Comptes Rendus, vol. lxxxviii., p. 716.

NOTES ON INDIAN DRUGS.

BY W. DYMOCK.

(*Continued from page* 582.)

CURCUMA Sp.? AMOMACEÆ. *The rhizome. Vernacular*: AMBÉ-HALDI, JANGLI-HALDI (Hind., Beng., Bomb.); KASTURI-MANJAL (Tam.)? KATTU-MANNAR (Malay)?

History, Uses, etc.—This rhizome is the *zédoaire jaune* of Guibourt, who tells us that the plant which produces it has been well described and figured by Rumphius. It is his *Tommon bezaar* or *Tommon primum*, which has been wrongly referred by most writers to the *Curcuma Zedoaria* of Roscoe (Confer. Guibourt, 'Hist. Nat.,' 6ème éd., tome ii., p. 214). It would appear also that it is identical with the cassumunar described by Pereira and the turmeric coloured zedoary of Ainslie. (Confer. Pereira, 'Mat. Med.' vol. ii., part i., p. 236). Lastly it would appear to be the same as the Cochin turmeric noticed by Flückiger and Hanbury ('Pharmacographia,' p. 580). The porperties of this drug are very similar to those of turmeric, but its flavour is not so agreeable; in Bombay it is used medicinally in combination with other drugs as an external application to bruises, sprains, etc.

The plant grows wild in the Concan. I have not seen it in flower. The foliage is like that of the *C. Zedoaria*, Roscoe; pale yellowish green with a purple stain down the midrib of the leaf. A good deal of the drug is sent from Bombay to Europe, where it appears to be used as zedoary. A European chemists' firm in Bombay, writing home for zedoary root, was supplied with this article. The name cassumunar is probably a corruption of the Malay Káttu-mannar.

Description.—Central rhizome oblong or conical, often more than 2 inches in diameter, external surface dark grey, marked with circular rings and giving off many thick rootlets; lateral rhizomes about as thick as the finger, with a few fleshy rootlets; at the ends of some of the rootlets are orange yellow tubers about the size and shape of an almond in its shell. Internally the central and lateral rhizomes are of a deep orange colour like turmeric. The odour of the fresh root is like turmeric, but more camphoraceous.

Microscopic Structure.—Similar to that of turmeric.

Commerce.—The Bombay market is supplied from the Malabar Coast. Value, unpeeled Rs. 24—25 per kandy of 5¼ cwt.; peeled Rs. 24—27. I have the plant in cultivation, but it has not yet flowered. Can it be the *C. zanthorrhiza* of Roxburgh?

CURCUMA AROMATICA, *Salis.* AMOMACEÆ. *The rhizome. Vernacular*: KACHOORA (Hind., Beng., Bomb.).

History, Uses, etc.—This plant affords the round zedoary of Guibourt, which he tells us is the zerumbet of Serapion, Pomet and Lemery. The following is his description of the drug. "The round zedoary is greyish-white externally; heavy, compact, grey and often horny internally, having a bitter and strongly camphoraceous taste, like that of the long zedoary, which it also resembles in odour. The odour of both drugs is analogous with that of ginger, but weaker unless the rhizome be powdered, when it develops a powerful aromatic odour similar to that of cardamoms." ('Hist. Nat.,' 6ème éd., tom. ii., 213.) The round zedoary is one of the two zurambáds (zerumbets) described by Mahometan writers, the other being the nar-kachoora of India, which does not appear to be known in Europe.

Description.—Guibourt's description already given agrees exactly with the kachoora of India, but it is often cut into transverse slices instead of into halves and quarters.

Microscopic Structure.—This is essentially the same as that of turmeric, but the resin and essential oil in the cells are of a yellowish-white colour, and the greater portion of the starch grains are ovoid or pyriform instead of narrow and elongated as in turmeric.

Chemical Composition.—Zedoary contains, according to Bucholz (*Rèpert. Pharm.*, xx., 376), volatile oil, a bitter soft resin, a bitter extractive matter, gum, starch, etc. The oil is turbid, yellowish-white and viscid, has a camphoric taste and smell, and consists of two oils, one lighter, the other heavier than water. Trommsdorff obtained from the root a substance which he called zedoarin, but did not further describe it (Watt's 'Dict. of Chem.' vol. v., p. 1066).

Commerce.—The Bombay market is supplied with Kachoora from the Madras Presidency. Value, Rs. 20—30 per kandy of 7 cwt.

CURCUMA Sp. AMOMACEÆ. *The rhizome. Vernacular*: NAR-KACHOORA (Hind., Bomb.).

History, Uses, etc.—This drug is one of the two zurambáds of Arabic and Persian writers on materia medica and the nar-kachoora of India. Strange to say it is not noticed by recent writers on Indian materia medica, though it is a well-known drug and to be found in all the shops. Meer Muhammad Husain states that the plant blossoms from the centre of the leaves like turmeric, which it also resembles in foliage. Can it be the *C. viridiflora* of Roxburgh and tommon-giring *seu* giri of Rumphius (Amb. 5, 169)?

Description.—The drug consists of small globular central tubers, from which spring numerous lateral rhizomes about the size of the little finger. It is of a dark grey colour externally and marked with circular rings; internally it is very hard and horny, of a greyish-orange when cut in thin slices; odour camphoraceous, taste bitter and camphoraceous.

Microscopic Structure.—The minute structure of this rhizome hardly differs from that of the zedoary. The starch contained in the parenchyme cells has been altered by heat and appears as a finely granular mass nearly filling the cell. The resin cells are about as numerous as in the zedoary, but the contents are of a dull orange colour. The vascular system consists of scalariform and spiral vessels, most numerous at the junction of the central and cortical portions of the rhizome.

Commerce.—This drug is said to reach Bombay from Cawnpore. Value, Rs. 4—5 per maund of 41 pounds.

ALPINIA OFFICINARUM, *Hance.* AMOMACEÆ. *The rhizome. Vernacular*: CHOTA-KULIJAN, CHOTÉ-PANKI-JAR (Hind., Beng., Bomb.); SHITTA-RATTAI (Tam.).

History, Uses, etc.—Although this drug has been long known its botanical source was only discovered in 1870, when a description of the plant was communicated to the Linnean Society of London by Dr. H. F. Hance, made from specimens collected by M. E. C. Taintor near Hoihow in the north of Hainan (Confer. *Journal of the Lin. Soc.*, 1873, xiii., 6). Galangal is not much used in Hindu medicine. In Sanskrit works it is called "kulinjána," evidently a corruption of the Arabic khúlanján. Mahometan writers suggest that the drug may be the root of very old plants of *Piper Betle*, but they are evidently in doubt about its being produced by that plant (Confer. 'Makhzan,' article "Khulanján"). Meer Muhammad Husain describes galangal as tonic, stomachic, carminative, stimulant and aphrodisiac. He tells us that if given to young children it makes themt alk early, and that a paste of the powdered drug made with oil or water will remove freckles. The Persian name is khusrodáru. Galangal is one of the ingredients of Warburg's tincture. It is not used in English medicine, but there is a considerable demand for it in Russia. Irvine ('Med. Topog. of Ajmeer,' p. 171) says that the natives add kuliján to bazar spirit to make it more intoxicating.

Description.—The dried rhizomes are about as thick as the little finger or often less. They have evidently been cut into short lengths (2—3 inches) while fresh; many of the pieces are branched, and all are marked by numerous circular ridges of a light colour. The external surface of the rhizome is of a deep reddish-brown; the interior pale red, hard and tough; the odour is aromatic and the taste hot and spicy.

Microscopic Structure.—The bulk of the rhizome consists of a uniform parenchyma traversed by fibro-vascular bundles. Some of the parenchyme cells are full of resin and essential oil, but most of them contain large starch grains of an elongated or club-shaped form.

Chemical Composition.—Galangal contains from one-third to one-half per cent. of an essential oil which is the odorous principle. According to Vogl its formula is $C_{10}H_{16}O$. Brandes extracted from galangal with ether a neutral, inodorous, tasteless crystalline body, kampferide, which requires further examination. The resin, which is probably the acrid principle, has not been examined.

Commerce.—Galangal arrives in Bombay from Canton and other Chinese ports. The imports are about 400 quintals yearly. Value, Rs. 3 8a. per maund of 37½ lbs.

The Great Galangal, though not so much used as the lesser, is well known in Bombay as baré-pán-ki-jar, malabáree-pán-ki-jar or kost-kuliján. The native dealers all state that it is imported from the Malabar coast. This drug is generally considered to be produced by the *Alpinia galanga*, Swartz, a native of Java. It is easily distinguished from the lesser galangal by its larger size, orange-brown exterior and yellowish-white interior. It is also less aromatic and pungent. Value, Rs. 50 per kandy of 7 cwt.

Hedychium spicatum, *Smith.* Amomaceæ. *The rhizome. Vernacular*: Kafur-kachri, Kápoor-kachri (Hind., Beng., Bomb.); Shimai-kich-chilik-kizhangu (Tam).

History, Uses, etc.—I have not met with any account of this drug in native works on materia medica, which seems strange, as it is very well known and a considerable article of commerce in India and China and is also exported to Europe. Two kinds of kapur-kachri are found in the Bombay markets, viz:—Chinese and Indian. The latter was supposed by Royle to be the sittarittee or lesser galangal of Ainslie ('Mat. Ind.,' vol. i., p. 140), but Moodeen Sheriff states that the sittarittie of the Tamils is the true lesser galangal, which statement appears to be correct. Kapur-kachri is used in perfumery, and to preserve clothes from insects. The Indian is preferred.

Description.—Indian kapur-kachri occurs in slices mostly circular, but sometimes the section is made in a sloping direction. The slices are half-an-inch or less in diameter and vary much in thickness; they are white and starchy and when freshly pared exhibit a faint line dividing the cortical from the central portion. The edges of each slice are covered by a rough reddish-brown bark, marked with numerous scars and circular rings; here and there rootlets remain attached. The odour is like that of orris root but more powerful and strongly camphoraceous. The taste is pungent, bitter and aromatic. Chinese kapur-kachri is a little larger than the Indian, white and less pungent. The bark is smoother and of lighter colour.

Microscopic Structure.—The rhizome consists of a delicate parenchyma, most of the cells of which are loaded with large ovoid starch grains; a few contain a yellowish resin and essential oil. The epidermis is composed of several rows of compressed, nearly empty reddish-brown cells. From the unaltered condition of the starch it appears that the rhizomes are not exposed to heat.

Commerce.—The Indian drug is said to be imported from the Malabar coast. The other kind comes from the Chinese ports. Value, Chinese, Rs. 4½ per maund of 37½ pounds; Indian, Rs. 5. The Arabs and Persians are the chief consumers.

Kämpferia rotunda, *Linn.* Amoinaceæ Bhuichampa of India.

This does not yield any of the zedoaries of commerce. It is commonly cultivated in gardens on account of the beauty and fragrance of its flowers, which appear in the hot weather before the leaves spring up. The fresh tubers are pounded and applied by the natives to wounds, bruises and swellings. The root consists of several central, almost globular rhizomes, from which proceed numerous thick, fleshy rootlets, all of which terminate in small round tubers. The substance of the rhizomes is of a pale straw colour and has a bitter pungent camphoraceous taste much like that of the true zedoary.

(To be continued.)

FOOD AND WORK.*

BY FRANCIS W. MOINET, M.B.,

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During the past few years a great deal has been said and written about food and cooking, and not without reason, as the importance of a knowledge of the food we eat, and how to cook it properly, can hardly be overestimated. This has been of late, I am glad to say, in some degree appreciated, although not to the extent it deserves. Thus it is now an offence by law to expose for sale or sell articles of food or drugs which are adulterated, even although the substances used for adulteration may be comparatively harmless to health, as milk and water; because it is a fraud on the public, as the article sold is not what it is represented to be, while the price asked is for the pure article. Still more worthy of punishment is he who defrauds the public with articles which are injurious to health. That the Adulteration Act was necessary we have had ample proof; that it will be beneficial in the future may taken for granted. Schools of cookery have also been established in various places, where those willing can learn how to cook properly, because cooking requires to be learned as much as reading or writing does. It is a great mistake to imagine that a knowledge of cooking comes naturally to a woman; practical proof of this almost every householder must have had in many so-called good plain cooks.

With a knowledge of cooking the power of conferring a great benefit is obtained, as good cooking implies:—1st, Economy; 2nd, It tends to promote appetite and digestion, and thus helps to preserve health of body and comfort of mind, as the dependence of good temper on good digestion is a well-known fact; while the importance of health as affecting the national prosperity cannot be overlooked, as its absence tends to promote pauperism, drunkenness and crime, and as a result increased taxation.

It is also, doubtless, a promoter of temperance and as such is now recognized in the many comfortable establishments where good and cheap food can be got and a comfortable place to eat it in. These must be a great boon to working men who frequently have to pursue their avocations at a considerable distance from home and otherwise would have to eat their food, not always the most suitable, in considerable discomfort.

How does it promote temperance?

By the well-cooked food promoting and satisfying the appetite and enabling the man to feel up to his work and so preventing that crave for stimulants which often proceeds from a stomach deranged by badly-cooked food, and, therefore, insufficient to support unaided the wear of the body.

The importance of a knowledge of cooking, especially among the working class, is very great, because they cannot get rid of their cooks if they are inefficient, as we can, since the law does not look upon that as a sufficient cause for divorce, and it is on account of this want of knowledge

* Read at a meeting of the North British Branch of the Pharmaceutical Society, March 24, 1880.

that we find a far greater proportion of the labouring classes suffering from derangement of the stomach than among the wealthier classes.

Besides when we consider and compare the number of times the wife of a working man has to cook, say in the course of a year, to the frequency with which she requires to write a letter, we will find it will probably be two or three hundred times to one. I, therefore, think in view of its importance to so large a portion of the community that a good case is made out for rendering it compulsory.

Having thus acknowledged the importance of cooking, because unless our food is properly cooked it is very apt to be a poison instead of food, I pass on to the subject of my lecture, viz., food and work, or rather the relation between food and work. Every one knows that without food no work could be done; even life itself would fail, for what is life but work. But behind this general relation, which is felt and appreciated by all as a law of existence, lie many other interesting and important relations, which at first sight are not so apparent and to which I wish to draw your attention this evening. But when I use the term work, I do not mean simply paid or manual labour; I employ the word in a more comprehensive sense to signify the general wear and tear of the body in our usual daily avocation of business or pleasure; and to make the subject clearer to you, we will first notice the general relation between food and work, or the function which food plays in the animal economy.

1st. *The Composition of the Body.*—I do not intend to detain you with a chemical analysis of the tissues of the human body, but simply give you a list of the elements, oxygen,* carbon, hydrogen, nitrogen, phosphorus, sulphur, chlorine, fluorine, silicon, calcium, potassium, sodium, magnesium, iron, manganese, copper, which in different combinations compose the various structure of the human body, the bones, muscles, nerves, fat, blood, brain, etc. These compounds are very numerous, depending on the number of the elements and the proportion in which they are present; just as you can get any number of tunes from the keys of a piano by various combinations, so out of comparatively few elements you get a great number of compounds, which collectively make up the human body.

As the food we eat or drink—the latter term applying only to the condition of the article used whether fluid or solid—is the only source from which these elements forming the constituents of the body are derived, it naturally follows that no article of food can satisfy the requirements of life which fails to comply with this condition. But as comparatively few articles of food contain all these elements, or in their proper proportion, it follows that we must combine different articles of food together to make a satisfactory meal, *i.e.*, a meal not only sufficient to satisfy the appetite, but also capable of supplying the different elements required by the tissue to replace what has been spent on work. Hence the reason and necessity of living on a varied diet, which experience taught our ancestors long before the scientific facts on which it is founded were discovered. For with the exception of milk, which is a perfect food, no ordinary article of diet contains all the necessary elements. But this is not only a necessity, but also a great advantage, as our food would be very apt to pall on our palates were it always the same, so nature liberally supplies us with a great variety to choose from, which are nearly equally capable of nourishing the body, and at the same time suiting different tastes, which to some individuals is a matter of importance, either from habit or natural peculiarity, still more valuable to the invalid whose recovery sometimes depends not on medicine, but on diet.

Another reason of this variety in nature is that all animals and vegetables are not found to flourish under the same conditions of climate and soil; hence in different countries the food supply is often obtained from different sources, plants and animals, especially the former.

* 'Food,' by A. H. Church, M.A. Oxon.

Having seen, then, what our bodies are composed of, and that as a natural result our diet must contain these elements in suitable proportion, and that if, excepting milk, no article of food contains all these elements, our diet must, to nourish us properly, consist of more than one article of food, we have now to notice the function of food, *i.e.*, how it nourishes the body, and enables it to perform its work, as work of some kind or other is necessary for health, and not only to health, but also to happiness. This is a wise provision of Providence in making what is essential to a useful existence a promoter of health and happiness.

The function of food may be described as twofold. Food is essential to the body to fulfil two distinct objects:—1st, to afford material to replace what is spent in labour, physical or mental, muscular or brain; 2nd, to supply fuel which is spent in force.

Because the tissues of the body are constantly changing, the old material being replaced by new, supplied from the food we eat, and as labour increases the destruction of old material, it necessitates a fresh supply to make up for it; hence why, as a rule, the harder the labour the more food is required. To render the second function of food, viz., to supply fuel which is spent in force, more clear to you, we will compare the human body to a steam engine, a common, but a good comparison,—the first function being simply to repair what is lost by wear and tear. In the steam engine the fuel is burnt, and its latent energy is set free in the form of heat, which is employed to convert water into steam, which sets the machinery in motion, the motion and power of the engine being the result of the burning of the fuel. What happens in the body is almost the same. A considerable proportion of our food, especially the fatty and starchy matters, after being digested and assimilated and stored up in the various tissues, are slowly burnt or oxidized by the oxygen which has been carried from the lungs by the blood, the fat is decomposed into carbonic acid and water, which are given off by the lungs and the kidneys and skin. By this oxidation, or burning, heat and force are generated to keep up the temperature of the body and keep the vital functions going, and to supply physical and mental energy, all the internal and external work of the body being performed by the combustion of the stored-up fat in the tissue. Hence the necessity of a regular and constant supply of food to warm the body and supply mental and physical energy, and repair the waste of the tissues. This brings us naturally to consider next whether this twofold function of food is performed by the same or any article of food. In some cases it is; but as most articles of food do not contain the substance required in suitable proportion to perform both of these functions, you require to take more than one article of food to make up what the other lacks, and in this way you get a diet sufficient to fulfil both of these functions. It is for this reason that articles of food, or their nutritive principle, have been classified according as they contribute especially to the growth and nutrition of the body, or to the production of heat and force, into two great classes:—I. Heat producers; II. Flesh formers, or non-nitrogenized and nitrogenized compounds, *e.g.*, organic constituents of food.

Heat-Producing.

Sugar Starch Gum Lignus Oils and Fats	composed of	Carbon Hydrogen Oxygen

Flesh-Forming.

Albumen Gluten Fibrin Casein Legumin	composed of	Carbon Hydrogen Nitrogen Oxygen Sulphur and Phosphorus

Of these compounds those which contain nitrogen are used principally for building up the muscles, while those which contain no nitrogen are burnt up in the body to yield heat and force. And you will notice that the flesh-forming compounds are not obtained solely from animal food, as gluten and legumin are obtained from the vegetable kingdom, from cereals and peas and beans respectively; while the heat-producers, with the exception of some oils and fats, are obtained solely from the vegetable kingdom. So that for perfect health our food must contain sufficient of both of these two classes of compounds to repair the tissues and to supply heat and force (the mineral substances being contained in these compounds, also partly supplied by the water we drink). As to the relative proportion in which they should be present in our food, there is no hard and fast line; this would be an impossibilty unless we were to weigh and analyse every article we eat. We judge by experience what will satisfy the appetite and enable us to feel up to our work. Besides it must vary considerably according to circumstances,—1st, the amount of work or exercise; 2nd, the climate. Thus you are aware how physical or bodily exercise compels us to eat more than when idle, our increased hunger or appetite being nature's method of indicating to our minds that our bodies require food to replace what has been expended in force and to repair the waste of the tissues. Then the colder the climate more food is required, especially of the heat-giving varieties, as more requires to be spent in keeping up the warmth of the body. Cold is also more conducive to physical work than warm weather, so that for this reason also more food is required in a cold climate.

This use of the fatty or non-nitrogenous articles of food (or heat-producers) you will often see exemplified in a painful manner in those suffering from fever or protracted illness. In these cases the sufferers are not capable of eating or digesting a sufficient quantity of food to keep the machinery of the body in motion, and repair the waste. To make up for the deficient supply nature draws on the store of fatty substances, which is laid up in the tissues for such an emergency; because if more such food is taken than is required it accumulates in the tissues and the individual grows fat or stout, and gradually as this stored-up fat is consumed to make up for the diminished supply, we find the patients becoming thinner and thinner, until often they are literally nothing but skin and bone, as first the fatty and then even the muscular tissues in such a case are slowly burnt up to keep the vital spark alive, until the flickering flame of life slowly expires as a lamp when the oil has run low. There is no doubt, therefore, that the fatty and starchy substances form the most important of these two groups in relation to the production of heat and force, as without a constant supply of these the body would soon cease to exist.

This is the reason why cod liver oil is so much employed and with such good results for delicate persons, for those who cannot take enough food to nourish them and for those who are suffering from diseases which entail a drain upon the system.

But why, you may ask, is cod liver oil more useful than other oils and fats, and in smaller quantity?

The answer to this must be looked for in its chemical composition.

Analysis of Cod Liver Oil.—Olein, 80 per cent., palmitin (margarin), 15 per cent., acetic, cholic, butylic, phosphoric and sulphuric acids, traces of iodine, bromine and chlorine, salts of lime, magnesia and non-colouring matter. The olein and palmitin are the chief constituents of many oils and fats and are present in as large a quantity, and yet they are not so useful. Winckles tried to explain it by saying that in cod liver oil the fatty acids were in combination with propylene instead of glycerine; disproved.

Hence, we must look for another explanation. Some have attributed its action to the iodine, bromine and phosphorus; but the amount which the oil contains is much too small to be medicinally active, while the therapeutic effects of the oil are quite different from those of these metalloids. The same may be safely said of the magnesia, lime and iron. Others have attributed it to the biliary principles (Bucheim), especially the acids. This latter is probably the true explanation. Thus fats when swallowed are partially emulsionized and saponified by the pancreatic and biliary secretions. But all fats are not absorbed with the same facility, and the presence of certain substances is necessary for this. This absorption of fat is accomplished by the bile. It was long since shown by Wistinghausen that in capillary tubes moistened with bile oil will rise much higher than in tubes not so moistened, or moistened with water or a saline solution. He also showed that oil will pass through membrane, saturated with bile much more readily than through similar membranes saturated with water (confirmed by Haussmann). So that as the presence of bile is necessary for the absorption of fats, it is for this reason that cod liver oil which contains it is more readily absorbed, and, therefore, more fattening than other oils and fats and in smaller quantity.

The necessity, then, of our requiring both flesh-forming and heat-producing articles of food to keep us in health is the foundation or reason of many of the combinations of articles of food which constitute our different meals, and which experience taught long before the scientific facts were discovered on which the requirement was based, *e.g.*, meat and vegetables, bread and cheese, porridge and milk, bacon and beans, etc., and so on from these more homely combinations up to the wonderful dishes of the professional cook. Thus meat and cheese, which are purely nitrogenous articles of food, or flesh-formers, would not form a sufficient meal by themselves; hence you add vegetables or bread to get the necessary amount of heat-producers to fulfil the two functions of food which I have mentioned; and this law we find has been unconsciously at work in forming the staple dishes of many races of people, regulated, however, by the climate, their source of food supply and amount of exercise.

The following table will give you some idea of the relative amount of flesh-formers and heat-producers in certain articles of food, showing the amount of heat-producing elements they contain for every ten parts of flesh-formers. Thus in the tropics, where little exercise can be taken, the waste of tissues is small, so that little nitrogenous food is required and only a moderate amount of fat is taken, the need of heat-producers being comparatively small, so that starchy products, as millet and rice, are the principal articles of food.

	Flesh-forming.	Heat-producing.
Milk*	10	40
Beans	10	22
Fat Mutton	10	27
Fat Pork	10	30
Beef	10	17
Hare	10	2
Veal	10	1
Wheaten Flour	10	44
Oatmeal	10	50
Barley	10	57
Potatoes	10	115
Rice	10	123

But gradually as you come north there is a marked increase both in the fatty and nitrogenous articles of food, until in the Arctic zone oily substances and animal food are the staple articles of existence, the amount of them that an Esquimaux will eat being something almost incredible, being necessary to resist the severe cold. But you will now notice that the vegetable kingdom alone can supply all that is necessary for the human body both of flesh-forming and heat-producing substances, and you

* Dr. Stevenson Macadam.

must not for a moment imagine that animal food is the only source of flesh-formers, as the world's population is supported to a large extent on vegetable products, especially in tropical regions, as we have already seen, while in colder climates, where vegetable products are hardly to be obtained, flesh and fat are indispensable. Thus man is clearly omnivorous; while men may be advantageously almost vegetarians in one climate, mixed eaters in another (as with us), and almost exclusively flesh eaters in a third, as in the Arctic regions. But, as you are aware, there are some people who live exclusively on a vegetable diet (vegetarians) in our country, believing that such a diet is right in principle. But only those are pure vegetarians who exclude milk, butter, eggs and cheese, as these are the very essence of animal food.

In regard to this theory of diet, without going into the question minutely, there are one or two facts which I will lay before you, from which you may judge the soundness of the theory.

We have already seen that man is capable of deriving all that is required for living and working from the animal or vegetable articles of food, either separately or combined. The question, therefore, is whether a purely vegetable diet or a mixed diet of vegetable and animal food is the better suited for our existence. To judge the question we have some facts to go upon.

1. We are so physically constructed as to be able to derive our nourishment from either animal or vegetable food.

2. That in the Arctic regions hardly any vegetables are to be obtained.

3. Man alone has the intelligence to obtain food from all sources and to render it by cooking fit for nourishment.

It apparently follows, therefore, from these facts, that while we are suited for either diet, or rather a combination of both, we may also select to some extent our diet according to our individual taste and habit of body and other circumstances, as work and climate, as experience has taught us that for the enjoyment of good health our diet must be regulated by the circumstances I have mentioned. These facts go far to prove, to my mind, at least, that a mixed diet of animal and vegetable food is for the majority the better and more natural diet in this northern climate, but certain deviations or variations are necessary in certain circumstances, according to certain individual peculiarities. Thus some people are so constituted, or have become so, that a vegetable diet is more conducive to their health and comfort than a meat one, in which case it is evidently their duty to live accordingly; but, not content with living thus themselves, they think with their limited vision that it must be best for others also, and take up and try to expound the advantages of vegetarianism, quite forgetting the old and true proverb that what is one man's meat is another man's poison. So that while some few find a vegetable diet best suited for health, our knowledge points strongly to the fact that under all circumstances the mixed diet is the more natural and of the two the better suited to support health and strength.

Having thus noticed the function of food and the general relation between food and work, we will now consider briefly certain circumstances which must also be taken into account, viz., how the relation between the two is affected by the amount of work, kind of work, age of the worker, and the circumstances under which the work is done. To state it properly we will commence with the infant.

The Infant.—Its work is simply to live and grow. But the child is father to the man, and just as a child's health greatly depends on the parent's health, so does the man's greatly depend on the child's. Hence nothing is more important than proper feeding for a child, and parents and guardians should understand their responsibility in this respect. Milk is a perfect food and the natural food for children; but many mothers and nurses think they can improve upon nature, and under the stupid idea that solid food is more nourishing, give them food quite unsuited for their digestive organs; the consequence is that the infant mortality directly due to improper feeding is something almost incredible. Then during youth it should be wholesome and nourishing, but plain, simple and varied as much as possible. Alcohol in any form should be avoided, as it is not only unnecessary, but may induce a habit the danger of which I need not dwell upon. Then in manhood it behoves us also to be careful in our diet in relation to our work, as carelessness in this respect is as little to be commended as extravagance or epicureanism, physical work requiring more food than mental, especially nitrogenous compounds. But it is a popular mistake, and an extravagant one, to imagine that physical work requires a large amount of animal food. We have seen that flesh-forming materials can be obtained from the vegetable kingdom, and for hard mechanical labour there is no doubt that a mixed diet is more nutritious and wholesome than one principally composed of animal food. This should be borne in mind, because at the present day there is as a rule too much animal and even other food consumed in this country, considering the climate, even among the working class, to whom it is an unnecessary extravagance, while to the rich it is a hurtful one; as the effects of such indulgence are injurious not only to the individual but also to the children.

But it should also be regulated by the climate.

Then, again, it is certain, although contrary to the popular belief, that while a good supply of food is essential during the period of growth and development and active middle life, a diminished supply is not less essential to health and prolongation of life during declining years, when physical exercise is small and the digestive power becomes somewhat feeble.

But you may be asking yourselves why I do not give you some more particular directions. Simply because they would be quite useless. The facts which I have given are quite sufficient for any one to follow out in practice without further details, and if more attention were paid as to the function of food and the value of different articles of food, and the importance of such a knowledge to the health and pocket were considered, a reformation would result fraught with material advantage to a great class of our community.

CEMENTS.*

Quite as much depends upon the manner in which a cement is used as upon the cement itself. The best cement that ever was compounded would prove entirely worthless if improperly applied. The following rules must be rigorously adhered to if success would be secured:—

1. Bring the cement into intimate contact with the surfaces to be united. This is best done by heating the pieces to be joined in those cases where the cement is melted by heat, as in using resin, shellac, marine glue, etc. Where solutions are used, the cement must be well rubbed into the surfaces, either with a soft brush (as in the case of porcelain or glass), or by rubbing the two surfaces together (as in making a glue joint between two pieces of wood).

2. As little cement as possible should be allowed to remain between the united surfaces. To secure this the cement should be as liquid as possible (thoroughly melted if used with heat), and the surfaces should be pressed closely into contact (by screws, weights, wedges, or cords) until the cement has hardened.

3. Plenty of time should be allowed for the cement to

* Quoted in the *Druggists' Circular* from the 'Workshop Companion.'

dry or harden, and this is particularly the case in *oil* cements, such as copal varnish, boiled oil, white lead, etc. When two surfaces, each half an inch across, are joined by means of a layer of white lead placed between them, six months may elapse before the cement in the middle of the joint has become hard. In such cases a few days or weeks are of no account; at the end of a month the joint will be weak and easily separated, while at the end of two or three years it may be so firm that the material will part anywhere else than at the joint. Hence, where the article is to be used immediately, the only safe cements are those which are liquefied by heat and which become hard when cold. A joint made with marine glue is firm an hour after it has been made. Next to cements that are liquefied by heat are those which consist of substances dissolved in water or alcohol. A glue joint sets firmly in twenty-four hours; a joint made with shellac varnish becomes dry in two or three days. Oil cements, which do not dry by evaporation, but harden by oxidation (boiled oil, white lead, red lead, etc.), are the slowest of all.

Aquarium Cement.—Litharge, fine, white, dry sand, and plaster of paris, each 1 gill; finely pulverized resin $\frac{1}{3}$ gill. Mix thoroughly and make into a paste with boiled linseed oil to which drier has been added. Beat it well, and let it stand four or five hours before using it. After it has stood for fifteen hours, however, it loses its strength. Glass cemented into its frame with this cement is good for either salt or fresh water. It has been used at the Zoological Gardens, London, with great success. It might be useful for constructing tanks for other purposes or for stopping leaks.

Casein Mucilage.—Take the curd of skim milk (carefully freed from cream or oil), wash it thoroughly and dissolve it to saturation in a cold concentrated solution of borax. This mucilage keeps well, and as regards adhesive power far surpasses the mucilage of gum arabic.

Casein and Soluble Glass.—Casein dissolved in soluble silicate of soda or potassa, makes a very strong cement for glass or porcelain.

Cheese Cement for mending China, etc.—Take skim milk cheese, cut it in slices and boil it in water. Wash it in cold water and knead it in warm water several times. Place it warm on a levigating stone and knead it with quicklime. It will join marble, stone, or earthenware so that the joining is scarcely to be discovered.

Chinese Cement (*Schio-liao*).—To three parts of fresh beaten blood are added four parts of slaked lime and a little alum; a thin, pasty mass is produced, which can be used immediately. Objects which are to be made specially water-proof are painted by the Chinese twice, or at the most three times. Dr. Scherzer saw in Pekin a wooden box which had travelled the tedious road *viâ* Siberia to St. Petersburg and back, which was found to be perfectly sound and water-proof. Even baskets made of straw became, by the use of this cement, perfectly serviceable in the transportation of oil.

Pasteboard treated therewith receives the appearance and strength of wood. Most of the wooden public buildings of China are painted with schio-liao, which gives them an unpleasant reddish appearance, but adds to their durability. This cement was tried in the Austrian Department of Agriculture, and by the "Vienna Association of Industry," and in both cases the statements of Dr. Scherzer were found to be strictly accurate.

Faraday's Cap Cement.—Electrical Cement.—Resin, 5 ounces; beeswax, 1 ounce; red ochre or venetian red in powder, 1 ounce. Dry the earth thoroughly on a stove at a temperature above 212°. Melt the wax and resin together and stir in the powder by degrees. Stir until cold, lest the earthy matter settle to the bottom. Used for fastening brass work to glass tubes, flasks, etc.

Cement for Glass, Earthenware, etc.—Dilute white of egg with its bulk of water and beat up thoroughly. Mix to the consistence of thin paste with powdered quicklime. Must be used immediately.

Glass Cement.—Take of pulverized glass, 10 parts; powdered fluorspar, 20 parts; soluble silicate of soda, 60 parts. Both glass and fluorspar must be in the finest possible condition, which is best done by shaking each, in fine powder, with water, allowing the coarser particles to deposit, and then to pour off the remainder, which holds the finest particles in suspension. The mixture must be made very rapidly, by quick stirring, and when thoroughly mixed must be at once applied. This is said to yield an excellent cement.

Gutta-Percha Cement.—This highly recommended cement is made by melting together, in an iron pan, 2 parts common pitch and one part gutta-percha, stirring them well together until thoroughly incorporated, and then pouring the liquid into cold water. When cold it is black, solid, and elastic; but it softens with heat, and at 100° Fahr. is a thin fluid. It may be used as a soft paste, or in the liquid state, and answers an excellent purpose in cementing metal, glass, porcelain, ivory, etc. It may be used instead of putty for glazing windows.

Iron Cement for closing the Joints of Iron Pipes.—Take of coarsely powdered iron borings, 5 pounds; powdered sal-ammoniac, 2 ounces; sulphur, 1 ounce; and water sufficient to moisten it. This composition hardens rapidly; but if time can be allowed it sets more firmly without the sulphur. It must be used as soon as mixed and rammed tightly into the joint.

2. Take sal-ammoniac, 2 ounces; sublimed sulphur, 1 ounce; cast iron filings or fine turnings, 1 pound. Mix in a mortar and keep the powder dry. When it is to be used, mix it with twenty times its weight of clean iron turnings, or filings, and grind the whole in a mortar; then wet it with water until it becomes of convenient consistence, when it is to be applied to the joint. After a time it becomes as hard and strong as any part of the metal.

Kerosene Oil Lamps.—The cement commonly used for fastening the tops on kerosene lamps is plaster of paris, which is porous and quickly penetrated by the kerosene. Another cement which has not this defect is made with three parts of resin, one of caustic soda and five of water. This composition is mixed with half its weight of plaster of paris. It sets firmly in about three-quarters of an hour. It is said to be of great adhesive power, not permeable to kerosene, a low conductor of heat, and but superficially attacked by hot water.

Cement for uniting Leather and Metal.—Wash the metal with hot gelatine; steep the leather in an infusion of nut galls (hot) and bring the two together.

Cement for Leather Belting.—One who has tried everything says that after an experience of fifteen years he has found nothing to equal the following: Common glue and isinglass, equal parts, soaked for ten hours in just enough water to cover them. Bring gradually to a boiling heat and add pure tannin until the whole becomes ropy or appears like the white of eggs. Buff off the surfaces to be joined, apply this cement warm, and clamp firmly.

Litharge and Glycerine Cement.—A cement made of very finely powdered oxide of lead (litharge) and concentrated glycerine unites wood to iron with remarkable efficiency. The composition is insoluble in most acids, is unaffected by the action of moderate heat, sets rapidly, and acquires an extraordinary hardness.

Cement for attaching Metal to Glass.—Copal varnish, 15; drying oil, 5; turpentine, 3. Melt in a water-bath and add 10 parts slaked lime.

Paris Cement for mending Shells and other Specimens.—Gum arabic, 5; sugar candy, 2; white lead, enough to colour.

Porcelain Cement.—Add plaster of paris to a strong solution of alum till the mixture is of the consistency of cream. It sets readily, and is said to unite glass, metal, porcelain, etc., quite firmly. It is probably suited for cases in which large rather than small surfaces are to be united.

Soft Cement.—Melt yellow beeswax with its weight of turpentine, and colour with finely powdered venetian red. When cold it has the hardness of soap, but is easily softened and moulded with the fingers, and for sticking things together temporarily it is invaluable.

Soluble Glass Cements.—When finely pulverized chalk is stirred into a solution of soluble glass of 30° B. until the mixture is fine and plastic, a cement is obtained which will harden in between six and eight hours, possessing an extraordinary durability, and alike applicable for domestic and industrial purposes. If any of the following substances be employed besides chalk, differently coloured cements of the same general character are obtained : 1. Finely pulverized or levigated stibnite (grey antimony, or black sulphide of antimony) will produce a dark cement, which, after long burnishing with an agate, will present a metallic appearance. 2. Pulverized cast iron, a grey cement. 3. Zinc dust (so-called zinc grey), an exceedingly hard grey cement, which after burnishing will exhibit the white and brilliant appearance of metallic zinc. This cement may be employed with advantage in mending ornaments and vessels of zinc, sticking alike well to metals, stone, and wood. 4. Carbonate of copper, a bright green cement. 5. Sesquioxide of chromium, a dark green cement. 6. Thénard's blue (cobalt blue), a blue cement. 7. Minium, an orange coloured cement. 8. Vermilion, a splendid red cement. 9. Carbon red, a violet cement.

Sorel's Cement.—Mix commercial zinc white with half its bulk of fine sand, adding a solution of chloride of zinc of 1·26 specific gravity, and rub the whole thoroughly together in a mortar. The mixture must be applied at once, as it hardens very quickly.

Steam Boiler Cement.—Mix two parts of finely powdered litharge with one part of very fine sand, and one part of quicklime which has been allowed to slake spontaneously by exposure to the air. This mixture may be kept for any length of time without injuring. In using it a portion is mixed into paste with linseed oil, or, still better, boiled linseed oil. In this state it must be quickly applied, as it soon becomes hard.

Turner's Cement.—Melt 1 pound of resin in a pan over the fire, and when melted, add $\frac{1}{4}$ of a pound of pitch. While these are boiling add brick dust until, by dropping a little on a cold stone, you think it hard enough. In winter it may be necessary to add a little tallow. By means of this cement a piece of wood may be fastened to the chuck, which will hold when cool; and when the work is finished it may be removed by a smart stroke with the tool. Any traces of the cement may be removed from the work by means of benzine.

Wollaston's White Cement for large objects.—Beeswax, 1 ounce; resin, 4 ounces; powdered plaster of paris, 5 ounces. Melt together. To use, warm the edges of the specimen and use the cement warm.

BORACIC ACID AS A PRESERVATIVE.*

BY H. ENDEMANN.

Boracic acid has, for the last ten years, held a place amongst our antiseptics, and has frequently been recommended for the preservation of meats and vegetable substances. The original discoverer, Gahn, sold in Europe two mixtures.

The one was a mixture of one part of boracic acid with one part of alum; the other, one part of boracic acid with two parts of alum. These were called respectively "aseptine" and "double aseptine."

Provisions in part preserved by boracic acid are generally within the time of from one to two months covered with a black crust, provided they are kept in the ordinary oak provision barrels. Alum prevents this.

This observation, long ago published, I found verified in my own investigations. It was, at first, my intention not to preserve without salt, but to limit the quantity of the salt to be used by the addition of certain antiseptics. In the following, without going into the details of the numerous experiments, I shall give the results of those which are directly of interest to the question discussed in this paper.

It was found that fresh beef, packed with 1 per cent of boracic acid and a salt pickle of 50 per cent., remained sweet and wholesome for several months, even if kept at an average temperature above 80° Fahr. It was likewise found that previously salted beef could not be preserved by the addition of boracic acid. From this it was evident that the process of salting removed from the beef certain substances, in the absence of which preservation became impossible. These substances proved, on further investigation, to be the phosphates. It was, therefore, not the boracic acid which had been the cause of the preservation, but, rather, substances which are produced by the action of the boracic acid—the acid phosphates.

I could cite a long list of materials which cannot be preserved with boracic acid, owing to the want of phosphates. In all these cases, however, preservation would be possible if, with the boracic acid, a phosphate were to be added: a somewhat roundabout way, which can be improved, as I shall explain further on.

During my investigations regarding the disinfecting properties of various substances I had found that it is very difficult to develop bacteria in a fluid containing acid phosphates, and also that many acids are powerful disinfectants, destroying the life of bacteria completely, even if present only in small quantities. One part of HCl in sixty-four parts of Cohn's fluid, well stocked with bacteria, destroyed these completely.

I was led, therefore, to make experiments in which boracic acid was replaced by equivalent quantities of other inorganic acids, and thus ascertained that exactly the same results could be reached as with the use of boracic acid.

The best results were reached by the use of phosphoric acid, and mixtures of phosphoric acid and hydrochloric acid.

Phosphoric acid, even in dilute solution, acts powerfully on fresh meat, covering it with a white layer of coagulated albumen, which, however, on standing gradually disappears. Mixtures, however, where the PO_5 is partly replaced by HCl, do not act in a like manner; and, even if some precipitation should take place, will soon allow the meat to recover its original appearance.

Meats thus treated keep exceedingly well, and at least fully as well as when preserved, under similar circumstances, with an equivalent quantity of boracic acid.

Less favourable results were obtained by the use of sulphuric, nitric, and acetic acids, which is easily explained by the instability of these acids.

The preservation by means of boracic acid cannot, therefore, be considered as involving a new principle; it is merely a variation of, but by no means an improvment on, the time-honoured vinegar pickling. The insipid taste of free boracic acid and the acid phosphates prevents its easy detection, and brings consumers to the belief that the meat is fresh.

This peculiarity is the only one recommending the use of boracic acid.

A French commission, appointed to investigate the influence of boracic acid on the human system, found that it could be taken for a considerable time without producing any injurious effects. Yet it is certainly neither a regular constituent of the body, nor is it contained in our food, and it is, therefore, doubtful whether the results reached by the commission must be considered as conclusive, as, in the course of time, constitutional difficulties may supervene, if such preserved provisions are taken for a considerable period.

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THE SALE OF PATENT MEDICINES CONTAINING POISON.

AMONG the letters that we publish this week is one from Dr. HUBBARD, in which he describes more clearly than before the real objects with which he addressed himself to the public through the medium of the daily papers. From that letter it is evident that the sale of poisonous drugs of which he spoke in his former letter was simply that mischievous practice carried on under the protection of the Patent Medicine Act, and the exemption made by section sixteen of the Pharmacy Act, which has lately been so often referred to in this Journal by correspondents or by speakers at the Council and other meetings.

It is certainly a great anomaly that while the educated and experienced pharmacist is not allowed to sell dangerous drugs otherwise than in accordance with certain formalities, and under conditions which are intended to prevent accident or misuse, still the same drugs can be sold without any such precautions and by any persons, ignorant or otherwise, so long as they are sold anonymously under the guise of secret nostrums with a patent medicine stamp.

Nor is it less surprising that there should have been so little effort on the part of medical men to protest against and oppose the continuance of a practice so dangerous to the general community and so antagonistic to their own interests. Though the cultivation of business and the acquisition of fortunes upon the basis of human credulity may not be a proceeding that in all cases calls for the interference of the Legislature to protect willing dupes from any damage possibly resulting from their own folly, there are certain lines of demarcation beyond which this species of commercial enterprise cannot and should not be allowed. The law steps in to prevent the country bumpkin from being damaged by his willingness to place his property in the hands of too plausible performers of the "confidence trick," and it is difficult to understand why it should not in like manner protect the enthusiastic invalid from injury to his health, or perhaps from loss of life, resulting from his belief that certain much vaunted, but poisonous, nostrums are gifts of the "healing hand," from which he may safely hope for relief. And of some preparations that are sold as patent medicines and as specific remedies it is not too much to say that their use is never unattended with peril. It is true that the composition of these articles has not been disclosed, and to some extent their exact ingredients can only be conjectured or in some instances detected by chemical analysis; but in regard to most of them there is little question what are the poisonous substances contained in them, and there should we think be as little question that such preparations ought not to be obtainable with the same ease as a box of purgative pills and with no greater precaution against misuse than would suffice in the case of such a simple medicine.

Dr. HUBBARD very justly urges that the reduced cost of a licence to sell patent medicines is injurious to general safety, because it gives to grocers and other dealers facility for distributing as patent medicines articles of the most dangerous character that should never be used except under competent supervision. While such a state of things exists, it would be of no avail for the chemist and druggist acquainted with the nature of these poisonous preparations to seek to apply to their sale the same rules and precautionary measures that he observes in selling the same poisonous drugs under their proper names. In the first place, he is not, under existing circumstances, justified in treating any such article as a preparation containing prussic acid, morphia, atropine, or what not, although he may have good reason for suspecting the presence of these or other poisons, and then such a course of action would be open to uncertainty. Neither can the chemist and druggist well decline to supply such articles without the risk of giving offence.

As a remedy for the various evils resulting from the sale of patent medicines containing poison, it seems, therefore, that the only feasible course is to require the disclosure of the constituents that are of a poisonous nature and to make the sale of the preparations containing poison subject to the limitations of the Pharmacy Act. This might be done without detriment to the proprietary interests of the manufacturers, and without making known the secrets of preparations which are in certain instances supposed to constitute in some degree the value of patent medicines, and as there is such cogent reason for adopting some such regulation of the sale of patent medicines containing poison, it is to be hoped, in the interest of the public, that the attention now directed to the subject by Dr. HUBBARD may be productive, as he desires, of something more than a "nine days' wonder."

DANGEROUS "VIOLET POWDER."

ATTENTION has again been directed to violet powder, or rather to that preparation which is sold under this name, consisting of or containing calcium sulphate, and according to the medical evidence given at the inquest referred to in this Journal last week, the use of this powder has been attended with a fatal result. This evidence, however, is far from being so conclusive as might be desired, and it seems to amount to little more than an expression of opinion by the medical man that "violet powder" containing sulphate of lime is highly dangerous and unfit for use. Moreover, the coroner, in summing up, appears to have regarded "violet powder" containing a large percentage of calcium sulphate in the same light as "violet powder" also containing a considerable amount of arsenious acid, for he referred to the cases which occurred some years ago as being analogous to the case he was then dealing with.

Although we have never admitted the propriety of selling under the name of violet powder an article consisting wholly or in part of calcium sulphate, we cannot altogether concur in the justice of the remarks made by the coroner in the recent case; first, because there is not, so far as we know, any evidence that calcium sulphate is injurious, and secondly, because there are some reasons for believing that it does not exercise any injurious influence when used as a dusting powder. Chief among these is the opinion expressed by Professor Redwood, as based upon his own experience, and in the absence of any positive evidence in the opposite direction that opinion is entitled to considerable respect.

The jury at the late inquest does not appear to have taken this into account, but to have adopted the opinion of the medical witness, and added as a rider to the verdict, "that these powders ought not to be sold without being analysed beforehand, and then under proper supervision." For our part we fail altogether to perceive the utility of this suggestion, or to understand what good purpose analysis or supervised sale would serve, if the article in question be really objectionable or dangerous to use. Of course, we are now assuming that the "violet powder" referred to in this case was not arsenical, like that which caused so many deaths some years ago.

The question then is whether calcium sulphate is generally injurious when applied to the skin of infants, or likely to be so in some instances. If that be the case its sale for such purposes ought to be stringently prohibited, and nothing short of such a course would satisfy the requirements of the case.

Apart from this question, we still perceive nothing to alter the view we have previously expressed in regard to the sale as violet powder of any other preparation than the perfumed starch which has by long usage acquired a prescriptive right to be designated by that name, and to that extent we agree with our correspondent, Mr. H. Brown, as to the propriety of applying that name only to perfumed starch, on the ground of expediency as well as honesty.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION.

We learn from Mr. Haydon that at the late election of the General Committee of this body, out of fifty-three nominations forty-two were irregular, and consequently only ten members could be declared duly elected. At the meeting of the General Committee to be held in London next month additional members can be added if it be considered advisable to do so.

FATAL MISTAKE IN DISPENSING.

The *Medical Times and Gazette* reports a fatal accident which has occurred in Bombay through the misreading of a prescription. The Italian consul, having a pain in his leg, placed himself under medical treatment by a fellow countryman, who ordered for him a preparation containing morphia, which was administered, and the same evening the consul died. In the course of the inquiry that followed it was found that the doctor ordered two grains of morphia, and wrote the word "grana" in full. This the dispenser mistook for "grammes," and made up the prescription accordingly.

THE PROPERTY IN LABELS.

Among our legal notices will be found a report of the decision of the Master of the Rolls in reference to an application for an injunction against a perfumery company for using labels that were alleged to be imitations of those used by the plaintiff, Mr. Rimmel. The case is important, since the ruling of the Master of the Rolls affirms the principle that a manufacturer's goods can be protected against imitation even when his name and trade mark have not been copied.

LEGISLATION RELATING TO THE SALE OF POISONS IN THE STATES.

A considerable amount of legislation regulating the sale of poisonous substances now exists in the United States. Some of these Acts have been already quoted in this Journal, and several more or less resemble our own Pharmacy Act, especially in defining what is legally a "poison." But the Act enacted on behalf of the people of Michigan leaves this point very indefinite, and shows originality in other aspects, as will be seen from the following quotation, in which the italics are ours:—"Every "apothecary, druggist, or other person who shall sell "and deliver at retail any arsenic, corrosive subli- "mate, prussic acid, *or any other substance or liquid* "*usually denominated poisonous,* without having the "word 'poison,' and the true name thereof, *and the* "*name of some simple antidote,* if any is known, "written or printed on the label attached to the vial, "box or parcel containing the same, shall be punished "by a fine not exceeding one hundred dollars."

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting will be held on Thursday, April 22, at 8.30 p.m., when the paper on "Robert Boyle," postponed from the last meeting, will be read by Mr. C. Thompson. A Report on Pharmacy will be made by Mr. H. R. Arnold, on "Emulsifying Agents."

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on April 1, Professor H. E. Roscoe, F.R.S., President, in the chair. After a few remarks from the President on taking the chair for the first time, the following certificate was read for the first time:—J. Taylor.

The President called upon Mr. Groves to read a paper on—

Betorcinol and some of its Derivatives. By J. STENHOUSE and C. E. GROVES.—Some thirty-two years ago, in the course of an examination of lichens, a quantity of crude usnic acid from *Usnea barbata* and *Cladonia rangifernia* was submitted to destructive distillation. In the distillate a crystalline substance was found of the composition $C_8H_{10}O_2$, homologous with and closely resembling orcinol; it was therefore named β orcin. It was somewhat hastily inferred that the usnic acid in the above lichens was the source of the β orcin. Subsequent attempts to prepare β orcin by distilling pure usnic acid, however, completely failed. A quantity of *Usnea barbata* was therefore obtained and the crude usnic acid extracted and submitted to destructive distillation. On adding to the distillate solution of chloride of lime a crimson red coloration proved at once the presence of the orcinol-yielding body. On purifying the usnic acid no trace of the orcinol was obtained after destructive distillation. The source of the β orcin, or, as the authors now name it, betorcinol, was therefore not usnic acid. To prepare betorcinol, $C_8H_{10}O_2$ or $C_6H_2Me_2(HO)_2$, *Usnea barbata*, carefully freed from other lichens, is exhausted with milk of lime, the solution precipitated by hydrochloric acid and the precipitate boiled with lime and water; the clear solution is neutralized with hydrochloric acid and evaporated, when the crude betorcinol crystallizes out. It is purified by crystallization from benzene and from water. Melts at 163° C. It is less soluble than orcinol, gives a bright crimson colour with hypochlorites, orcinol a purplish-red. The ammoniacal solution is rapidly coloured on exposure to air, whilst the corresponding orcinol solution is but slowly changed. Tetrachlorobetorcinol, dichlorobetorcinol, the corresponding bromine derivatives and a mononitroso compound, were prepared and examined. The acid which yields the betorcinol was separated after some trouble from the usnic acid by taking advantage of its greater solubility in cold ether. It melts at 186° and decomposes at a somewhat higher temperature, carbonic anhydride and betorcinol being formed. It has the formula $C_{19}H_{20}O_7$, having the same relation to betorcinol that evernic acid, $C_{17}H_{16}O_7$, has to orcinol. As, however, it cannot be at present definitely asserted that it is a dimethylevernic acid, the authors have provisionally named it *barbatic acid*. Hesse obtained an acid from an usnea growing on calisaya bark melting at 172° which he termed usnetic acid. This is probably not identical with barbatic acid, but the authors suggest that it may be an ethereal salt of barbatic acid, as Hesse used alcohol in extracting and purifying his substance.

The President, after complimenting the authors on the completeness and clearness of their communication, called on the Secretary to read a paper—

Note on Chemical Equilibrium. By M. M. P. MUIR.—The object of this paper is to describe a few measurements of the variations caused in chemical changes by modifications in the condition of these changes, and to attempt to generalize some of the conditions of chemical equilibrium, looking at the phenomena from a dynamical point of view. The influence of the manner of mixing on the changes which occur when potassium permanganate, oxalic and sulphuric acids react in the presence of sulphate of manganese is illustrated by numerical results, showing that during the earlier part of the reaction the velocity of the chemical change is greater when permanganate is slowly added, and the liquids are not thoroughly mixed until after three minutes. The disturbing influence of a secondary change upon the primary is illustrated by a few numbers representing the relative velocities of the solution of ferric oxide by sulphuric acid alone, in the presence of zinc, and when aided by the passage of an electric current. In the two latter cases, the velocity of the change is considerably greater than in the former; the nascent hydrogen appears to decompose the product of the primary change, ferric sulphate, and to set free sulphuric acid in contact with ferric oxide, the latter being rapidly acted upon. Attention is drawn to the work of Professor Willard Gibbs, wherein the conditions of equilibrium of a system of heterogeneous substances are deduced from a consideration of the great principles of the conservation and dissipation of energy, and a rough attempt is made to connect the so-called "chemical induction" with the commonly occurring phenomena of chemical action, and to trace analogies between chemical and electrostatic induction. The general conclusions arrived at are, that chemical changes are always complex; that each change consists of at least two parts, a direct and a reverse change; that during the progress of either of these, secondary changes may be induced, which will, in their turn, modify the primary changes; that systems not in phases of absolute stability tend to undergo changes by contact with very minute quantities of matter in phases other than their own; that such systems will always tend to pass into that phase the passage to which is attended with the maximum loss of entropy; but that this tendency may, to a certain extent, be prevented by the action of impressed force.

Dr. Armstrong thought that it would have been desirable to make a series of observations, and take the mean results; apparently, only single observations had been made, and the slight differences might, to some extent, be due to experimental errors.

The President commented on the difficult nature of such investigations, but agreed with Dr. Armstrong that it would have been better to have made a series of observations.

The Secretary then read a communication from Japan, entitled—

Preliminary Note on the Action of the New Diastase, Eurotin, on Starch. By R. W. ATKINSON, Professor of Chemistry at Tôkiô.—M. Korschelt described in the 'Transactions of the German Asiatic Society,' in some detail the Japanese brewing process (*Ding. Polyt. Jour.*, 230, 76), and mentioned the occurrence of a soluble ferment, which he named eurotin, in the fermenting material employed, having the property of dissolving starch, and converting it into sugar. A brief description of the process was given by the author in *Nature*, 1878. The fermenting body is termed "koji," and is prepared as follows:—Washed rice is soaked in water till soft, it is then steamed for some hours until the starch has gelatinized; when lukewarm the mass is sprinkled with spores of the fungus *Eurotium oryzea*. The grains are then well mixed, and exposed in trays to a temperature of about 25° C. In three days the mass is cemented together by the silky filaments of the mycelium, and forms the "koji," which is used instead of malt in the brewing process. When extracted with water koji yields a solution reducing the Fehling test; when digested with water for about ten minutes the solution gives about 12–14 per cent. of glucose. Alcohol also dissolves out sugar, so that probably some sugar is present in the substance before treatment with water. Korschelt has shown that the cold aqueous extract of koji has properties resembling those of malt, and when added to gelatinized starch renders it limpid and forms sugar. He also concluded that the temperature of 45°–50° was the most favourable to this change. The author of the present paper has examined more minutely into the chemical reactions of the brewing processes of the Japanese, and has come to the conclusion that the starch breaks up in this process into glucose and dextrin, instead of maltose and dextrin as in our mashing operations. Korschelt assumed that maltose was formed, but gives no estimation of sugar or polariscopic determinations. The author then describes the process, and gives analyses of the mash on different days. A mixture of koji, steamed rice and water is made in the cold; on the 5th to 7th days the mash is warmed by introducing tubs filled with hot water. The principal points in the analyses are given in the following table:—

	1st day	3rd day.	5th day.	7th day.	10th day.	14th day.	17th day.	19th day.	24th day.	28th day.
Alcohol, per cent.	—	—	—	5·2	8·61	9·20	5·80	9·44	12·41	13·23
Dextrose, per cent.	—	7·35	12·25	5·4	0·99	0·50	2·06	1·16	0·27	0·0
Dextrin, per cent.	—	5·12	5·69	7·0	2·81	2·57	3·89	2·74	0·47	0·41
Starch and cellulose .	38·2	26·5	21·49	15·64	15·67	16·15	19·25	132·5	10·22	8·69
Rotatory power .	—	124°	106°	135°	100·7°	116°	160°	132·3°	48·2°	36°
Sp. gr. of mash .	—	1·15	1·18	1·08	1·05	1·04	1·03	1·02	0·99	0·98

It is to be noted that between the 14th and 17th days two further additions of steamed rice and water were made, and again on the 18th day a fourth addition of steamed rice ferment and water took place. The mash was then pressed, and during the interval the small quantity of dextrin underwent fermentation, and the specific rotatory power of the filtered liquid became almost *nil*. The filtered liquid (Saké) which contains the water used to rinse out the fermenting tuns contains 11·14 per cent. alcohol, glycerin and resin, 1·99, fixed acid, 0·13, volatile acid, 0·02, water, 86·72. The fermentation is probably spontaneous; the size of the ferment cells is a little less than that of the beer yeast. The author endeavoured to obtain the sugar formed by solution in alcohol, but no crystallizable sugar separated. Experiments made by mixing cold extract of "koji" with gelatinized starch invariably gave a rotatory power lower than that calculated from the amount of dextrose and dextrin, assuming only these two substances to be present. The author leaves the detailed consideration of these reactions for a future communication; at present he is satisfied to have shown that the diastase of "koji," unlike that of malt, yields glucose and dextrin when it acts on gelatinized starch.

Dr. Armstrong said that the paper was very suggestive and interesting, but he was sorry that more details of the methods and especially of the polariscope used were not given. He must differ from the author, and did not think he had proved that glucose was formed. The author seemed to think that the formation of dextrose and dextrin was due to the eurotin, an unorganized ferment resembling diastase, and to neglect the action of the organisms present, which are, as is well known, capable of converting starch into dextrose.

Mr. Groves called attention to the large amount of alcohol present and suggested that it might be due to the particular organisms present.

The Secretary then read a note on—

The Products of Combustion of Coal Gas. By L. T. Wright.—Some years ago the author was much struck by the powerful odour, suggestive of ozone, which he noticed when coal-gas was consumed in a Bunsen burner in an atmosphere charged with the nitrogen oxides evolved from fuming nitric acid. During some experiments on the estimation of sulphur in gas the author passed the products of combustion of a Bunsen burner through solutions of iodine, and noticed that after the iodine solution had been bleached and the current of gas stopped, free iodine reappeared after some time in the solution. This reaction was attributed to nitrous acid and was completely prevented by adding sodium bicarbonate to the iodine solution; the sulphur could then be determined by burning half a cubic foot of gas. In 1877 the author proved that nitrous acid was produced by the combustion of coal-gas in ordinary air but that if the gas and the air were both freed from ammonia no nitrous acid was formed (*Chem. Soc. Journ.*, 1879, Trans. 42). The futility of the ordinary methods of washing gases was also proved. The author has never had the least difficulty in obtaining a blue reaction with paper moistened with iodide of potassium and starch when coal gas is burning in a Bunsen burner. Since reading Mr. Ridout's paper on "The Production of Ozone," read before the Society a few weeks back, further experiments have been made, and the author concludes that ozone is not formed by the combustion of coal-gas, and that while ordinary gas burned in air usually gives the blue colour with starch and iodide of potassium, no such reaction is obtained when ammonia and its compounds are completely removed previous to combustion.

The Secretary then read a paper on—

Polysulphides of Sodium. By H. Chapman Jones.—These bodies were usually prepared by the direct union of sodium and sulphur; the author establishes the existence of Na_2S_5 which on heating gives off sulphur and leaves Na_2S_4, it being extremely difficult to obtain the substances pure. The body Na_2S_5 seems to be the highest sulphide procurable; in a body containing more sulphur than the pentasulphide, the excess of sulphur seems to be merely dissolved. An aqueous solution of Na_2S_5, when gently warmed evolves sulphuretted hydrogen; the pentasulphide cannot, therefore, be satisfactorily prepared by boiling a lower sulphide with excess of sulphur; on boiling the above solution no sulphur is precipitated, $Na_2S_2O_3$ and SH_2 being formed. The author has examined the action of cadmium carbonate and other cadmium salts on the pentasulphide and concludes that the precipitate consists of cadmium sulphide and sulphur, the latter being removable by carbon disulphide. The pentasulphide is believed by the author to be a tetrathiosulphate. He hopes to be able to prepare the di- and tri-thiosulphates, and has obtained on several occasions a substance (giving a dark green solution having an absorption band) which may be one of these bodies. In conclusion the author gives some properties of a black residue which is uniformly left when sulphur is burned, but has not examined the substance as Dr. T. Cross (*Berl. Ber.*, 1879, 788) is already investigating the subject.

The next paper was read by the Secretary on—

The Reflection from Copper, and on the Colorimetric Estimation of Copper by means of the Reflection Cuprimeter. By T. Bayley.—The author has shown that the light reflected from metallic copper contains all the elements of white light, but that the region of the spectrum to the red side of the D line is more intense than in the spectrum of the reflection from a white surface of equal illumination; the light transmitted by dilute solutions of cupric salts is deficient in those rays which the spectrum of reflection has in excess. It follows that if we look at a copper surface through a sufficient thickness of cupric sulphate solution, the metal appears silver white, for the solution absorbs the excessive rays which make the copper red. Upon these facts the construction of the "reflection cuprimeter" is based. The direct light from the sky is reflected from a mirror of copper and through two vertical tubes closed at the bottom by plates of glass. The sheaves of light are concentrated by lenses on two layers of tissue paper moistened with glycerine. The level of the liquid in the tubes can be adjusted by means of an aspirator. A standard solution of copper is made by dissolving 1 gram of copper in nitric acid, adding excess of sulphurous acid and diluting to a litre. It was found that a depth of 8·01 centimetres of this solution gave the silver-white tint to the copper reflector. Iron does not interfere if reduced to the ferrous state. The degree of accuracy is shown by analyses. The apparatus is made by Messrs. Jackson, 65, Barbican.

The next paper was—

On Pyrene. By WATSON SMITH and G. W. DAVIES.—The crude material was obtained from Dr. Schuchardt and consisted of a dark brown crystalline mass. This was purified by solution in petroleum spirit and crystallization. Crystals were light yellow, melted at 149°. A drawing of the crystals and a determination of the angles of the faces are given. The crystals are monoclinic. Analysis gave the formula $C_{16}H_{10}$. Vapour density was found to be 6·912, calculated 6·999. The authors used Victor Meyer's method and a lead bath. They recommend smoking the glass, dipping into the melted lead, in a luminous gas flame; this prevents cracking and adherence of the lead.

Analyses of the Ash of the Wood of two Varieties of the Eucalyptus. By WATSON SMITH.—The two varieties were the red and blue gum trees, *E. rostrata* and *E. globulus.* The wood is remarkably hard and gives rise to a powerful aromatic odour when planed. Sp. gr. of *E. rostrata* is 0·8112, of *E. globulus* 0·752. Ash respectively 2·25 per cent. and 2·01 per cent.; K_2O and Na_2O, 12·9 per cent. and 25 per cent., CaO, 43·8 per cent. and 35·08 per cent., with small quantities of iron alumina, etc. The author suggests the use of a decoction of the leaves of *E. globulus* as tea.

On the Action of Organo-Zinc Compounds on Quinones. Second Notice. By F. R. JAPP.—In a previous communication the author described a compound of the formula $C_{16}H_{14}O_2$–C_2H_6O, but failed to isolate the substance $C_{16}H_{14}O_2$; in the present paper this body has been isolated and its more important reactions studied. The alcohol was absorbed by sulphuric acid after being sealed up some months in an N-shaped glass tube. Analysis gave the formula $C_{16}H_{14}O_2$. The substance melted at 80°. In the reactions the compound $C_{16}H_{14}O_2C_2H_6O$ was employed. By oxidizing a solution in glacial acetic acid with chromic anhydride a mass of orange-coloured needles of phenanthrene quinone was obtained. By distillation with zinc dust, redistilling the distillate and treating the product with picric acid, the double compound of phenanthrene and picric acid was obtained in long orange needles, melting at 143°, from which phenanthrene was obtained, melting at 95°–96°. On treating the compound $C_{16}H_{14}O_2C_2H_6O$ with caustic alkali it dissolves, yielding a potassium salt in satiny flat needles, soluble in water; from this solution CO_2 precipitates the body $C_{16}H_{14}O_2$, which thus behaves like a phenol. The author then considers the question as to the constitution of the quinones and comes to the conclusion from the action of zinc ethyl and other considerations that Graebe's views are correct and that phenanthrene quinone has the structure of a peroxide, thus

$$\begin{array}{l} C_6H_4\text{—}C\text{—}O \\ \;\;|\qquad\;\; \| \quad\; | \\ C_6H_4\text{—}C\text{—}O \end{array}$$

and is not, as suggested by Fittig,

$$\begin{array}{l} C_6H_4\text{—}C=O \\ \;\;|\qquad\;\; | \\ C_6H_4\text{—}C=O \end{array}$$

Dr. Armstrong objected to the conclusions arrived at by Dr. Japp and thought that though his argument was very ingenious it was not conclusive; in fact, that it was just as likely that a substance having the constitution assigned by Fittig would give

$$\left\{\begin{array}{l} C_6H_4C(OEt) \\ \qquad \| \\ C_6H_4C(OZnEt) \end{array}\right. \quad \text{as} \quad \left\{\begin{array}{l} C_6H_4C \left\{\begin{array}{l} Et \\ OZnEt \end{array}\right. \\ \qquad\;\; | \\ C_6H_4CO \end{array}\right.$$

In fact, the probabilities were in favour of the first supposition, when the behaviour of phenanthrene quinone with nascent hydrogen was considered.

The Society then adjourned to April 15, when the following papers were to be read: "On the Lecture Illustration of Chemical Curves," by Dr. Mills, and "On the Analysis of Organic Bodies Containing Nitrogen," by W. H. Perkin.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, March 25, Mr. H. Allen, Vice-President, in the chair.

Mr. W. Elborne, in a preliminary note on the "Preparation of Tinctures," drew attention to a new apparatus which he had devised for the preparation of the tinctures of the British Pharmacopœia with a minimum of loss. The author will communicate the results of his experiments in a paper to be read on May 13.

A Report on Inorganic Chemistry was then read, dealing with the subject of—

THE FORMULÆ OF SOME INORGANIC SUBSTANCES.

BY C. H. HUTCHINSON, F.C.S.

The introduction of some simple form of apparatus for the achievement of a particular branch of scientific research has often been the precursor of important discoveries in that branch. An example of this fact may be now seen in the beautifully simple apparatus which Professor V. Meyer has invented for the determination of vapour densities, and by means of which he and C. Meyer and Züblin have already accomplished much important work, extending from the verification of doubtful vapour densities to the probable dissociation of some "elements."

As the apparatus has been already described to the Association by Dr. Senier (see *Pharmaceutical Journal*, May 17, 1879), I can pass immediately to an account of some of the results which have been obtained by means of it; all of these are not new, but are worth collecting, since they have been arrived at under conditions differing from those originally employed, and, coming from such skilful hands, dispel at once any doubts which may have existed with regard to them.

The substances chosen for examination have been chiefly those about the formulæ of which doubt may have arisen, or which for various reasons have never been experimented with in the form of vapour. Pentasulphide of phosphorus is such a one, for although several determinations of its pentachloride have been made, the pentasulphide has not been thoroughly examined on account of its high boiling point. It seemed interesting, therefore, to determine whether this substance could be volatilized unchanged, or whether its composition in the state of gas was represented by $3P_2S_3+S_6$ or $P_2S_3+S_2$. Accordingly the vapour density was taken at a red heat in a lead-bath, the bulb of the glass apparatus being protected by means of a layer of clay 2 to 4 mm. thick, which prevented the shape of the glass vessel being in the slightest degree altered. The apparatus was filled with nitrogen, a proceeding which was adopted in nearly all the estimations which will be here enumerated. Two determinations* gave the numbers 7·63 and 7·67, and since the calculated vapour density of P_2S_5 is 7·67 the experiment shows that this substance does not suffer dissociation when volatilized at this temperature.

In a similar manner they have also obtained the vapour density of indium chloride, for the volatilization of which a temperature just short of bright red heat is necessary, a temperature which the glass bears quite well if it be covered with the coating of clay. The numbers found in their determination were 7·87, which accord very well with the calculated density of $InCl_3$ (7·6).

The method of weighing such deliquescent substances as this was as follows:—The bottle to be introduced into the density apparatus was weighed in a stoppered bottle, then taken out and connected to a glass rod by means of a piece of india-rubber tubing passed over its closed end, and when thus conveniently held filled with the powdered substance by being pushed into it, in the bottle in which it was stored; after removing the particles adhering to the outside by wiping with silk the bottle was replaced in the stoppered bottle and again weighed.

* *Deut. Chem. Ges. Ber.*, 12, 609.

Since the specific weight of the vapour of no copper compound is known the determination of the vapour density of cuprous chloride is of considerable interest. The temperature at which this substance volatilizes is so high that it was necessary to employ a porcelain apparatus instead of the usual glass one; this was constructed in the same shape and about the same size, differing, however, in the fact that the narrow tube ended at 200 mm. from the bulb, and to it was joined by means of a piece of india-rubber tubing the ordinary glass gas delivery tube. The bottle in which the substance to be experimented upon was weighed consisted merely of a piece of the stem of an ordinary clay tobacco-pipe, 2 to 3 c.m. long, closed at one end by a clay plug fused into it. The source of heat was a Perrot's gas furnace.

The determinations showed that the usually accepted formula for this substance, viz., Cu_2Cl_2 was correct, the numbers obtained being 7·05* and 6·93,† instead of that calculated for this formula, 6·84.

Mitscherlich, forty-five years ago,‡ showed that the formula of arsenious acid is As_4O_6 and not that which has been customarily adopted. Some chemists, and Kolbe among them, seem to have been of the opinion that arsenious acid would have a density corresponding with the formula As_2O_3 if estimated at a sufficiently high temperature.

In order to settle this point two determinations were made,§ one at a moderate red heat, the other at a temperature of about 1560° C. The vapour density obtained in the first experiment was 13·80, in the second 13·78; both of which numbers correspond with that calculated for As_4O_6, 13·68.

Similarly the formula for antimonious oxide is Sb_4O_6, instead of that usually accepted, as shown by the numbers 19·6 and 19·98 obtained‖ at a temperature of about 1560° C., which agree with 19·9, that calculated for Sb_4O_6.

The vapour density of mercuric sulphide (cinnabar) has also been determined by Mitscherlich, who obtained the numbers 5·95, 5·99. On this result he could not, however, place much confidence, since the glass of this apparatus was considerably attacked. The work was therefore repeated in Zurich, a porcelain tube being employed, the vapour density found being 5·39,¶ the density calculated for a mixture of $Hg+Hg+S_2$ is 5·34. It is noteworthy that at the temperature employed by Mitscherlich, 669° C., the sulphur existed as S_2 and not as S_6.

The only work which has been published with regard to the vapour density of stannous chloride is a short note by Rieth,** where he records the numbers 7·47 and 6·88, which points to the formula $SnCl_2$, the corresponding number being 6·53.

The Messrs. Meyer thought it desirable to repeat this work, which they accordingly undertook and at temperatures of about 619° and 697° C. obtained the numbers 12·85 and 13·08. These seem to show that the formula should be doubled, since the density calculated for Sn_2Cl_4 is 13·04. The difference between their results and those obtained by Rieth they attribute to the probability of decomposition having taken place at the temperature employed by the latter.

Dr. Carnelly, however, suggests†† that the Meyers' results were obtained at a temperature too near the boiling point of stannous chloride, 617°–628° C., so that the formula suggested by Rieth's work may after all be the correct one.

No determination of the vapour density of zinc chloride having been made, this substance was next chosen, and volatilized in the porcelain apparatus, which is not acted upon by the gas at temperatures below the melting point of iron. The temperature employed was about 907° C.; the resulting numbers were 4·53 and 4·61. The number calculated for $ZnCl_2$ is 4·7.

Two determinations of the vapour density of ferric chloride, one at the boiling point of sulphur,* the other at 619° C., gave respectively 11·14 and 11·01, these numbers agreeing with that calculated from Fe_2Cl_6, viz., 11·23.

Since only the density of cadmium itself is known it was considered desirable to determine the vapour density of one of its salts, the bromide being chosen. This acts on glass at a temperature of 800° C.; the estimation was therefore conducted in the porcelain apparatus. At a temperature of about 923° C. the density 9·22 was found; at a temperature of about 914° C., 9·28. The vapour density calculated for $CdBr_2$ is 9·40.

The task of determining the vapour density of the alkali metals has also been undertaken by Victor Meyer, but so far without success, he finding, as others before him, that these metals exert a powerful action on the apparatus employed. Thus Mitscherlich in 1834† found that Bohemian glass tubes were destroyed by the vapour of potassium. Rieth, in 1871,‡ was met by the same difficulty, and gave up the experiments after finding that determinations in copper tubes were likewise untrustworthy. Dewar and Dittmar,§ endeavoured to effect the determination in iron vessels, but, as was pointed out by Dewar and Scott later on,‖ this method is impracticable, since iron absorbs the vapours of the alkali metals, an alloy being produced. Victor Meyer attempted to obtain a determination in his porcelain apparatus¶ in an atmosphere of nitrogen, but found that the porcelain under the action of the sodium vapours was converted into a black mass. His next experiment was with a Bohemian glass apparatus which had been coated with silver inside; a red heat, however, quickly turned the silver bottle with its charge of sodium into a lump of alloy, the vapours from the sodium being so rapidly absorbed by the silver that no gas escaped from the apparatus; a platinum vessel proved itself equally unsuitable for the determination. The only substance not tried which is likely to withstand the action is carbon; there are, however, difficulties in the way of preparing an apparatus from this substance.

These negative results were published by Victor Meyer on account of the publication by Dewar and Scott of the vapour densities of the alkali-metals** obtained by operating in a wrought iron apparatus of the same construction as Meyer's and by means of which they obtained results corresponding with the formulæ K_2, Na_2. In their next paper, however,†† they state that the vapours of the alkali metals, as before quoted, are absorbed by iron, and therefore these results were not trustworthy. They then repeated their experiments in a platinum apparatus, finding numbers agreeing with the formulæ K_1, Na_1, though these are not more trustworthy than the last, since they state that the platinum apparatus was so strongly acted upon as to be useless after two or three experiments.

As a continuation of their work on the vapour densities of gases at high temperatures, Professor V. and Herr C. Meyer determined to examine the specific weights of the elements at the highest yellow heat attainable in their gas furnace.‡‡

Since the accuracy of their results depended entirely on the non-decomposability of the nitrogen molecule at

* *Deut. Chem. Ges. Ber.*, 12, 1116.
† *Ibid.*, 12, 1283.
‡ *Ann. Chem. Pharm.*, 12, 165.
§ *Deut. Chem. Ges. Ber.*, 12, 1116.
‖ *Ibid.*, 12, 1282.
¶ *Ibid.*, 12, 1118.
** *Ibid.*, 3, 668.
†† *Ibid.*, 12, 1836.

* *Deut. Chem. Ges. Ber.*, 12, 1198.
† *Ann. Chem. Pharm.* 12, 173.
‡ *Deut. Chem. Ges. Ber.*, 4, 807.
§ *Chem. News*, 27, 121.
‖ *Chem. News*, 40, 293.
¶ *Deut. Chem. Ges. Ber.*, 13, 391.
** *Proc. Roy. Soc.*, No. 179.
†† *Chem. News*, 40, 293.
‡‡ *Deut. Chem. Ges. Ber.*, 12, 1423.

the temperatures employed, it was considered advisable to check its behaviour at widely differing temperatures against that of a gas whose molecules were even less likely to divide. The gas chosen was that from mercury, since as this substance has a monatomic molecule, the probability of a further division is as small as possible. Two estimations gave the following results:—At a temperature of about 440° C., 6·86; at about 1567° C., 6·81; calculated for Hg 6·91.

These experiments showed the nitrogen to be trustworthy, and accordingly the density of oxygen was chosen for the next determination. Since, however, the nature of their apparatus required the substance to be introduced in the solid form, it was necessary to choose some compound which at the temperature employed would part entirely with its oxygen, and the residue of which would not be in the least volatilized.

Silver oxide, answering these requirements, was chosen, the results obtained being at a temperature of about 1392° C., 1·06, 1·04; at about 1567° C., 1·04, 1·06; the calculated density of O_2 is 1·105.

The results of this and other experiments were to show that the elements oxygen, nitrogen and sulphur, possess the usually ascribed formulæ at the temperatures employed—O_2, N_2 and S_2.

In the case of chlorine, however, different results were obtained. The substance chosen for examination was platinous chloride, which is more convenient to handle than either platinic or gold chloride, not being deliquescent. The results, which are tabulated below, show that at a temperature of about 800° C., the dissociation of chlorine commences, medium numbers being obtained at 1000° C.; whilst at 1200° C., the numbers become again constant, corresponding with $\frac{2}{3}$ Cl_2, thus:—

Approximate temperature.	Observed density.	Calculated density.
620° C.	2·42 2·46	Cl_2 : 2·45
808° C.	2·21 2·19	
1028° C.	1·85 1·89	
1242° C.	1·65 1·66	
1392° C.	1·66 1·67	
1567° C.	1·60 1·62	$\frac{2}{3}$ Cl_2 : 1·63

In order to satisfy themselves that the porcelain apparatus had not been acted upon, a piece of one of the tubes was cut off, and after the external glaze had been removed by grinding, it was dried and weighed, and then heated to a temperature of about 1567° C. in a stream of chlorine gas; on again weighing, the weight was found to have remained constant.

The next substance examined was, as one might naturally expect, iodine.* The substance employed in this case was the carefully purified solid halogen. The results of fourteen experiments in the porcelain apparatus are tabulated below:—

Approximate temperature.	Observed density.	Calculated density.
253° C.	8·89 8·83	I_2 : 8·78
450° C.	8·84 8·85	
586° C.	8·73 8·71 8·71	
842° C.	6·68 6·80 6·80	
1027° C.	5·75 5·74	
1570° C.	5·67 5·60 5·71* 5·81*	$\frac{2}{3}$ I_2 : 5·83

On comparing this table with that already given for chlorine, it will be seen that the density corresponding with $\frac{2}{3}$, the accepted formula, is reached at a much lower temperature in this case than in that; the chlorine requiring a temperature of 1200° C., whereas 1000° C. is sufficient to produce a constant $\frac{2}{3}$ density in the case of iodine.

That the iodine had no action on the porcelain tube was proved by comparing the results obtained in it with those obtained in a platinum apparatus.† In this case the iodine vapour comes in contact with nothing but platinum and nitrogen, as no substance such as asbestos or sand is necessary to break the fall of the small bottle, a precaution which has to be taken in the glass and porcelain apparatus. The results thus obtained are included in the table given above, being those found at a temperature of about 1570° C. marked with an asterisk.

It was not considered desirable to determine chlorine in this way on account of the action which that gas exerts on platinum at a high temperature.

With the object of obtaining the vapour density of bromine it was at first decided to work with platinous bromide. Professor V. Meyer and Herr Züblin found, however, that platinic bromide may easily be prepared in the following manner:—Platinum sponge is heated with bromine and aqueous hydrobromic acid in sealed tubes to a temperature of 180° C., the filtered liquid is evaporated to dryness, the residue dried at 180° C., the platinic bromide thus obtained extracted with water to separate from traces of platinous bromide, again evaporated to dryness and the residue dried at 180° C.* Operating with this substance at a temperature of about 1570° C. they obtained the numbers 3·78 and 3·64, which agree with those calculated for the formula $\frac{2}{3}$ Br_2, viz. 3·64.

Experiments were then instituted with free bromine, which at a temperature of 100° C. gave the density 5·38, corresponding with the density of Br_2 5·52. But when attempting to perform the experiment at a yellow heat, they were met with the difficulty that the bromine volatilized with explosive violence; by sealing small quantities in capillary tubes they were, however, enabled to obtain the following results, the difference between them probably referable to the explosive manner in which even these small quantities are volatilized:—

4·30; 4·14; 3·94; 3·99; 3·78; 4·20; 4·14.

These numbers lie between those calculated for Br_2 5·52 and $\frac{2}{3}$ Br_2 3·64.

This difficulty of the too rapid vaporization of bromine and other volatile substances such as water, they have not yet been able to overcome; they hope, however, soon to be able to publish a table of the densities of bromine at differing temperatures in order to show at what temperature this substance first exists as $\frac{2}{3}$ Br_2. These experiments they are not yet able to undertake on account of other substances which are now the objects of examination.

I will now draw your attention to objections which have been raised to this latter part of Meyer's researches.

Professor Seelheim's criticism shall be the first to be considered. He suggested that the determination of the vapour density of chlorine might have been rendered inaccurate owing to the volatilization of platinum which is known to take place in an atmosphere of chlorine.

Professor Meyer replied† that he had exposed platinum at a temperature of 1570° C. to the action of a stream of dry chlorine gas and found that in the course of one hour it lost about 1 per cent. Now in the case of his determinations, which only occupied a few seconds, the platinum left by the chlorine only weighs about 0·07 gram, and this is not subject as in the experiment above referred to, to the action of a stream of chlorine, being almost instantaneously separated from the chief bulk of the gas by the bottle containing it. He therefore considers that the volatilization of the platinum does not practically occur, an argument which is supported by the fact that after weighing the platinum left in the bottle after the experiment, he found it now suffered no loss.

In the *Compt. Rend.*, 90, 184, Professor Crafts published an account of some experiments he has been carrying out with a modification of Meyer's apparatus, the modification consisting of two graduated and calibrated U tubes kept at constant temperature by a bath of cold water, connected with Meyer's apparatus in such a manner that by means of a fine tube a measured volume of a gas

* *Deut. Chem. Ges. Ber.*, 13, 394.
† *Ibid.*, 12, 1398.

* *Deut. Chem. Ges. Ber.*, 13, 404.
† *Ibid.*, 12, 2022.

could be transferred from the one U tube to the heated bulb of the apparatus, the amount of gas displaced by it being collected and measured in the other U tube.

The apparatus being filled with air and heated to the highest temperature of the Perrot's furnace, two experiments showed that 10 c.c. of chlorine displaced 10·37 c.c. and 10·24 c.c. of air, and the apparatus being filled with chlorine 10 c.c. of air were found to displace 9·98 and 10 c.c. of chlorine. Operating with a platinum vessel instead of the porcelain one used in these experiments, he found that 10 c.c. of chlorine displaced 10·43 c.c. and 10·50 c.c. of air. If the expansion observed by the Meyers had taken place, the quantity of air collected should have been 15 c.c., that of chlorine, 6·6 c.c.; his experiments, therefore, with free chlorine do not verify those of the German chemists with nascent chlorine.

Working with iodine, he obtained the densities 6·01 and 5·93, which correspond very nearly with 5·83, the calculated density of $\frac{2}{3}$ I_2.

Bromine was found to be intermediate, giving the numbers 4·39 and 4·48, instead of 5·57, the normal density.

Professor Meyer, referring to this observation of Professor Crafts,* states that he had observed this property of chlorine some months before the appearance of the latter chemist's publication, and† describes his method of experimenting, which was as follows:—

The heated apparatus was filled with dry chlorine by means of a narrow platinum tube, reaching down to its bottom; after this had had time to be heated to the temperature of the furnace, it was displaced by air passed through the same tube, its amount being estimated by titration of the iodine displaced from a solution of potassium iodide. By filling the apparatus with dry air, and allowing it likewise to attain the temperature of the furnace, and then displacing it by means of carbonic anhydride and collecting in a measuring tube over potassium hydrate solution, the contents of the porcelain apparatus were determined; corrections were then made, so that the volumes of gas compared were only those contained in the strongly heated part of the apparatus.

The results of the comparisons thus instituted showed that free chlorine is not dissociated at this temperature (yellow heat); the numbers obtained were 2·57, 2·63, 2·64, that calculated for Cl_2 are 2·45.

It might be interesting further to state that the explanation of the difference between the observations of V. Meyer on the one hand,‡ and Troost and Deville on the other, may perhaps lie in the different conditions attending the respective experiments, and therefore both observations may be correct.

Troost and Deville, who used iodine in their classical researches on vapour densities, first assured themselves that the expansion of this substance is regular. Meyer, as has been shown, found the expansion to be irregular.

In the experiments of the latter, the iodine was almost instantaneously raised to a high temperature, in contact with another gas; in the former case, the iodine being introduced into the apparatus was slowly heated to the required temperature, and whilst under experiment was not in contact with another gas.

The differences in the results produced by such a different procedure in the case of destructive distillation is well known; the influence, too, of a foreign body in promoting the dissociation of complicated molecules or molecular groups is well illustrated by the interesting researches of Horstmann,§ on the vapour of acetic acid, in which he showed that although the vapour density of this substance, when heated alone, is only normal at a temperature considerably above its boiling point, the theoretical value may be obtained even at the temperature of a room, if the vapour be experimented upon when mixed with a considerable amount of air.

In order to satisfy themselves that oxygen or nitrogen has no special influence in promoting the dissociation of iodine, Professor Meyer and Herr C. Meyer took its vapour density in an atmosphere of hydrochloric acid, the result verifying the former observations, being 5·98 at a temperature of about 1570° C., instead of 5·83 calculated for $\frac{2}{3}$ I_2.

What the products of the dissociation of chlorine, bromine and iodine may be, we do not yet know; that a change has taken place similar to that in the sulphur molecule at different temperatures is scarcely probable, or proof of the heteromorphic nature of these substances would surely, ere now, have been found in some one of the many compounds containing them, whereas all those examined have been shown to contain (to take the case of chlorine) either 35·4 or a multiple of this number, and never a multiple of its part. We must therefore wait for a solution of this problem at the hands of those who, by their accuracy of thought and skill in experimental research, grace the science of chemistry with those discoveries to which it owes its very existence.

For convenience of reference, I here append a table of the substances whose formulæ have been considered in the foregoing report.

Cu_2Cl_2 .	$CdBr_2$	As_4O_6	P_2S_5	Hg
Fe_2Cl_6 .	...	Sb_4O_6	..	O_2
$InCl_3$.	...	...	...	N_2
Sn_2Cl_4*.	...	...	...	S_2
$ZnCl_2$.	...	...	...	Cl_2 (as free chlorine)
...	...	...	...	$\frac{2}{3}$ Cl_2 (*in statu nascendi*)
...	...	...	...	$\frac{2}{3}$ Br_2 " "
...	...	...	...	$\frac{2}{3}$ I_2 (as free iodine)

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the above held on March 24, Mr. F. W. Branson in the chair, a paper was read by Mr. W. Smart, on "The Growths and Functions of the Skin."

The author first described the anatomical structure of the skin, illustrating his remarks by reference to diagrams; then followed an explanation of its physiology and the functions of absorption and excretion, also the part played by it in the regulation of temperature. The sensibility of the skin relative to the estimation of weight and temperature under varied conditions was commented on. The origin, development, and structure of various skin modifications, as hair, nails, teeth, etc., were then considered, and the paper was concluded by an excellent exhibit of microscopic slides of the tactile corpuscles, sweat glands, etc.

After the discussion, a vote of thanks was proposed by Mr. Wallis, seconded by Mr. Lund, and carried unanimously.

The last paper of the session will be read on Wednesday next, April 21, by the President; subject, "Chalk: its Origin and Distribution."

Parliamentary and Law Proceedings.

The Use of a Perfumery Trade Mark.

In the Chancery Division of the High Court of Justice, April 9, 1880, before the Master of the Rolls, the case Rimmel *v.* Thompson came on for hearing. This was a motion by the plaintiff, the well-known perfumer, for an injunction to restrain the defendants, who trade under the name of "The Crown Perfumery Company," from

* *Deut. Chem. Ges. Ber.*, 13, 394.
† *Ibid.*, 399.
‡ *Ibid.*, 401.
§ *Ibid.*, 3, 78, and 11, 1278.

* Dr. Carnelly (*Deut. Chem. Ges. Ber.*, 12, 1836) considers that the density corresponding to the formula was obtained at a temperature too near the boiling point of stannous chloride.

using certain labels on perfumery and other articles sold by both parties, and being an imitation of labels used by the plaintiff. The labels used by the defendants were stated to be for the Brazilian market, and were, according to his Lordship's opinion, an improper imitation of those used by the plaintiff. The defendants now gave an undertaking not to use the eight labels complained of or any imitation thereof, and the costs of the motion were made costs in the action.—*The Times*.

Reviews.

Cooley's Cyclopædia of Practical Receipts and Collateral Information in the Arts, Manufactures, Professions and Trades, including Medicine, Pharmacy and Domestic Economy; designed as a Comprehensive Supplement to the Pharmacopœia and General Book of Reference for the Manufacturer, Tradesman, Amateur and Heads of Families. Sixth Edition. Revised and greatly enlarged by Richard V. Tuson, M.I.C., F.C.S., etc. London: J. and A. Churchill. 1880.

"Cooley" is a work well known to a large number of chemists and druggists, who are in the habit of consulting it in the thousand and one difficulties with which they meet in carrying on their business. Comprehensive as the rather long title is, in the original author's opinion it did not express completely the design of the work, and it must be admitted that it raises no expectations that are not fairly fulfilled. This opinion finds confirmation in the fact that Cooley's 'Cyclopædia' has now passed through five editions, and indeed were it not that in its sixth edition it comes to us in a much altered form a commendatory reference to so well established a favourite might seem superfluous.

The new edition has been issued in sixteen monthly parts, and now that it is completed it makes two thick volumes of 900 pages each, instead of one of 1200 pages. A considerable proportion of this increased size is due to the insertion of a number of fresh articles on medical subjects, notices of new additions to the materia medica, and several fresh wood cut illustrations. We notice also many new recipes and formulæ. The work is moreover brought well up to date in other subjects, such as electric lighting, liquefaction of gases, weights and measures legislation, etc.

The revision of such a work must have been a task of no slight dimensions, and it appears on the whole to have been admirably performed. But it must be confessed that a considerable number of errors have been overlooked. Thus in the Paris Society's formula for dialysed iron the specific gravity of the solution of ammonia to be used is given as 1·169. We mention this error particularly because, although not so stated, the paragraph in which it occurs appears to have been copied from this Journal (where a similar slip occurred and was the subject of a correction), and the mistake would probably not have been perpetuated had the rule which Mr. Cooley laid down for himself been followed,—"Secondary channels of information have been scarcely ever relied on when original authorities were within my reach." In another case where this Journal is quoted as the authority we have "Carnauba wax" uniformly turned into "Carnanba wax," an error for which we must decline any responsibility. Then in the list of "Eclectic Remedies," there are "Baptis*t*in," and "*In*glandin" (? "Juglandin"), and in the list of "Vapours" we find "Vapor Pini Plumilionis," "Vapor creosoti, B.P., and "Fir-woo*d* oil." In the article on "Mixtures, Arithmetic of," under *b*, a not very lucidly expressed rule is obscured by a wrong figure in the illustration. These errors are typical of others that occur, and are mentioned not because of their importance, but because they may easily be eliminated. They are only slight blemishes in a book that has no rival in the amount of information it contains which is specially applicable in the every-day business of the chemist and druggist.

The Society of Arts Artizan Reports on the Paris Universal Exhibition of 1878. London: Sampson Low, Marston, Searle and Rivington. 1879.

A few weeks before the opening of the last International Exhibition in Paris, a suggestion was made by the Prince of Wales to the Council of the Society of Arts that it should undertake the duty in co-operating with a Committee to be appointed from the members of the Royal Commission, of sending a number of selected artizans to Paris, with a view to the preparation by them of a series of reports on the articles representing their respective trades in the great building in the Champs de Mars. The suggestion was acceded to, and at the solicitation of the Committee that was formed the movement received active assistance from the municipal authorities and chambers of some of the larger towns, as well as of private firms, and eventually two hundred and eight artizans visited the Exhibition under the auspices of the Committee. The reports received from these delegates numbered one hundred and sixty-eight, and of these about forty have been printed at the expense of those by whom the reporters were sent. From the remainder a selection of about as many more has been made, to form the material of a bulky octavo volume, which has been issued under the editorial supervision of Mr. H. Trueman Wood, the secretary of the Society of Arts.

The branches of industry reported on in this volume are, pottery and glass, art workmanship, mechanical engineering, agriculture and horticulture, the building trades, cabinet work, watch and clock making, jewellery and optical instruments, printing, textile fabrics, leather and india rubber, and mining and metallurgy. It will be seen therefore, that the book contains nothing having a special bearing upon pharmacy, for only the barest mention of microscopes and spectroscopes occurs in the report on optical instruments. But notwithstanding this, and although marred here and there, as might be expected, by attempts at fine writing, crudeness of expression, and inopportune moralizing, the reports selected are important as the intelligent expression of the results of the observation of picked workmen upon the objects belonging to their respective crafts, and frequently, also, of the conditions under which they were produced. They will therefore be welcomed by all those who take an interest in the relative progress of the British artizan in his competition with the foreigner, whilst to many who enjoy a hobby, in glass, pottery, or other departments—as many pharmacists do—they will have a special value.

BOOKS, PAMPHLETS, ETC., RECEIVED.

The Calendar of the Pharmaceutical Society of Ireland. 1880. Dublin.

Pharmaceutische Chemie. Von F. A. Flückiger. Berlin: R. Gaertner. 1879. From the Publisher.

An Introduction to the Study of Chemistry. Specially designed for Medical and Pharmaceutical Students. By A. P. Luff, F.I.C., F.C.S., F.L.S., etc. London: J. and A. Churchill. 1880. From the Publishers.

Minutes of the General Medical Council, of the Executive Committee, and of the Branch Councils for England, Scotland and Ireland, for the Year 1879. Vol. XVI. London: Spottiswoode and Co. 1880. From the Registrar.

Potable Water. How to Form a Judgment on the Suitableness of Water for Drinking Purposes. By Charles Ekin, F.C.S. London: J. and A. Churchill. 1880. From the Publisher.

Obituary.

Notice has been received of the death of the following:—

On the 15th of December, 1879, Mr. Gavin Stiell, Pharmaceutical Chemist, Dunfermline. Aged 68 years. Mr. Stiell had been a Member of the Society since 1841, and for several years acted as its Local Secretary in Dunfermline.

On the 6th of March, 1880, Mr. John Page, Chemist and Druggist, Blackfriars Road. Aged 61 years. Mr. Page had been a Member of the Pharmaceutical Society since 1870.

On the 12th of March, 1880, Mr. Samuel Smith, Chemist and Druggist, Mabgate, Leeds. Aged 84 years.

On the 20th of March, 1880, Mr. George Rossiter, Chemist and Druggist, Tiverton. Aged 64 years.

On the 21st of March, 1880, Mr. William Smith, Pharmaceutical Chemist, Western Road, Brighton. Aged 51 years. Mr. Smith had been a Member of the Pharmaceutical Society since 1853.

On the 24th of March, 1880, Mr. Thomas Hall, Pharmaceutical Chemist, Westgate, Grantham. Aged 74 years. Mr. Hall had been a Member of the Pharmaceutical Society since 1849.

On the 31st of March, 1880, Mr. Robert Gibson, Chemist and Druggist, Soho, W. Aged 40 years.

On the 1st of April, 1880, Mr. Richard Hind Harburn, Chemist and Druggist, Bishop Auckland. Aged 48 years.

On the 8th of April, 1880, Mr. Jonathan Henry Adams, Pharmaceutical Chemist, Stoke-on-Trent. Aged 62 years. Mr. Adams had been a Member of the Pharmaceutical Society since 1853.

On the 11th of April, 1880, Mr. Thomas Hartley Pickup, Pharmaceutical Chemist, Blackburn. Aged 62 years. Mr. Pickup carried on business as a chemist and druggist in Preston upwards of forty years, and during that time took an active part in municipal affairs. He was elected an alderman, and in 1869 and again in 1870 he was chosen mayor, an office that he filled with great credit. In 1874 he was appointed on the commission of the peace for the borough. Mr. Pickup became a Member of the Pharmaceutical Society in 1845, and for many years served it as Local Secretary.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Sale of Patent Medicines containing Poison.

Sir,—I have read with much interest your paper upon this very important subject. I have had numerous private letters from town and country correspondents, some thankful and flattering, and others setting me right upon some trifling inaccuracy or omission which are unnecessary to allude to, as they are completely wide of the mark and object. From many remarks and letters, I find I am much misunderstood.

The objects in taking the course I did, and the letter I wrote, were two.

1. To show that the restrictions put upon chemists by section xvii of the Pharmacy Act of 1868 are inoperative, and worse than useless so long as the provisions of that section are rendered for all practical purposes null and void by section xvi, in dealing with patent medicines.

2. To show how injurious to general and domestic safety, and encouraging bad habits to the weary minded and wakeful, and leading to very serious consequences, disasters, and accidents of the most unfortunate kind,—the greatly reduced licence giving grocers and others every facility to scatter broadcast even to little children (!!) potent poisons, the nature of which they are utterly ignorant of.

In consequence of this absurdly ridiculous state of things, chemists and druggists are, in my experience, hampered, perplexed, and not unfrequently offend their best friends, and for bringing these points as I may say to the surface and public opinion, I am sadly abused by some. I trust my humble efforts may prove more than "a nine days' wonder."

Henry W. Hubbard,
L.R.C.P., Vice-President, St. Mary's Hospital.
26, *Elgin Road, Notting Hill, W.*

The Dispensing and Vending of Poisons by Corporations.

Sir,—I fail to see the advantage of adopting the suggestions of Mr. Tebbutt in a recent Journal. On the other hand, I think it is clearly the duty of the Society to appeal to the House of Lords, whatever it may cost.

If the Sale of Poisons and Pharmacy Act of 1868 will not bear its intentions scrutinizing any better than its wording, surely it is high time the question was definitely settled, and the Act amended to include corporations if the decision is against us.

I still believe that as corporations cannot be examined therefore they cannot be registered, and consequently cannot legally dispense or vend poisons.

Our present position *re* poisons is a very one-sided arrangement; the public get all the protection now, but can they reasonably expect qualified men to keep shops in small towns on such terms and prices as the stores do business at?

If the present state of affairs continues, and the stores increase their trade, there will not be enough business to support a chemist in scores of small towns throughout the country, and the public will have to go a long way to find a chemist.

The Irish Pharmacy Act (if I am not mistaken) prohibits the sale of poisons by corporations.

If our Act fails on being put to the test, the sooner all registered chemists are aware of the fact the better it will be for everybody concerned.

Judging by the recent decision, there is nothing to prevent any grocer, draper or hairdresser from turning his shop into a limited company, by distributing a few shares amongst his assistants, then engaging a registered chemist and conducting all branches of our business. But the question arises, if corporations are exempt, need they employ a qualified person at all?

No Surrender.

The Sale of Patent Medicines containing Poisons.

Sir,—Whilst the subject of the sale of poisons by unregistered persons is so freely discussed in your columns, I write to communicate an unusual application for poison which I received at the uncomfortable hour of 5 o'clock on Sunday morning last. On answering the night bell, a young man, respectably dressed, but of vacant appearance, applied for some laudanum to give his father, and on inquiring for what purpose, he said that his father was suffering mentally from a family trouble, and that he was then so violent they had to procure assistance to hold him in bed, and he thought if he gave him a good dose of laudanum to procure sleep, he would soon be well again. I inquired if he had had medical advice, and he replied in the negative, so, of course, I refused to supply him, and cautioned him not to give his father narcotics without medical authority. He left the shop and I have not since seen or heard of him, so do not know what steps he took, but probably on the morrow he was able through the protection of the patent medicine stamp to procure the laudanum from some grocery stores and dose his father (or himself) *ad libitum*.

I may add the young man was quite unknown to me, and did not live in the neighbourhood.

Leamington. Edward Thornton.

Sir,—Is not the time arrived when the Pharmaceutical Council may suitably combine with members of the medical profession in an attempt to obtain for registered chemists and druggists the exclusive sale of proprietary medicines, or at any rate of such as contain poisonous ingredients? The facility with which such poisonous substances as chlorodyne and solution of chloral can be obtained from grocers, hucksters, etc., should make it evident that such a course would be conducive to the safety of the public, and the present is an auspicious time for chemists to bring the subject prominently before the notice of their local representatives in Parliament.

It is an old adage that "new brooms sweep clean," and is it not likely that a new Parliament, with the pressure that individuals in each locality could put upon its members, would be able to pass such a measure as proposed? Would it not, then, be well if the Council, in view of such legislation, should instruct the Secretary in London to forward to the local secretaries a circular setting forth the objects which they seek in legislation, with a list of cases illustrative of the importance of such legislation in the interests of the public, and requesting them to bring the matter in such way as they may deem best before their local representatives in Parliament? Such a united effort might be crowned with success.

Scarborough. CHAS. FRYER.

Sir,—Please except me from the Hubbardian stigma, as no chloral solution has ever been supplied without medical authority by

GEORGE ADAMS, M.P.S.

Clarendon Road, Notting Hill.

Election of Council.

Sir,—The important privilege of electing fourteen members of Council now devolves upon the Pharmaceutical Society, and it is to be earnestly hoped that every elector will conscientiously and wisely discharge the duty of voting for those gentlemen whose knowledge, experience, and interests are such as to guarantee a faithful performance of the onerous duties attaching to the office.

There are now no burning questions at issue, although the competition arising from co-operative societies is such as to cause the deepest concern, and is doubtless felt as much by the well-to-do members of our Society as by those in humbler positions. Happily the question of counter practice is at rest, and it therefore seems a pity that a name should have been put in nomination which is liable to bring this subject to the front again, especially one which is likely to arouse the suspicion and distrust of the Society of Apothecaries, which is now friendly towards us. Surely Mr. Shepperley has the interests of his brethren sufficiently at heart to perceive on reflection that it is incumbent upon him to withdraw from the contest.

A MEMBER.

Volumetric Estimation of Alkaloids.

Sir,—As unfortunately I could not be present at the last evening meeting, to read my paper on the "Volumetric Estimation of Alkaloids," perhaps you will allow me space to reply to some of the remarks of Messrs. Luff and Moss.

Neither of these gentlemen can, I think, have carefully gone over the paper or they would have seen that in the formula $3\,(BiI_3)\,2\,(\bar{Q}HI)\,x\,(HI)$, the value of "$x$" cannot by any possibility affect the results, and that if known, the knowledge would be of no practical service whatever. All the double iodides examined were found to contain more or less HI, and their formulæ therefore could be expressed in the form—

$$a\,(BiI_3)\,b\,(\bar{Q}HI)\,c\,(HI)\,;$$

but as for my purpose it was only necessary to know the value $\frac{a}{b}$, the value of "c" in the special case was not determined but put as "x."

That such an exceedingly simple matter should have so excited the wonder of Mr. Moss, and have proved such a stumbling block to Mr. Luff, is certainly surprising.

Again Mr. Luff says he is *loth to suppose* that I employ a certain formula, simply because it is the only which agrees with my results. Surely when it is ascertained that a certain amount of quinine is precipitated by a certain quantity of bismuth, it follows as a consequence that the precipitate thus produced will contain the two in that proportion, and as in the cases referred to, 3 atoms of bismuth were found almost exactly to precipitate 2 molecules of quinia, the inference is that the double iodide contains $3\,(BiI_3)\,2\,(\bar{Q}HI)$. Since also in all the specimens examined the molecule had been found to contain more or less HI, it was most likely that this precipitate also contained it, hence the addition of x (HI).

From the nature of these precipitates their accurate gravimetric analysis is almost impossible, but as I have shown that in most cases their composition, so far as regards the ratio of the bismuth to the alkaloid, can be readily determined by synthetic methods.

The formula above given was therefore employed, simply because it agreed with the results, and undoubtedly expressed the proportion of quinine precipitated by any given quantity of bismuth in my volumetric solution. Of course the formulæ could have been dispensed with, and perhaps, from a practical point of view, it would have been better to have avoided their use; but it will at once be evident to anyone that the formulæ for the quinine precipitate so closely corresponds to the results calculated from, say the three first experiments, from which the "titre" might have been standardized, that it is a matter of indifference in which manner the results of the other quinine determinations are calculated.

The formulæ of all the alkaloids were taken from the 'Pharmacographia' (first edition), and accepting the formula for aconitia given by Dr. Wright and quoted by Mr. Luff, the formula for the bismuth and aconitia iodide will be incorrect. This, however, does not affect the fact that in both the experiments 1 c.c. of "titre" precipitated 10 milligrammes of alkaloid.

With regard to the error in this case being in the third decimal place, Mr. Luff must know that by such an expression chemists understand the error to be between ·001 and ·009 per cent., whereas the difference (or error) between the amount of alkaloid precipitated, as determined by experiment, and the theoretical amount calculated from the formula is 2· per cent. Had I elected to express the quantities in kilograms, according to Mr. Luff the error would then have been in the sixth (!) decimal place.

Should time allow I should like to follow out the suggestion of Mr. Moss, and "evolve a process which would enable them to determine the quantity of alkaloids in all kinds of vegetable solutions and infusions," but since many substances interfere with the reaction, special methods would have to be devised to remove such substances from the infusions. It would also be necessary to know what alkaloid was present, and what quantity of it corresponds to 1 c.c. of the "titre."

The method given for aconite and belladonna roots may prove to be applicable in many instances, and some of the experiments alluded to are part of a series which I am conducting to ascertain whether such is the case or not.

Buxton. JOHN C. THRESH.

Poisonous Violet Powder.

Sir,—A poison is usually defined as a substance capable of destroying life when taken into the system either by the mouth or by absorption, and that in small quantity. I think this definition covers most of the ground of a debatable point; but the term "small quantity" does not always hold good. In the case of violet powder in which calcium sulphate enters into its composition, it is questionable how far the term "poisonous" is correct. I am inclined to think it is a misnomer.

When arsenious acid is added, either by mistake or to increase the weight of violet powder, the whole aspect is changed, and the word "poisonous" then possesses its full and true meaning. That such "violet powder" was sold it is now useless to deny, because one sample contained the enormous proportion of 38·5 per cent. of arsenious acid.

It would be idle to characterize such gross carelessness in manufacturing as other than akin to a criminal offence, and a most disreputable trade proceeding. The hackneyed word "mistake" is no excuse.

I am unwilling to blame any person in particular as to the continued manufacture of spurious violet powder by wholesale dealers; but, I add most emphatically, that if Professor Redwood and others, in 1878, had not by their opinions expressed, and absolutely advocated, that selenite powder was good, useful, and even better than pure starch as a dusting powder for infants, we would long ere this have had the question settled. It is now revived, and I ask the advocates of the selenite powder to give an explanation of the cause of death of the child in Mrs. Marshall's care, other than that testified to at the inquest, lately held by Mr. Payne. The violet powder was purchased from a druggist in Waterloo Road; after using it for a day or two great irritation ensued. The child died, and it was the opinion of the medical man in attendance that blood poisoning caused the infant to succumb. The blood poisoning was the result of great local skin irritation, induced by the application of selenite violet powder.

Here the facts end, and it is now for the advocates of adulterated violet powder, and Professor Redwood in particular, to make good their position as to the innocuous nature of selenite of the kind and quality used in the manufacture of the Waterloo Road poisonous dust for infants.

I know it has been said that in the case of ordinary starch powder irritation has been set up.

Not in the hands of a good and clean nurse, be it observed, but only in those cases where fermentative changes have been induced by inattention to cleanliness. I think the small amount of perfume in most powders is wholly inadequate to cause excoriation or blistering of the skin, but I can well understand Professor Redwood's harmless selenite lighting up all kinds of skin mischief, if once chafing has taken place.

If there is a doubt about the matter, and I think there is not a thread to hang from, why do chemists sell, or put up, the selenite rubbish? Surely the price of violet powder is quite equal to the cost of its manufacture when made from pure starchy matters without adding selenite. The finest builders' alabaster may be obtained for 30*s.* a ton, but pure precipitated calcium sulphate costs 3*s.* a pound, and it is evident that common selenite is used instead of starch wholly on account of its cheapness. Why then, do chemists permit a fraud to be practised, first upon themselves, and then to be the means of perpetrating it upon their customers? In every aspect of the case the whole proceeding is wrong, very mischievous, and fraudulent.

It is a question which does not admit of unbiassed discussion, because wherever fraud is practised or intended, all men of honour should wash their hands clean from such chicanery, and not support, even for trade interest, that which is wrong and decidedly unjust. I therefore say that every chemist throughout the length and breadth of the land should no longer deal in spurious violet powder, and the public should insist upon genuine nursery powder made from starch. I hope this letter may be the means of once more causing an awakening upon a subject which has been tampered with by leaders of the pharmaceutical body, and their apathy towards, or advocacy of, a system of sophistication has caused countless misery to infants, and I close by asserting, in direct opposition to Professor Redwood's opinion, that his statement in regard to the usefulness of selenite compared with starch has no foundation in fact, and let us hope every man who cares for the comfort of our infant population will denounce in unmeasured terms all sophisticated violet powders. I leave other matters concerning the topic in hand for a future occasion, and await replies.

Northallerton. HENRY BROWN.

NOTE ON A RARE FORM OF COLCHICUM AUTUMNALE, L.

Sir,—In the article last published for "The Month" the remark is made that "the botanist, in his early perambulations, may even now expect to find a few medicinal plants awaiting him." To those there mentioned I will add *Colchicum autumnale* as now to be found in full bloom!

The specific names of many of our common plants are in more or less distinct relation to their habits, character or uses, and there is little doubt that colchicum was christened "autumnale" in recognition of its conspicuous appearance at a season when little floral beauty remains to be seen. One feels almost inclined to carp at the paradoxical freak of Nature, which has induced a plant so truly autumnal to put forth flowers in early spring, but the occurrence is so rare that, in the present threshed-out condition of British botany, it is with a feeling of gratitude for the presentation of an object so interesting that we proceed to examine and record it.

On the 15th of March I was rambling a few miles from home, and endeavoured to shorten my return by taking a cut across some country which had not previously been explored. Having surmounted a few obstacles, I entered a large pasture and welcomed the appearance of a great quantity of daffodils, whose bright golden flowers enliven too few of our British fields. Welcome, indeed, they are

"That come before the swallow dares, and take
The winds of March with beauty."

Here and there among the herbage, scarcely raised above the soil, was dotted a pale pink blossom, like a little crocus. This was soon recognized to be the flower of colchicum, by some accident appearing in the spring.

The structure and growth of this singular plant in its normal condition have often been described and commented on. In the spring-flowering form the corm is large, plump, and in the same condition in which we usually find it in October. The perianth tube is radical, perianth small, with narrow segments, pale and "washed out" in point of colour. Stamens imperfect, the anthers shrivelled, and not containing pollen. I find no mention of this form in any record to which I have access, and one of the most distinguished of our botanists tells me he has never met with it. In Sir J. Smith's 'English Botany,' vol. 20, tab. 1433, there is a figure of a monstrous colchicum, found in Wiltshire nearly a century ago, which bore an abortive, misshapen flower in the position normally occupied by the fruit. That is quite a distinct plant. It is referred to by Pereira, Hooker and Arnott, and others.

My supposition is that this spring-flowering form will not prove to be a permanent variety. I think it probable that the young corms were seriously impeded in their development by the unusually wet and cold summer of last year, and that many of them therefore were not prepared to flower before the first frosts of winter compelled them to postpone the effort.

It may not unjustly increase the indictment of offences already preferred against 1879, if we add to it that of having utterly upset the equilibrium of plant-life in the common colchicum.

Clifton. JAS. W. WHITE.

A.G.—(1) The process given by Gmelin for preparing oleate of zinc is to precipitate it from sulphate of zinc by a boiling solution of oleate of potash. (2) Professor Clay's prescription was—"Chian turpentine, six grains; flowers of sulphur, four grains; to be made into two pills to be taken every four hours.

"*Melanion.*"—(I) The subject is not a recent addition. (2) No doubt the candidate would be expected to "work out sums."

"*Inquisitor.*"—We cannot advise you, in the direction you require. The only advice we can give you is that you study the subjects of examination carefully, and that when you meet with difficulties you should consult some older member of the trade, who may be acquainted with your circumstances, as to the best way of overcoming them.

G. B. O. R. (who should have sent his name and address).—Fox's lungs is a term applied to syrup of poppies in some districts.

W. H. R.—Possibly the cautious use of a depilatory might effect the required result, but we do not think the subject is one that can be properly advised on in these columns.

A. Y. Z. should apply to the Secretary, 17, Bloomsbury Square.

B. M. Stoakes.—Possibly a powder of the so-called "Australian fever bark" (*Alstonia scholaris*).

R. W. Hogg.—See a paper by Mr. Siebold on "Urinary Examination," in vol. iv. of the present series of this Journal, p. 249.

Scilla, Hirwain.—Systematic botany is treated of incidentally in the work mentioned, but the principal subject is physiological botany.

A. J. S.—See a paper on "Some Preparations of Coca" in vol. v., p. 483, of the present series of this Journal; also vol. vii., p. 1064.

"*Junior.*"—See Dr. Tidy's paper read before the Chemical Society, in December, 1878 (*Pharm. Journ.* [3], ix., p. 501).

M. P. S., Lytham.—See under the respective metals in Watts's 'Dictionary' or Gmelin's 'Chemistry.'

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Mackay, Haydon, Taylor, Postans, Macaulay, Modlen.

EXPERIMENTS ON TARAXACUM ROOT.*

BY J. B. BARNES, F.C.S.

Dr. Symes's able paper on taraxacum, read at the November meeting last year, has been the means of directing my attention to this subject.

Whatever doubts may exist as to the medicinal value of taraxacum, I think as long as its preparations have a place in the Pharmacopœia it is desirable to endeavour to improve them. I have, therefore, made some experiments with this object in view, and hope that further discussion may result in some advance being made.

I quite agree with Dr. Symes that the activity of the succus cannot be very great; the extract, although it does contain inulin, is, notwithstanding, when prepared in accordance with the directions of the Pharmacopœia, a more concentrated preparation; but now that we have the resin of podophyllin, euonymin, etc., in competition with this popular drug it is desirable to have a still more concentrated preparation than those now in use.

Experiment No. 1.—In order to exclude inulin (which in the autumn is so very abundant and necessary to the development of the plant, gives considerable trouble, and causes much waste in preparing the succus, and is not completely separated from the extract), clean fresh taraxacum root in thin slices, with the milky juice exuding, was covered with rectified spirit for two hours, strained and washed with more spirit, and the clear liquor evaporated over a water-bath to dryness, the result being a bright canary-coloured hygroscopic powder possessing an intensely bitter taste and perfectly soluble in water.

Experiment No. 2.—The above preliminary operation being wasteful of spirit, one pound of clean fresh thinly-sliced root was macerated with an equal weight of spirit of wine for two days, the liquid poured off, the marc pressed and the product filtered, the spirit recovered by distillation, and the solution evaporated over a water-bath to the consistence of an extract, which is bitter and of a light brown colour. The quantity obtained was one ounce and a half.

Experiment No. 3.—The above operations were repeated, three pounds of another sample of fresh root being now employed, but the evaporation was continued to dryness and the product powdered, the result being a yellowish hygroscopic powder, a sample of which is on the table. It possesses a bitter taste, but not so intense as that obtained in experiment No. 1, the pressure having extracted a something, probably sugar, and other matters in addition. A small quantity of inulin was pressed out, which, however, was readily separated by filtration; the quantity of dry extract obtained was three ounces and a quarter.

Experiment No. 4.—One pound of the fresh thinly sliced root was macerated in distilled water for twelve hours, thrown on a filter, washed with water and the liquid evaporated over a water-bath; a dark brown extract possessing a sweet taste was obtained.

Experiment No. 5.—Half a pound of dried taraxacum root, reduced to powder, was macerated for twelve hours in half a pound of rectified spirit and percolated with a further portion of spirit. After distilling off the spirit an oily looking substance was observed floating upon the surface of the liquid. It was separated by filtration and dissolved in ether; the latter having evaporated, there remained a semi-solid, tasteless, greenish, oily substance. The liquid extract upon further evaporation yielded a golden-coloured, bitter, solid extract, so very hygroscopic as to defy my efforts to reduce it to powder.

In all these experiments upon taraxacum root with spirit, albumen and inulin are necessarily separated; it is clear that No. 1 gives the best result, presuming bitterness and brilliancy of colour to be the standard of efficiency.

Commercially, Nos. 2 and 3 show the most satisfactory result, the waste of spirit being reduced almost to nil and the yield satisfactory.

No. 4 shows that cold water does not separate the bitter principle of taraxacum. These results are so clear that there does not appear to me any difficulty in arriving at the conclusion, that an alcoholic extract of taraxacum root is superior to the extract of the Pharmacopœia.

A tincture made by percolating the dried root with rectified spirit, so as to obtain it of the strength of one in two, would I think be an improvement on the preserved juice; it resembles tincture of nux vomica in colour and has a very bitter taste.

When water is added to this tincture it becomes opaque, and after the addition of dilute hydrochloric acid, in a few hours a pale brown precipitate soluble in ether, chloroform, and petroleum spirit is formed, upon the evaporation of which there remains the greenish oily substance above described.

[*The discussion on this paper is printed at p.* 860].

* Read at an Evening Meeting of the Pharmaceutical Society, April 21, 1880.

THE COMPOSITION OF TONGA: A REPUTED REMEDY FOR NEURALGIA.*

BY A. W. GERRARD, F.C.S.

A paper was published in the *Lancet* of March the 6th of this year, by Professors Sydney Ringer and William Murrell, giving details of the use of tonga in eight cases of neuralgia, six of which were promptly cured, one was much improved, and in the other a week's trial of the remedy failed. The drug was brought to Professor Ringer by a gentleman residing in Fiji, named Mr. Ryder, with the following account: "It has been used several years by the aborigines of the Fiji Islands, and a European, who married a chief's daughter, learnt the secret from his father-in-law, in whose family the knowledge of the composition of this remedy had been an heirloom for upwards of two hundred years." Mr. Ryder described the drug as a mixture, and knew nothing of its botany, and the name tonga, I am informed, was invented by himself, the drug previously bearing the name "Neuralgia Medicine."

Tonga, as first placed in my hands, consisted of small loose bundles about the size of a small Florence flask, containing in the interior a mixture of bark, leaf and woody fibre; the outer covering or wrapper consisted of the inner bark of the cocoa-nut tree; the following instructions were given for its use:

"The bundle, without being unfastened, to be steeped in half a tumbler of cold water for ten minutes; then squeeze the liquid from the bundle back again into the tumbler, and take a claret-glass of the infusion three times a day about half-an-hour before each meal; dry the bundle and hang it up in a dry place to prevent its getting mouldy; it will

* Read at an Evening Meeting of the Pharmaceutical Society, April 21, 1880.

answer for twelve months. Hot drinks and exposure to cold winds should be avoided whilst taking the medicine."

Mr. Ryder and his friends have tried the remedy extensively, and found it very successful, curing by the second or third day. It has also been used in Sydney with much success.

A supply of about eight pounds of the drug was placed in my hands by Professor Ringer; it had been removed from its envelope of cocoa-nut tree fibre. The drug, upon separation into its various parts, was found to consist of about an eighth per cent. leaf, two per cent. fibre, and the remainder portion bark. These proportions are not constant, on account of the rough mode of preparation.* The leaf is cut or broken into small pieces which precludes a description of its form; its colour is deep green; taste slightly bitter and astringent. The fibrous portion is of loose structure chopped into irregular lengths, varying from one half to two inches, and torn into shreds. No bark is attached, and there is nothing I can find in its structure to indicate with certainty whether it is root or stem. Its colour is dull greyish-brown, odour peculiar, and may be termed urinous, and taste of the same kind. The bark is found in irregular-sized pieces, much broken and partly in coarse powder, the majority of pieces consisting of inner bark rarely beyond a line in thickness; its colour is not uniform, but varies from pale brown to purplish-black; many pieces are brownish-yellow, due, I think, to undetached portions of outer bark; its taste is slightly sweet and astringent.

Examination of Bark.—Sixty grammes of bark in fine powder was divided into six parts, and treated respectively to exhaustion with hot benzole, benzine, ether, chloroform, alcohol, and water; the resulting solutions were allowed to spontaneously evaporate, except those of alcohol and water, which were evaporated over a water-bath. The benzole, ether, and chloroform gave no residues worthy of examination; benzine gave a slight residue, consisting of an essential oil and a pale, fat-like substance. The amount being small, they were not further examined.

Alcohol yielded an extract of pale brown colour, sweet and slightly astringent taste, and mostly soluble in water. The filtered watery solution of this extract, when tested for alkaloid, gave negative results, but readily reduced when warmed the alkaline cupric tartrate. The bulk of this alcoholic extract was dissolved in water, and treated to excess with basic lead acetate, filtered and excess of lead removed with H_2S, filtered from lead sulphide and evaporated, when a pale yellow tenacious residue was obtained, which by its chemical reactions I identified as glucose.

The watery extract of the bark was examined, and during evaporation became pectinous. A portion treated with alkaloidal reagents gave negative results, but, like the alcoholic extract, readily reduced alkaline cupric tartrate; and further examination proved that, excepting the pectin, the watery extract does not differ essentially from that prepared by alcohol.

Examination of Fibre.—The fibre portion of tonga being, unfortunately, very small in quantity, I have been obliged to limit myself to work upon ten grammes. Five grammes were exhausted with water, and the infusion, upon concentration and addition of the necessary reagents, gave strong evidence of the presence of an alkaloid. The semi-fluid aqueous extract, now treated with excess of alcohol, almost entirely passed into solution and, upon evaporation of the alcohol was deposited as a brown crystalline residue of a deliquescent character; the crystals, upon examination, proved to be mainly chloride of potassium commingled with an alkaloid salt. The potash salt was removed by treatment with tartaric acid and alcohol, and the filtered alcoholic solution when evaporated left a pasty crystalline mass of an alkaloid salt, having the following reactions:—Moderately strong solutions gave white precipitates with potash, soda, and ammonia, hydrates and carbonates, also with mercuric chloride, tannic acid, potash mercuric iodide, phosphomolybdate of soda and nitric acid; with potash bismuth iodide it gave a red precipitate; strong sulphuric acid changed it brown, evolving an odour of hawthorn flowers. When the solution is treated with caustic alkalies, the alkaloid is evolved, bluing red litmus paper; the odour of the vapour is peculiar, and suggestive of decomposed potatoes. The vapour passed into dilute nitric acid gave a solution having the above alkaloid reactions. The remaining five grammes of fibre was worked out with alcohol, and yielded results parallel to the above.

The leafy portion of tonga being only a fractional percentage and its separation tedious, I did not consider it worthy of examination, neither do I think it takes any part in the action of the drug.

To summarize: the preceding results show that the drug called tonga is composed mainly of a mixture of fibrous material, probably a root, and the inner bark of plants, the botanical sources of which are unknown; the main constituents of the bark being pectin, glucose, a little essential oil, and fat; the fibre containing a volatile alkaloid, which is probably the active principle, and may for the present be named tongine, also some chloride of potassium.

I trust we may soon command botanical specimens and larger supplies of this interesting drug, and be able to substantiate the reputation it bears, and prove it a valuable addition to our materia medica.

[*The discussion on this paper is printed at p.* 861].

* Since writing the above, Messrs. Allen and Hanbury have kindly placed at my disposal further samples of tonga, one of which is without leaf, and in which the fibrous portion consists of compact transverse sections broken longitudinally—additional evidence of its want of uniformity.

THE ACTION OF POTASSIUM CHLORATE ON FERROUS IODIDE.*

BY R. H. PARKER.

When a solution of potassium chlorate is mixed with syrup of iodide of iron, a nearly colourless solution is obtained, which on standing a few hours acquires a reddish-brown colour and an evident odour of iodine. This change is followed by the subsidence of a red precipitate and deeper colour of the supernatant liquid; in a few days the solution becomes supersaturated with iodine and crystals of this element are deposited. Sodium chlorate produces a similar decomposition.

As far as I have been able to search, recorded information fails to give a satisfactory explanation of the reaction; the following attempt was, therefore, made to solve the problem.

A number of experiments were started simultaneously as follows:—Varying quantities of potassium

* Read at an Evening Meeting of the Pharmaceutical Society, April 21, 1880.

chlorate (0·2 to 2·0 grams) were mixed with 10 c.c. of syrup of ferrous iodide diluted with 30 c.c. of water and allowed to stand at ordinary temperatures; some of the bottles were completely filled in order to exclude atmospheric air, and the contents of one were heated nearly to boiling as soon as prepared.

After standing for a period of from four to six weeks the supernatant liquid, treated with slight excess of sodium thiosulphate (hyposulphite) to remove iodine, failed to give any blue colour with ferro or ferridcyanide of potassium, indicating complete precipitation of iron.

Assuming that the sugar present exerted a retarding influence on the reaction, a similar series of experiments was conducted on an aqueous solution of ferrous iodide. This method did not appear to expedite the process; the saccharine solution was, therefore, again resorted to.

It was observed that the liberation of iodine was more rapid in presence of increased proportion of chlorate, but that the rate of decomposition was most accelerated by heat, while in all cases the total amount of iodine set free was approximately the same. The iron remaining in solution during the gradual precipitation continued entirely in the ferrous condition, while the precipitate at all stages of the process, washed and disolved in dilute hydrochloric acid, consisted entirely of a ferric compound. This precipitate was carefully examined for acidulous radicals by boiling it, after washing, in a strong solution of pure potassium hydrate and accurately neutralizing the diluted filtrate with nitric acid. The solution so obtained gave no precipitate with argentic nitrate, proving the compound was not basic chloride or iodide. Another portion mixed with potassium iodide and starch solution gave no immediate blue colour with a dilute acid; the absence of iodate was thereby demonstrated. The precipitate is, therefore, ferric hydrate or hydrated oxide. It was found that the addition of sodium thiosulphate at the commencement of the reaction, so as to absorb the free iodine as soon as liberated, rendered the precipitate much more manageable; in fact, without this modification it was impossible to collect the whole of the precipitate for quantitative examination. Assuming that the body produced in this way was identical with that thrown down in the absence of thiosulphate, its study was resumed with this method of preparation.

The physical characters of this iron compound seem to indicate that it is ferric oxide, with probably not more than one molecule of water. Its colour is bright red, it is very dense, its bulk is not materially diminished by desiccation, and its tint and pulverulent character are preserved even after ignition. On the other hand, ferric hydrate is dull reddish-brown, very bulky, shrinks much on drying and when ignited, assumes the form of hard fragments of dark steel-grey colour.

The potassium chlorate being the probable source of the oxygen required for the conversion of the iron from the ferrous to the ferric condition, the formation of potassium chloride was expected. The filtrate after precipitating the iron and removing the iodine by ebullition, gave abundant evidence of the presence of a chloride.

From the qualitative evidence thus obtained, the reaction would appear to be in accordance with the following equation:—

$$2FeI_2 + KClO_3 + H_2O = Fe_2O_3,H_2O + 2I_2 + KCl.$$

It now remained to prove the accuracy of this theory by quantitative estimation.

In the presence of large excess of chlorate the reaction was found to be complete after a few minutes' boiling. Two parallel estimations were conducted by boiling 10 c.c. of the B.P. syrup with 2·0 grams $KClO_3$ and 60 c.c. v.s. thiosulphate. In the first case the precipitate was washed, dried at 105° C., weighed, ignited and again weighed. In the second case the precipitate was washed, dissolved by heating with HCl and a little HNO_3, precipitated by excess of AmHO, washed, dried at 105° C., weighed, ignited and again weighed.

		Weight at 105°	Weight after ignition	Ratio
1	10 c.c. syrup	0·2260	0·2012	1 : 0·890
2	10 c.c. „	0·2292	0·2031	1 : 0·887

These results corroborate the qualitative evidence of the absence of acidulous radicals in the precipitated iron compound; the ratio of its weight at 105° C. to that after ignition indicates that it contains at least one molecule of water, the ratio of Fe_2O_3,H_2O to Fe_2O_3 being 1 : ·898.

The very close approximation of the amounts of ferric oxide and free iodine obtained to the actual amounts operated on are detailed in the subsequent note on the estimation of the syrup, and eliminated the necessity of searching for iodine in state of combination.

The amount of KCl produced now remained for investigation. An attempt was made to find the minimum amount of chlorate required to completely decompose a given quantity of iodide. This could not be arrived at definitely, because with only small quantities of chlorate such protracted boiling was required to complete the decomposition; thus, according to the equation, 10 c.c. of B.P. syrup should require ·1545 $KClO_3$. For complete precipitation—

10 c.c. syrup + 2·0 $KClO_3$ required 3 minutes' boiling.
10 c.c. „ 1·0 „ „ 10 „ „
10 c.c. „ ·5 „ „ 30 „ „
10 c.c. „ ·2 „ not complete after 40 minutes' boiling.

The syrup was in each case diluted, and an excess of sodium thiosulphate added.

The next method adopted was to use a large excess of chlorate, boil off most of the iodine, make up to a known volume, filter and titrate one portion for free iodine with v.s. $Na_2S_2O_3$, and another for total iodine and chlorine with v.s. $AgNO_3$.

This method did not give correct results, because the filtrate appears to contain an iodide, which would of course be calculated as a chloride.

As yet, therefore, the amount of KCl produced is an open question, but is still under investigation.

It is doubtless superfluous to point out the importance of physicians bearing this reaction in mind, but the fact of having seen potassium chlorate prescribed in combination with syrup of iodide of iron is perhaps an adequate apology for so doing.

[*The discussion on this paper is printed at p. 861*].

THE QUANTITATIVE ESTIMATION OF SYRUP OF IODIDE OF IRON.*

BY R. H. PARKER.

The study of the reaction detailed in the foregoing note suggested its application as a method for esti-

* Read at an Evening Meeting of the Pharmaceutical Society, April 21, 1880.

mating syrup of iodide of iron. The ordinary volumetric and gravimetric processes for determining the amount of iron present are rendered more or less inconvenient or entirely inapplicable by the presence of sugar. The British Pharmacopœia does not mention its quantitative analysis, but, tacitly assuming that no loss occurs during its preparation, says "it contains 4·3 grains of iodide of iron in 1 fluid drachm," which is a theoretical deduction from the amount of iodine taken and the volume of syrup produced.

Numerous attempts were made to obtain a solution or syrup of iodide of iron of known strength by using definite quantities of iodine, but with all precautions some loss was incurred from decomposition of the iodide. Syrups carefully prepared by the author and commercial samples were therefore used to test the value of contemplated processes.

In order to save time, definite quantities of syrup were apportioned by diluting one volume to four with water and measuring the resulting solution with a bulb pipette. The dilution reduced to a minimum the adhesion of the liquid to the surface of the pipette, and this method was found almost as accurate as the more tedious one of making two weighings for each quantity taken, and determining the sp. gr. of each sample examined.

The first idea followed was to render the process directly volumetric, by boiling a known quantity of syrup with $KClO_3$ and a known excess of volumetric solution of thiosulphate, estimating the amount of the latter used up by titrating the filtrate with vol. sol. iodine, and from this result calculating the quantity of iodide of iron present, thus—

Take 20 c.c. diluted syrup (1 in 4), 1·0 gram $KClO_3$ and 30 c.c. v.s. thiosulphate, boil gently for five minutes, cool, make up to 50 c.c. with water, filter and titrate 20 c.c. of filtrate with v.s. iodine, checking the result with another 20 c.c. filtrate.

The amount of iodine absorbed by the filtrate does not indicate the exact amount of thiosulphate undecomposed, and consequently the amount of iodine liberated by the chlorate cannot be precisely ascertained. This follows from the fact that tetrathionate of sodium (produced by the action of iodine on sodium thiosulphate $2Na_2S_2O_3 + I_2 = Na_2S_4O_6 + 2NaI$) is decomposed* by ebullition according to the following equation :—

$$Na_2S_4O_6 = Na_2SO_4 + SO_2 + S_2.$$

Still, it was hoped that the decomposition would prove sufficiently definite to enable the actual amount of iodine liberated from the syrup to be calculated from the results obtained by this process.

Concordant results in estimations by this process were only obtained by scrupulously observing the same conditions in each case. Discrepancies were found to result from the presence of different quantities of chlorate and thiosulphate, also from varying periods of ebullition.

A careful study of the decomposition of the tetrathionate during ebullition was made by boiling together definite quantities of v.s. iodine and v.s. thiosulphate under all the conditions found to give discrepant results, each point being attacked by a series of experiments conducted *cæteris paribus*.

The results obtained were calculated into a percentage of error upon the quantity of iodine taken, as indicated by the final titration with v.s. iodine. The experiments, which are much too lengthy to produce here in detail, established the following conclusions :—

In somewhat concentrated solutions, containing excess of thiosulphate, the evolution of SO_2 and precipitation of sulphur commence with boiling heat.

In dilute solutions, *e.g.*, a mixture of the volumetric solutions, especially when only slight excess of thiosulphate is present, ebullition may be continued for five, or even ten minutes, without the appearance of sulphur or odour of SO_2; longer ebullition gave evidence of the change.

When the thiosulphate is very nearly adjusted to the amount of free iodine taken, the error from five minutes' boiling is very slight. The presence of a considerable excess of thiosulphate gives a result indicating a large error of deficiency, which is increased by continued ebullition. The presence of potassium chlorate and the iron precipitate exert an influence in the opposite direction, the calculation indicating a larger quantity of iodine than the amount taken. These bodies would favour the evolution of SO_2; but their influence beyond that does not seem quite clear, for thiosulphate alone is not decomposed by a few minutes' ebullition with $KClO_3$ and Fe_2O_3,H_2O.

By the light of these conclusions we are prepared to find that the application of the direct volumetric process to syrup of iodide of iron gives unreliable results; but that if several estimations are made, each time reducing the amount of thiosulphate used until an insufficiency is indicated by the appearance of iodine in the vapour after five minutes' boiling (wet starch paper being turned blue in the steam) a tolerably close approximation to the actual amount of iodide of iron present may be obtained, as indicated by the results detailed at the end of this paper.

This process being not altogether satisfactory, another method was devised, viz., the separate determinations of iron and iodine, collecting the former and weighing as Fe_2O_3, distilling the latter into solution of KI, and titrating with v.s. thiosulphate. This method gave exceedingly good results, and was finally adopted as follows :—

Estimation of Iron.—Into a 200 c.c. flask put 2·0 grams $KClO_3$, 60 c.c. v.s. thiosulphate, and 40 c.c. diluted syrup (=10 c.c.), boil gently for five or ten minutes, pass while hot through a very fine filter, rinse the flask and filter once with boiling water, wash the precipitate from the filter into the flask, dissolve it by heating with dilute HCl, precipitate with excess of AmHO, wash the precipitate, dry, ignite, and weigh as Fe_2O_3.

Estimation of Iodine.—Deliver 20 c.c. diluted syrup into a plain glass retort containing 2·0 grams $KClO_3$. The neck of the retort should pass quite to the bottom of a flask containing about 2·0 grams KI and enough water just to cover the end of the retort; the flask must be immersed in a jar of cold water. Distil until nearly all the iodine has passed over, change the flask and water surrounding it, and continue the process until the distillate passes over colourless. Mix the distillates, and titrate with v.s. thiosulphate.

In order to form an idea of the extent of loss incurred by this iodine estimation, several trials were made by distilling 40 c.c. v.s. iodine, and titrating the distillate, with the following results :—

* Gmelin's 'Chemistry,' vol. iii., p. 99.

39·86 c.c., 39·43 c.c., and 39·5 c.c., or a loss per cent. of 0·35, 1·42 and 1·25 respectively.

The results of the examination of various samples of syrup of iodide of iron are tabulated below.

No. 1. Prepared by the author; particular attention was paid to the weight of sugar taken and the final weight of the syrup. The solution of FeI_2 was heated for five or ten minutes after the froth became white; the flask and filter were washed as completely as the small quantity of water permitted. The product was light straw coloured, sp. gr. 1·398, and crystallized slightly on keeping.

No. 2. Prepared by the author; the solution of FeI_2 was filtered as soon as the froth became white. This was done in order to see whether much loss of iron resulted from ten minutes' subsequent heating. The product contained a trace of iodine.

No. 3. Commercial sample of syrup prepared by adding a liquor ferri iodidi to simple syrup. It was perfecly colourless, sp. gr. 1·374. The estimation of the iron in this case presented a difficulty not encountered in examining any of the syrups prepared by the B.P. process. The iron when first precipitated was in an extremely fine state of division and passed through the closest filter paper. By repeatedly returning the filtrate to the filter until it passed quite bright, the whole of the iron was at last collected, dissolved and the process completed in the usual way.

No. 4. A commercial sample prepared by the B.P. process. Light straw coloured.

No. 5. A commercial sample prepared by the B.P. process and exposed to light until very nearly colourless, sp. gr. 1·380.

The table indicates the results obtained, using in each case 10 c.c. of syrup (*i.e.*, 40 c.c. diluted syrup).

	Fe_2O_3.	I_2.	I_2 Theory from Fe found.	Error I_2 per cent. from Fe found.	Deficit per cent. of Iron.
1.	0·2031	0·6519	0·6411	1·7 +	1·1
2.	0·1993	0·6273	0·6328	0·87 −	3·0
3.	0·1897	0·5592	0·6023	7·0 −	7·6
4.	0·1800	0·5680	0·5715	0·6 −	12·4
5.	0·1770	0·5562	0·5620	1·0 −	13·8
6.	0·1876	0·5702	0·5956	4·2 −	8·7
7.	0·1768	0·5525	0·5614	1·5 −	13·9
8.	0·1757	0·5469	0·5579	1·9	14·5
9.	0·1838	0·5659	0·5836	3·0	10·5
10.	0·0628	0·1758	0·1994	11·8	69·4
11.	0·2016	0·6358	0·6401	0·65	1·9
Theory B.P.	0·2055	0·6444			

It will be observed that the amounts of Fe_2O_3 and I_2 obtained in No. 1 approach very nearly the B.P. theory, but the iodine is *above* what theory demands from the Fe_2O_3 found. No. 5 is very deficient in strength; probably long exposure to light causes loss of iron; but what becomes of it is not evident, since the bottle contained no deposit.

The apparently anomalous error of iodine in No. 3 was checked by another sample (No. 6) obtained from the same source, and prepared in the same manner. This deficiency in available iodine indicates that the syrup made with a "liquor" differs materially from those prepared by the B.P. process; the physical difference in the Fe_2O_3, H_2O already referred to, points to the same conclusion.

In the earlier stages of the investigation, while endeavouring to obtain a solution of iodide of iron of known strength by adding excess of reduced iron to v.s. iodine, it was observed that after standing a day or so bubbles of gas were disengaged from the sediment and eventually the solution appeared to be very deficient in iron. Following this observation, two parallel series of experiments were conducted, using in one case iron wire, and in the other reduced iron, thus:—

3 grams iodine and 3 grams iron wire with a little water were heated gently and at the close of the reaction boiled for ten minutes. The solution was diluted so that 40 c.c. = 0·6 iodine. The iron and iodine were determined after standing nine hours. 80 c.c. of the solution was kept seven days in contact with a few pieces of bright iron wire. It was then quite colourless and was again estimated.

In the second case, precisely similar steps were taken, using 3·0 grams reduced iron (50 per cent. Fe). The solution was examined after nine hours, 80 c.c. set aside with 1·0 gram reduced iron for a week and again estimated.

		Fe_2O_3.	I_2.	Loss Iodine per cent. from Fe found.	Loss Iron per cent.
Theory		0·1889	0·600		
Iron wire	9 hours	0·1800	0·5446	4·7 −	4·6
	7 days	0·1786	0·5395	4·8 −	5·4
Reduced iron	9 hours	0·1545	0·4623	5·7 −	18·2
	7 days	0·1140	0·3320	8·2 −	39·6

The solution made with iron wire lost after nine hours 4·7 per cent., and after a week 5·5 per cent.; while that made with reduced iron indicated at the end of nine hours a deficiency of 9·4 per cent., and after seven days 39·7 per cent. The use of a large excess of reduced iron, therefore, causes a serious deficiency of strength of the resulting solution, especially if kept in contact for any great length of time.

The precise nature of the change which occurs on keeping solution of iodide of iron in contact with iron does not seem quite clear, and is a point requiring further investigation. It is stated that ferric oxide is deposited, and iodine liberated, which recombines with the metallic iron present, but Berzelius regarded the deposit as a basic salt.* According to the former theory, the solution should continue of unvarying strength; this is disproved by the results tabulated above. It should be noticed in this table, that the available iodine decreases in very nearly the same proportion as the iron.

After distilling the iodine from the solution kept for a week over reduced iron, the filtered residue in the retort was found to be quite neutral, free from iron and uncombined iodine, but gave abundant evidences of chlorides and iodides. This would indicate the absence of hydriodic acid and formation of chloride and iodide of potassium.

If hydriodic acid were formed by keeping the solution of ferrous iodide it is probable that the iodine estimations would be too high, compared with the amount of iron found, for according to Kerner,† hydriodic acid dissolves Fe_2O_3 on heating, forming ferrous iodide and free iodine; in which case, the total iodine would be distilled by continued ebullition; this, however, does not occur, for, as previously noticed, the available iodine

* Gmelin's 'Chemistry,' v., p. 249.

† Gmelin's 'Chemistry,' v., p. 249.

diminishes in very nearly the same ratio as the iron estimations fall, while an undecomposed iodide remains in the retort.

In order to discover the relation which the iodine estimations made by the first mentioned process bear to the results obtained by distillation, the following experiments were conducted upon the same sample of diluted syrup:—

40 c.c. diluted syrup, 2·0 grams $KClO_3$ and 60 c.c. v.s. thiosulphate, boil ten minutes, filter, dissolve, precipitate Fe_2 6 HO, wash, dry and ignite = (1) 0·1763; (2) 0·1776, Fe_2O_3.

40 c.c. diluted syrup, 4·0 grams $KClO_3$, distil into 2·0 grams KI = 0·5561 I_2.

The same repeated, distilling into 3·0 grams KI = 0·5563 I_2.

20 c.c. diluted syrup examined according to the first volumetric process, using 30 c.c. v.s. thiosulphate; the iodine indication, × 2 = 0·5762 I_2.

The same repeated, using 25 c.c. v.s. thiosulphate = 0·5763 I_2.

The same repeated, using 22 c.c. v.s. thiosulphate = 0·5556.

The same repeated, using 20 c.c. v.s. thiosulphate; after five minutes' boiling, iodine was detected in the steam, showing that the actual amount of iodine present lay between 20 and 22 c.c. Another experiment, using 21 c.c., would probably have given even a closer approximation to the amount indicated by the distillation process than that already obtained.

This proves what has previously been alluded to, that when the amount of thiosulphate used is nearly adjusted to that of iodine present the error incurred is not large.

[*The discussion on this paper is printed at p.* 861].

CHIAN TURPENTINE.

BY WILLIAM MARTINDALE.

This drug, the oleo-resin from *Pistacia terebinthus*—having until lately fallen into desuetude—since the appearance in the *Lancet** of an article recommending its use in cancer of the female generative organs, has been much in request. Owing to the small demand for it very little has of late years come into the market, and it has been stated that much of what has been supplied to the trade is factitious. There is little doubt with the demand now created plenty of the genuine article will be forthcoming in time.

The history of its use in medicine seems to be lost in antiquity. It was always more prized by the Greeks than the pinaceous oleo-resins. It has principally been obtained from the Island of Scio; here, as well as on the other islands of the Archipelago, Cyprus, Asia Minor and Syria, the tree is cultivated and flourishes to the greatest perfection. It attains the height of 40 feet or more in favourable localities, but in others it grows as a stunted straggling shrub, and is found as far east as Afghanistan and west as the Canary Islands. The yield of the oleo-resin from a large tree, 4 or 5 feet in circumference, is only about 10 or 11 ounces yearly. A great part of it exudes spontaneously, but more of it is obtained by making incisions into the trunk and branches in the spring, from which the turpentine continues to flow during the whole summer. It is collected in the morning, after the coolness of the night has somewhat solidified it, from the stem and flat stones placed at the foot of the tree to receive what may have run down.

* *Lancet*, vol. i., 1880, p. 477.

Chian turpentine has been omitted from the British Pharmacopœias, but was official in the London Pharmacopœias. Royle states that it used to be taken chiefly to Venice, where it was in request for making the far-famed Theriaca. Pereira, Guibourt and Hanbury describe it, and their descriptions are rather conflicting. It has a very firm honey-like consistence, yet is slightly brittle and becomes more so with age and exposure to the air, and even then it alway takes the form of the vessel in which it is kept. It is translucent, small pieces appear yellow or brownish-yellow, but in mass it has a greenish-brown colour. It has, when fresh, a distinctive odour, slightly like the pinaceous turpentines, but much more agreeable and aromatic, according to some, resembling citron and jasmine; but there is always a background smell like that of mastic which becomes more developed and distinct with age, when it has lost the more volatile portion, the essential oil. According to Pereira the turpentine-like odour is combined with the odour of fennel, and Guibourt says, when kept in a covered glass vessel the odour is strong and agreeable, analogous to that of fennel or the resin of elemi. I have only seen one sample which had an odour at all resembling fennel. It probably loses this rapidly. A specimen, bearing Guibourt's name, in the Society's Museum, has now no trace of it, but the mastic odour is very persistent. If the fennel odour be very evident in it, I should fear the sample was not genuine, as in a statement made in the *Lancet** the writer says what is sold as Chian turpentine "is either greatly adulterated, or a wholly factitious article manufactured from black resin, Canada balsam, and the essential oils of fennel and juniper." The taste of genuine Chian turpentine resembles that of mastic; it is agreeable and free from the characteristic bitterness and acridity of the pinaceous turpentines.

From its mode of collection, even the genuine Chian turpentine is always contaminated with impurities, earthy dust, etc. Testing a number of what I have reason to believe are genuine samples, as well as some not genuine, I find they are all (mechanical impurities excepted) entirely soluble in ether and absolute alcohol. Still the genuine oleo-resin, as stated by Guibourt, leaves a little glutinous resin undissolved when treated with alcohol slightly diluted (I used rectified spirit, sp. gr. ·838); yet this can scarcely be identical with the beta-resin or masticine of mastic, which is left undissolved when mastic is treated even with absolute alcohol. The alcoholic solution of Chian turpentine reddens litmus paper. The pimaric acid of Canada balsam is not soluble in cold absolute alcohol, but admixture with other ingredients might render it so. I am unacquainted with any definite test for its purity.

In judging of its genuineness, we must rely on its taste, odour and physical characters as above described. It should, more especially, be not too fluid. The drug was considered by Dioscorides to be diuretic, stomachic and laxative.

In administering it for cancer (an application of it

* *Lancet*, vol. i., 1880, p. 541.

Mr. J. Tweedy has shown to be not new,*) three formulæ have been employed by Professor Clay:—pills, ethereal solution, and an emulsion made from the latter. The pills consist of 3 grains of Chian turpentine and 2 grains of sulphur in each. Sulphur is a novel excipient, and not a very good one, as the pills lose their shape. The excipient generally used and recommended in books for the purpose is calcined magnesia. Three grains of Chian turpentine and 1½ grain of light magnesia make a pill which retains its shape tolerably well; but it is perfectly indigestible, barely losing one-tenth of its weight in passing through the body.

Some years ago† I was asked to prepare tar in a pilular form. The excipients mostly used for this—light magnesia and beeswax — have both the disadvantage of making the pills indigestible, and knowing the peculiar action lycopodium has of absorbing these oleo-resins, I succeeded in making a very good pill with 2 parts of tar and 1 of lycopodium. I, at that time, also made some pills with 2 parts of American turpentine and 1 part of lycopodium, which kept their shape. Chian turpentine, although harder, I find requires a little more lycopodium to enable the pills to keep their shape; 3 parts with 2 of the powder make fairly good pills; but these also are not digested. Sugar is a no better excipient than sulphur in enabling the pills to retain their shape. The sulphur pills are digested, and perhaps no better formula can be devised. With any excipient the pills should not be made too hard. I have seen some pills of Chian turpentine coated which retained their shape well; but I should be inclined to doubt their digestibility.

The other formulæ used are an ethereal solution of 1 ounce of Chian turpentine dissolved in 2 fluid ounces of absolute ether, the resulting solution measuring slightly over 3 fluid ounces, and an emulsion is prepared from this as follows:—

℞ Ethereal solution of Chian turpentine	fl. ℥ss.
Solution (mucilage) of tragacanth .	fl. ℥iv.
Syrup	fl. ℥j.
Sublimed sulphur	grs. 40.
Water . . . . to	fl. ℥xvj.

Mix.

The sulphur appears to have been added because it was not wished to lose anything contained in the pills which had previously been proved to be of such service. Mix it as you will, the sulphur will separate from such a mixture and aggregate the resin in masses first to the top and then at the bottom of the bottle. By using mucilage of acacia in place of mucilage of tragacanth, a satisfactory mixture may be obtained by first putting the mucilage into the bottle, adding the turpentine solution, shaking, and diluting with a little water; rub the sulphur with the syrup and pour into the bottle, fill up gradually with water, shaking after each addition of a little; or a good emulsion can be made, using either mucilage of tragacanth or mucilage of acacia, by omitting the sulphur altogether. This, as pharmacists, we are not warranted in doing, but the substituting of mucilage of acacia for mucilage of tragacanth is a deviation from the strict letter of the prescription which, with the leave of the prescribers, I have had recourse to.

* *Lancet*, vol. i., 1880, p. 582.

† *British Medical Journal*, vol. ii., 1875, p. 498.

The Pharmaceutical Journal.

SATURDAY, APRIL 24, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE EXHIBITION AT THE SOCIETY'S ROOMS.

It is now six years since an exhibition of objects specially interesting to pharmacists was held at Bloomsbury Square, on the occasion of the Conference meeting in London, and as it is considered that the approaching anniversary of the Pharmaceutical Society will be an opportune time for renewing the effort, the Secretary has, by direction of the Council, issued a circular announcing that an exhibition will be held on the 18th, 19th and 20th of May, and inviting persons desirous of exhibiting to give early intimation to him what they propose to show, and what space will be required for the purpose.

Already a considerable number of applications have been received in reply to this circular, and there seems to be every reason to anticipate that the exhibition will be a feature of considerable interest for those attending the Annual Meeting of the Society. In order to promote the success of the undertaking, by making it known as widely as possible, it will not be out of place to call attention to the matter here, and to remind our readers that as the time allowed for sending in applications for space is short, and as the available space is but limited, those who desire to exhibit should not delay making known their intention. There are now but fourteen days within which this can be done, so as to allow of the arrangement of such exhibits as may be sent and the preparation of a catalogue preparatory to the Annual Meeting.

We understand that the classification of the exhibits will be, as far as possible, of such a nature as to place them under one of three groups, viz., 1. Apparatus; 2. Drugs and Chemicals; 3. Educational Appliances.

A similar exhibition to that now contemplated has been for several years carried out in connection with the annual meeting of the German Pharmaceutical Association, and it has invariably proved very successful. As these meetings are held at different places every year, it is necessary to hire a building for the exhibition, and a small charge is made for the space occupied by exhibits at the rate of about five shillings per square yard. Members of the Association are admitted without payment, but persons who are not members are charged a shilling admission.

While speaking of the exhibition now proposed to be held in connection with the Annual Meeting, it may be admissible to recall to mind the proposal made some years ago by Mr. Schacht to establish a pharmaceutical laboratory or a permanent collection of pharmaceutical apparatus at Bloomsbury Square, and to offer the suggestion that the forthcoming exhibition may pave the way towards a realization of that project. At the time when this subject was under the consideration of the Council several letters were received from correspondents warmly advocating Mr. Schacht's proposal, and amongst others who took this view we may refer to Dr. Symes, Mr. Tanner and Mr. Barnard Proctor.

One of the chief objections to the adoption of this plan was founded upon the argument that a collection of pharmaceutical apparatus, such as furnaces, stills, etc., etc., would not be of much utility for purposes of instruction unless practical operations were constantly being carried on with them, and that if this were done the Society would necessarily have to enter upon the manufacture and sale of preparations. This was admitted on all hands to be an undesirable course for the Society to take; but at the same time it was not admitted that such a proceeding would be necessary, and Mr. Proctor contended that valuable and useful assistance might be gained from the inspection of even a "dummy laboratory" having "furnaces without fire and stills without steam."

Another objection had reference to the probable difficulty of deciding what particular form of apparatus would be best for the different purposes to which it was to be applied, and though the real existence of this difficulty was acknowledged, Mr. Tanner made it a ground for supporting Mr. Schacht's suggestion, inasmuch as he considered that the possession of a museum of apparatus would afford opportunity for the comparative trial of different forms of apparatus and for deciding which of them was best suited for certain purposes.

Certainly the great difference of opinion manifested when this subject was being discussed sufficiently shows that it is one of considerable difficulty. If the establishment of such a museum of pharmaceutical apparatus were undertaken, it would also involve considerable expense for its maintenance, and in addition to that, further continual outlay would be requisite, in order to keep pace with the improvements introduced and for the substitution of perfected forms of apparatus in the place of those which had become antiquated or obsolete in process of time. We have, however, called attention to this matter, because it has on a recent occasion been again referred to by Mr. Schacht, and because there is some connection between it and the exhibition that is to be held during the ensuing month.

COUNTER PRACTICE IN FRANCE.

Some months ago, the *Répertoire de Pharmacie* contained an account of a case in which M. de Bossy, a pharmacist at Harfleur, was prosecuted for the illegal practice of medicine, and was condemned by the tribunal of Havre to the payment of a fine. The offence with which M. de Bossy was charged consisted in his having administered an emetic to a child suffering from croup, and in his having done so without the order of a medical man. It was admitted that in all probability the action taken by M. de Bossy was the means of saving the child's life under the circumstances, and it was urged on his behalf that what he had done was excusable on account of the urgency of the case; but the tribunal refused to listen to this defence as constituting any justification of the accused, because there was at Harfleur a medical man, to whom it was held that M. de Bossy ought to have applied for directions before he ventured on his own account to render any assistance to the child at the solicitation of its parents.

M. de Bossy has since appealed against the decision of the tribunal, and it is on the whole satisfactory to learn from the report in the last number of the *Répertoire* that the judgment against him has been reversed by the higher court at Rouen. But the satisfaction to be derived from this result is somewhat qualified by the circumstance that the reversal of the judgment was, in the first place, based upon the evidence proving that upon the day M. de Bossy gave the emetic the medical man residing at Harfleur was not in the town, and only as a secondary consideration upon the fact that the case was one of great urgency, involving a question of humanity that would not admit of delay on the part of M. de Bossy.

Notwithstanding the heartburnings and discord there have been among ourselves in regard to the matter of counter practice, we may congratulate chemists and druggists in this country that they are not likely to be exposed to the trouble and annoyance experienced by the Harfleur pharmacist, and that in this respect at least we are not under the necessity of admitting that they manage these things better in France than we do.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION.

In stating the result of the late election of members of the General Committee of the body last week, we should have mentioned that the nominations only referred to the election of "additional members," and we have been requested by Mr. Haydon, the Secretary, to make this correction. At his request we also publish on another page a list of the members of the General Committee as it now stands, which will, we trust, prevent the trade from being misled in any way.

Messrs. Allen and Hanburys write to us in reference to a report, which they find is being circulated, to the effect that they are selling patent medicines below the recognized retail prices, and they request us to make known that this report is entirely and absolutely without foundation.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

At a meeting of the Board of Examiners for England and Wales, held in London on Wednesday, April 21, 1880, the report of the College of Preceptors on the examination held on April 6, was received.

Three hundred and fifty-six candidates had presented themselves for examination, of whom *one hundred and fifty-two* had failed. The following *two hundred and four* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

(Arranged alphabetically).

Adams, Joseph Henry ....Newcastle-on-Tyne.
Aikman, John ....Edinburgh.
Armstrong, John ....Langholm.
Atherton, Albert George.........Tunbridge Wells.
Atkinson, Walter Alexander ...Long Benton.
Bailes, Henry Cochrane ....Newcastle-on-Tyne.
Barker, George......................Mirfield.
Barnaby, William Arthur ......Lincoln.
Beach, Thomas Edgar............Bridport.
Beardmore, Alfred Edmund ...Wolverhampton.
Bell, Edward Wightman.........Doncaster.
Bellamy, Robert Arthur ....Bedale.
Birss, Robert, junr. ....Aberdeen.
Blain, William Rushton ....Bolton.
Blond, James Le ....Hamilton.
Bostock, Henry.....................Hyde.
Bowie, George ....Aberdeen.
Boyden, Alfred E. ....Burnley.
Braden, Frank ....Nottingham.
Breeze, Alfred Dennant ....Devonport.
Brigham, George ....Hull.
Browne, John ....Lowestoft.
Brunyee, Arthur ....Thorne.
Burden, Arthur Clarke ....Ryde.
Burt, John Aurens ....Castle Eden.
Campbell, Charles.................Manchester.
Cass, John William ....Guisborough.
Cheshire, Frederick ....Lexden.
Clark, William Alfred...........Southampton.
Coats, Richard Ridley............North Shields.
Cockle, William Henry ....Lynn.
Copland, William..................Huntly.
Crarer, Edward.....................Blairgowrie.
Crook, George ....Southport.
Crowther, Horace Woodward...West Bromwich.
Cryer, Joseph ....Liverpool.
Cullwick, Geo. Hamar Jones ...Birmingham.
Davidson, George ....Aberdeen.
Davies, Daniel E...................Carmarthen.
Dempsey, Arthur ....Edinburgh.
Dick, James ....Newcastle-on-Tyne.
Doble, Henry Tregellas ....London.
Doble, Richard Dennis ....Tavistock.
Dobson, George Edwin ....Bridlington.
Dodsley, Charles Edward ......Mansfield.
Dorman, James.....................Stranraer.
Drummond, Robert Gordon ...Broughty Ferry.
Duffus, William ....Aberdeen.
Dukes, Henry John ....Stafford.
Duplock, Walter ....Petersfield.
Edmondson, Thomas ....Keswick.
Elborne, Herbert ....Southampton.
Eley, Herbert ....Derby.
Evans, Hugh Thomas ....Carnarvon.
Evans, Owen ....Carnarvon.
Evans, William Lloyd............Barbourne.
Fawcitt, Thomas ....York.
Fell, Frederick William ....Preston.
Fletcher, Francis Round ....Netherton.
Forbes, James A. B. ....London.
Forsyth, William ....Elgin.
Fresson, Alfred Reginald ......Stevenage.
Ganson, John ....Aberdeen.
Gee, Edgar Frederic...............Neath.
Goodliff, George ....Huntingdon.
Gould, Charles William ....London.
Groves, Ernest ....Richmond, Surrey.
Hall, Charles Hurd ....London.
Harris, Henry Thomas ....Worksop.
Harrison, Arthur John ....Nottingham.
Hatrick, William Lindsay ......Pollokshields.
Haworth, Walter...................Levenshulme.
Heald, Alfred Francis ....Burnham, Bucks.
Heyworth, Samuel ....Bradford.
Hinde, Albert Henry ....Lowestoft.
Hodgson, George ....Doncaster.
Holloway, Charles Terry.........London.
Horsey, Herbert Vaughan ......Southampton.
Hubbard, Emily ....Downham Market.
Hughes, Hugh Griffith ....Chester.
Humphrey, Albert Edward......Portmadoc.
Jackson, Alfred ....Widnes.
Jackson, Richard Herbert ......Hull.
James, Morgan William ....Llandovery.
Jaques, George ....Leeds.
Jarvis, Leonard Vickery ....Norwich.
Jeffery, Elias.........................Falmouth.
Johnson, Frederick David ......Beverley.
John, William ....Narberth.
Jolley, S. Herbert ....Heaton Norris.
Jones, John ....Stockport.
Knight, George......................London.
Lang, John West..................Southport.
Lay, William George ....Clevedon.
Leech, John Frederick ....Tideswell.
Leslie, George ....New Pitsligo.
Lewis, Alfred Wheatcroft ......Swansea.
Lewis, James Adam...............St. Clears.
Lewis, Thomas Wright ....Bloxwich.
Little, Andrew ....Old Aberdeen.
Lloyd, Edwin Henry ....Ashby-de-la-Zouch.
Lowe, William Baillie.............Forres.
Luis, Ellia Raphael ....Edinburgh.
Machattie, Adam ....Keith.
McIntosh, James ....Elgin.
McKenzie, James...................Macduff.
McKenzie, James...................Perth.
McLeod, James......................Ayr.
Malone, Joseph Peter ....Rochdale.
Marsden, Charles Edwin.........Huddersfield.
Marshall, John ....Accrington.
Martin, John Pearson ....Maryport.
Mason, Edgar ....York.
Mason, Hubert Huxley ....Clevedon.
Matthew, Edwin ....Hadleigh.
Matthews, Harry James.........Warwick.
May, Samuel Augustus ....Jersey.
Medd, Frank Edward ....Gloucester.
Metcalfe, James ....Bradford.
Metcalfe, Percival William......Bradford.
Milne, Alexander ....Montrose.
Mitchell, James ....Aberdeen.
Morrell, Frederick ....London.
Morris, John Hall ....Bolton.
Morriss, Edward Stow............Sleaford.
Morse, Frederick Bartho.........London.
Mulliner, Thomas Chas. Mills...Southsea.
Munro, John Joyner ....Strichen.
Negus, John Henry ....Northampton.
Nicholson, Richard Thomas ...Maidstone.
Nicol, George Harry ....Dumfries.
Nowers, Lawrence Edward......Lydd.
Ogle, John Henry...................London.
Oliver, John Robert...............Lynn.
Oram, Frank.........................Totnes.
Padley, Frank Robert ....Birmingham.
Parker, Edwin ....Stoke-on-Trent.
Parker, William ....Wainfleet.

Parsons, Henry Imber............Barnstaple.
Parsons, Stanley Bernard ......London.
Paterson, George ....Aberdeen.
Pellew, Albert ....Woodbridge.
Peterkin, James ....Elgin.
Phillips, David......................Llandilo.
Plant, Frederick ....Buxton.
Potts, Robert ....Newcastle-on-Tyne.
Redfern, Edward ....Rhyl.
Richmond, Paul Henry ....Wigtown.
Rickards, Henry William ......London.
Ricketts, James ....Plymouth.
Ridley, Charles......................Newcastle-on-Tyne.
Rigg, George Farrer ....London.
Robertson, William George......Jedburgh.
Robinson, Charles Henry ......Ashbourne.
Robinson, Harry ....Guiseley.
Salt, George ....Ashbourne.
Salter, William Appleton ......Scarborough.
Savidge, Frederick William ...Ely.
Senior, George ....Doncaster.
Shapcott, William Henry Pyne.London.
Shaw, Alfred..........................Blackpool.
Simcock, James......................Knutsford.
Sinclair, John White ....Lerwick.
Skinners, William................. Broughty Ferry.
Smith, John ....Preston.
Smith, Oliver Albert ....Birmingham.
Smith, Sidney ....Bromsgrove.
Stafford, George Waidson ......Welshpool.
Staniland, John Henry ....Malton.
Start, George Edward ....Nottingham.
Stephens, David ....Llandilo.
Stevens, Walter Rowland ......Wye.
Stokoe, James Clarke ....Clare.
Swain, Eliza ....London.
Taylor, Charles......................Tregoney.
Taylor, William ....Turriff.
Taylor, William Chadwick C....Saltburn-by-the-Sea.
Thomas, Evan ....Pwllheli.
Thomas, Evan Jenkyn............Newquay.
Thomas, Daniel Griffith ....Cardigan.
Thomas, Tom ....Halifax.
Thompson, George ....Knaresborough.
Thorpe, John..........................Leigh.
Thorpe, William ....Sleaford.
Todd, William Carter ....Preston.
Tregellas, Clifton Pari............London.
Tucker, Thomas ....London.
Turner, Robert Michael ....Oundle.
Turner, Samuel......................Buxton.
Waddington, Alfred Henry......Bradford.
Wade, Herbert ....Oldham.
Walker, Charles Herbert.........Hull.
Watson, John Robert ....Newport, Mon.
Watt, Robert..........................Huntly.
Webster, Robert ....Selby.
Welch, Frederick ....Colchester.
Westover, John Turton ....Bridgnorth.
Wheeldon, Frederick John ......Manchester.
Wheeler, William Robert ......Fant Holme.
Wilkes, Thomas James ....London.
Wing, John William ....Colsterworth.
Wood, Fred ....Ely.
Woodward, Charles Frederick...Wellingborough.
Wright, Joseph Pretty ....Burton-on-Trent.

The questions for examination were as follows:—

Time allowed: Three hours for the three subjects.

I. LATIN.

1. Translate into English the following passages:—

A. Post ejus mortem nihilo minùs Helvetii id, quod constituerant, *facere conantur*, ut e finibus suis exeant. Ubi jam se ad eam rem paratos esse arbitrati sunt, oppida sua omnia, numero ad duodecim, vicos ad quadringentos, reliqua privata ædificia incendunt, frumentum omne, præterquam quod secum portaturi erant, comburunt, ut, domum reditionis spe sublatâ, paratiores ad omnia pericula subeunda essent; trium mensium molita cibaria sibi quemque domo efferre *jubent*.

B. Postridie ejus diei Cæsar, præsidio utrisque castris quod satis esse visum est, *reliquit*; omnes alarios in conspectu hostium pro castris minoribus constituit, quò minùs multitudine militum legionariorum pro hostium numero valebat, ut ad speciem alariis *uteretur*: ipse, triplici instructâ acie, usque ad castra hostium *accessit*.

2. Give the present, perfect, infinitive, and supine of the verbs in italics.

3. Decline throughout—*mortem, eam rem, omne frumentum*.

4. Translate the following sentences into Latin:—

(i.) The soldiers were fortifying the camp.
(ii.) On the next day they began to seek help from Cæsar.
(iii.) The Helvetii determined to depart from their own territories, in order that they might obtain possession of all Gaul.

II. ARITHMETIC.

[The working of these examples, as well as the answers, must be written out in full.]

5. Divide 203 litres of soup among 18 men and 22 women, giving each man double a woman's share.

6. What number must be added to $\frac{3}{7}$ of $\frac{5}{9}$ to make $\frac{1}{2}$ of $\frac{6}{9}$?

7. Divide the product of 4·255 and ·032 by ·00016.

8. If $\frac{7}{12}$ acre of land cost £118 13*s.*, what will $10\frac{6}{7}$ acres cost?

9. If 7 fires consume 4 tons 10 cwt. of coal in 30 days of 10 hours each; how much will be consumed by 12 fires in 20 days of 14 hours each?

III. ENGLISH.

10. Of what inflexions are nouns capable? Write down those inflexions which are used to distinguish the feminine gender from the masculine.

11. Define Active Voice and Passive Voice. Show that verbs may be active without being transitive, and transitive without being active.

12. Enumerate the Personal Pronouns, simple and compound.

13. Parse fully each word in the following sentence:—

"Is this a dagger that I see before me?"

14. Write a short composition on one of the following subjects:—"Reading," "Waste of Time," "The University Boat-Race"; or give a short outline of one of Shakspere's Plays.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates. Examined.	Passed.	Failed.		Candidates. Examined.	Passed.	Failed.
Aberdeen	17	16	1	Lancaster	9	3	6
Birmingham	20	12	8	Leeds	17	11	6
Bristol	6	3	3	Lincoln	9	5	4
Cambridge	10	5	5	Liverpool	14	7	7
Canterbury	4	2	2	London	45	26	19
Cardiff	5	1	4	Manchester	26	18	8
Carlisle	9	4	5	Newcastle-on-T.	13	7	6
Carmarthen	9	8	1	Northampton	5	2	3
Carnarvon	7	4	3	Norwich	13	7	6
Cheltenham	2	2	0	Nottingham	15	7	8
Darlington	7	3	4	Oxford	2	0	2
Dundee	7	4	3	Peterborough	3	2	1
Edinburgh	13	5	8	Sheffield	5	3	2
Exeter	9	6	3	Shrewsbury	5	2	3
Glasgow	9	5	4	Southampton	6	5	1
Hull	13	6	7	Truro	3	2	1
Inverness	5	4	1	Worcester	2	0	2
Jersey	1	1	0	York	11	6	5

The undermentioned certificates were received in lieu of the Society's Examination:—

Certificate of the University of London.

Thomas, William ....Burnley.

Certificates of the University of Oxford.

Bird, Frederick Charles John...Bath.
Drew, Walter Clark................London.
Gilbert, Charles George ....Walthamstow.

Certificates of the University of Cambridge.

Jeans, Edward ....Mansfield.
Puckey, Courtenay ....Herne Hill.
Taylor, Francis William ....Newport Pagnell.
Thomas, John ....Oswestry.

Certificates of the College of Preceptors.

Birch, John ....Heywood.
Elliott, Alfred ....Stowmarket.
Fox, Frederick William ....Lincoln.

EXAMINATIONS IN LONDON.

April 14, 1880.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

Dr. Greenhow was also present, on behalf of the Privy Council.

MAJOR EXAMINATION.

Seven candidates were examined. *Four* failed. The following *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Ashmead, John Stubbings ......Clifton.
Cox, Frederick John ....Newark.
Powrie, Percival Chamberlain..Mossel Bay.

MINOR EXAMINATION.

Twenty candidates were examined. *Twelve* failed. The following *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Ashton, Henry ....Lynn.
Ballinger, Arthur Joseph ......Coventry.
Bamforth, Joseph.................Manchester.
Bayfield, Gabriel Thomas ......Norwich.
Bennett, Charles Joseph ....Widnes.
Bentley, John Thomas............Hull.
Blagg, Eli ....Hanley.
Bolton, Frederick William ......London.

April 15, 1880.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman, and Taylor.

MAJOR EXAMINATION.

Seven candidates were examined. *Four* failed. The following *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Carruthers, Robert ....Dumfries.
Howell, Edmund ....Oxford.
Williams, William ....St. Clears.

MINOR EXAMINATION.

Twenty-one candidates were examined. *Fifteen* failed. The following *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Brooker, Algernon ....Exeter.
Burnett, William ....Hull.
Callander, William Wright......Exeter.
Evison, Alfred ....Alfreton.
Fletcher, James Edward.........Saltley.
Goodchild, Alfred Clarke ......London.

April 16, 1880.

Present—Mr. Schacht, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

Dr. Greenhow was also present, on behalf of the Privy Council.

MINOR EXAMINATION.

Twenty-three candidates were examined. *Twelve* failed. The following *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Guy, Daniel ....Lee Green.
Hagon, Albert ....Cardiff.
Hall, Alfred Lee ....Winchcombe.
Hardwicke, Arthur ....Sheffield.
Hebblethwaite, George Arthur.Hull.
Hill, John Staniforth ....Blackpool.
Holloway, Edwin Arthur ......Leominster.
Horne, John ....Wednesbury.
Hughes, Henry Milner ....Newcastle-on-Tyne.
Jackson, Henry Lawson ....Crediton.
Jones, Hugh Robert...............Bangor.

April 21, 1880.

Present—Mr. Sandford, President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

Dr. Greenhow was also present, on behalf of the Privy Council.

MAJOR EXAMINATION.

Seven candidates were examined. *Five* failed. The following *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Jones, William Harris............Abergavenny.
Shepherd, John William ....Settle.

MINOR EXAMINATION.

Twenty-one candidates were examined. *Eleven* failed. The following *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Morgan, William ....Saint Clears.
Morse, Charles Henry Stafford..Bishop's Stortford.
Nethercott, Walter John.........Stroud.
Parsons, James Vincett ....Icklesham.
Phethean, James ....Bolton.
Radford, James Alfred ....Birmingham.
Ratcliffe, Joseph William ......Sutton Bridge.
Richards, Randolph Hutchings..London.
Seward, George Halifax ....London.
Williams, Charles Adrian ......Plymouth.

April 22, 1880.

Present—Mr. Sandford, President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, Greenish, Linford, Martindale, Moss, Plowman and Taylor.

Dr. Greenhow was also present, on behalf of the Privy Council.

MAJOR EXAMINATION.

Six candidates were examined. *Two* failed. The following *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Thompson, John Tatham.........Scarborough.
Williams, James Edward ......Louth.
Wimpenny, James McMillan...Waterloo.
Winfrey, Richard ....Long Sutton.

MINOR EXAMINATION.

Twenty candidates were examined. *Twelve* failed. The following *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Shipman, Joseph James ....Chesterfield.
Steward, Alfred ....Great Yarmouth.
Thompson, George ....Epworth.
Tutton, James ....Northampton.
Waring, Edwin Scholey ....Greetland.
Wellington, Frederick............South Petherton.
Williams, John.....................Carnarvon.
Wright, Eli ....Tipton.

MODIFIED EXAMINATION.

One candidate was examined, and was declared qualified to be registered as a Chemist and Druggist:—

Mickle, Edward.....................Liverpool.

PHARMACEUTICAL MEETING.

Wednesday, April 21, 1880.

MR. GEORGE WEBB SANDFORD, PRESIDENT, IN THE CHAIR.

An adjourned Evening Meeting of the Society was held on Wednesday last, in order that four papers which were announced for the meeting on the 7th inst., but were then postponed through want of time, might be read. The chair was taken at half-past eight o'clock. The first paper read was entitled—

Experiments on Taraxacum Root.

BY J. B. BARNES, F.C.S.

The paper is printed on p. 849, and gave rise to the following discussion:—

Mr. Greenish congratulated Mr. Barnes on having produced a very practical paper, one which emanated from the laboratory rather than from the desk. In his first three experiments he had no doubt Mr. Barnes adopted the true principle in making a succus taraxaci, viz., adding spirit as early as possible, as soon as the juice was exposed to the air, so as to prevent fermentation being set up and the formation of a saccharine principle. It was known that in other instances of a similar character if fermentation took place there occurred not only a conversion of the starchy matter into sugar, but whatever bitter principle the root contained would also be decomposed. The results were extremely satisfactory, though he should have liked to know the quantity of root operated on in experiment 1 and the amount of product. He did not think Mr. Barnes's conclusion that cold water did not separate the bitter principle was quite borne out by experiment 4, because the root having been exposed to the action of cold water fermentation would have been set up and sugar formed unless spirit were added. Mr. Barnes had evidently got a large quantity of inulin, which decomposed and fermented, and this would account for the sweet taste. Even if he had tried spirit, after twelve hours' maceration in cold water, he would probably not have separated any bitter principle. Mr. Barnes's earlier experiments quite agreed with his own, and if care were taken in obtaining the taraxacum in good condition, and the spirit were added as soon as possible, he thought a preparation would be obtained far superior to anything which could be got from the dry root.

Mr. Moss agreed with Mr. Greenish that Mr. Barnes's statement about the power of cold water to separate the bitter principle did not necessarily follow from the observation that the product of experiment 4 possessed a sweet taste. He did not, however, quite agree with Mr. Greenish's reason, though he differed from Mr. Barnes. The bitter powder prepared by experiment No. 2 was not so bitter but that the taste would be masked by a considerable quantity of the sweet matter of taraxacum root. It must be there in the product of experiment 4, though it could not be tasted. That powder also was somewhat crystalline to the taste, and he should suppose that possibly some chloride of potassium had been dissolved out by the spirit; if so it would account for the hygroscopicity. Mr. Barnes had referred to the resins of podophyllin and euonymin, and the speaker had hoped he had experimented with a view of getting a similar preparation from taraxacum. If he added the spirituous tincture to water it was quite possible he might get a resin precipitated which would compare better with those he had named than the spirituous extract he had obtained. Of course, the resin thus obtained would not be so uniform as many substances having names with the same termination, but it would be more uniform than the extract, decoction or succus, because the diluting matters which occurred in all those preparations would be eliminated.

Professor Redwood said there were two objects contemplated in preparations of vegetable substances possessing medicinal properties, one of which was that of administering the substance in an available form, but as nearly as possible in the condition in which it occurred in nature. This object was especially kept in view in the preparation ordered in the Pharmacopœia under the name of succus taraxaci. This was a desirable object to carry out, as some vegetable substances appeared to produce more satisfactory effects when administered in their natural state than when the active principles in their isolated condition were used. Nevertheless it had been a great step in advance to be able to isolate the active principles from vegetable substances, and that appeared to be the direction of Mr. Barnes's researches. Whether the resinous substance which was thus isolated were the most valuable medicinal constituent of taraxacum still remained to be proved, that must be left for medical men to determine. It was very desirable to have preparations which could be tested in this way, and so far the paper was very valuable, as it showed the means of obtaining this active principle in an approximately pure condition, so that its value as compared with the succus could be ascertained. The two preparations, however, were quite distinct, as were the processes for their production.

Mr. Gerrard asked if the passage of 32 ozs. of rectified spirit over a pound of powdered taraxacum entirely exhausted it of its bitterness. It seemed to him scarcely sufficient for the purpose. He should also like to know what percentage of loss occurred, and whether Mr. Barnes recovered the spirit absorbed by pressure, or used the displacement method. Of course, in percolating a pound of powdered root with 32 ozs. of spirit nothing like 32 ozs. would pass through.

Mr. Barnes said he did not add any more spirit; he simply passed the 32 ozs. through the powder. No doubt there would be some of the bitter principle remaining.

Mr. Postans said Mr. Greenish had anticipated several things he should have said; but he could not help saying a word for the old succus of the Pharmacopœia. The demand for it was something enormous, and that, too, by medical men, so that as pharmacists they were bound to supply it. He took it that in the Pharmacopœia it was intended where possible to have a liquid and a solid preparation, a succus and an extract. It occurred to him, as he had mentioned on a former occasion, that as the Pharmacopœia ordered that the succus should be heated to 212° before evaporation, it might perhaps have been a more elegant way of getting rid of the various matters to use the succus of the Pharmacopœia to which spirit had been added, and evaporate it at a low temperature. The result was very similar to that which Mr. Barnes had presented to the meeting. Pereira said that 100 lbs. of taraxacum root would yield about half their weight of juice, and in the months of April and May rather more; but Squire said that 100 parts of root yielded 30 parts of succus and 8 of extract. Mr. Barnes, in his experiment No. 2, took one pound of root, which yielded $1\frac{1}{2}$ oz. of extract, prepared by treating the fresh roots with rectified spirit; one pound of the expressed juice would yield something over $1\frac{1}{4}$ oz. He hardly looked upon Mr. Barnes's extract as really alcoholic, because there was clearly a good deal of water in the succus, whether it were expressed or the root itself were treated with spirit. The real alcoholic extract was obtained when the dried root was treated with alcohol.

Mr. Urquhart wished to say just one word as a medical man. There were two forms of administering medicine, the solid and fluid; the latter had been chiefly employed for taraxacum, and the succus had hitherto been found unfailing in its action. A great many experiments would have to be tried, therefore, before it would be set aside.

A vote of thanks was passed to Mr. Barnes.

The next paper read was one on—

The Composition of Tonga: a Reputed Remedy for Neuralgia.

BY A. W. GERRARD, F.C.S.

The paper is printed at p. 849, and gave rise to the following discussion:—

Mr. Holmes said that he had little to add to the observations he made at the last Evening Meeting, viz., that he believed that the so-called root was the stem of a species of *Rhaphidophora*, probably *Rhaphidophora vitiensis*, Seem. He had placed on the table microscopical slides, both of that plant and of tonga, for comparison. With regard to the bark found in the tonga, he believed that it would be found to belong, in all probability, to a tree of the natural order Sapotaceæ, several plants of that group having a bark of a singularly sweet and slightly astringent taste, *e.g.*, monesia bark. He believed Mr. Greenish had examined the bark under the microscope, and might be able to give some information on the point.

Mr. Jackson said all he had seen of this drug hitherto was a small quantity, about half a teaspoonful, which was submitted for examination at Kew, some time back, but there was not sufficient to determine the botanical structure of any portion. There was no leaf at all, and only a small portion of wood or root; he could not really say which. He was much interested in seeing these specimens wrapped up in the sheathing bark of the leaf stalks of the cocoa nut.

Mr. Greenish said that he, like many others, had been much interested in this tonga, which he found was a very expensive article. He sent to Mr. Tanner and asked him to be good enough to send him some typical specimens for examination. Three specimens were sent, viz., the bark, the root and the leaf. In the bark there were very dark and light portions. He had made sections of the dark part, and found that it consisted not of the primary, but the secondary layer. The cortical portion seemed to have been removed. The whiter portions were evidently the inside portions of the same bark,—what might be termed the tertiary layer. The secondary dark rind had the stone cells very prominent, and the inside portion had the bast cells which belonged to the tertiary layer. There was no doubt that these two portions belonged to each other, and to a dicotyledonous plant. That which was called the root had a large amount of fibrous material, but it was evidently from a monocotyledonous plant and had nothing whatever to do with the bark. The leaf again was that of a dicotyledonous plant, and might possibly belong to the bark; he could not say. But really, when the root of a monocotyledon and the leaf of a dicotyledon were found mixed together in that sort of bag, and varying very much in their relative proportion, it required a large amount of faith to believe in the value of such a remedy for neuralgia. Mr. Holmes had mentioned an arum as the probable source of the root, and he believed Mr. Holmes was guided to some extent by the starch, but he had examined the starch grains, and compared them with those of the arum, and they certainly differed very considerably. He could not say what starch it was, but it was very much smaller, and of a different form.

Mr. Holmes said he had placed a specimen of raphidophora under the microscope and the starch seemed to him as nearly as possible of the same size and character as that of the tonga. He was quite willing to admit that the starch of *Arum maculatum* was much larger and possibly different in shape, but he knew of no other starch which the tonga starch approached so nearly in character. If the bark belonged to a plant of the order of Sapotaceæ, as he supposed, the leaf could not belong to the same plant, because plants of that order had usually thick leaves, very different in character to those mixed with the tonga.

A vote of thanks was passed to Mr. Gerrard.

The Chairman said that the next two papers would be read and discussed together. The subjects were—

The Action of Potassium Chlorate on Ferrous Iodide; and

The Quantitative Estimation of Syrup of Iodide of Iron.

BY R. H. PARKER.

The papers are printed on pp. 850 and 851, and gave rise to the following discussion:—

Mr. Naylor said the reaction which Mr. Parker had embodied in this communication was evidently a combination of a process which had been long known and of one which, perhaps, was less known. The action of alkaline chlorates upon ferrous salts was very well known indeed, and Stelling had devised a method of estimating the chlorine in chloride of potassium, based on the reaction of alkaline chlorates upon ferrous oxide. The other reaction was not so well known, viz., the change which a ferrous iodide solution underwent in the presence of water. He believed there was very good evidence still to believe that when ferrous iodide was dissolved in water, and the aqueous solution allowed to stand for some time, hydriodic acid was formed. This could be readily shown by making first of all a perfectly neutral solution, which when kept for some time in a bottle acquired an acid reaction, and it became in time still more acid; in fact, it went through all those changes which Mr. Parker had so minutely recorded. He had satisfied himself that it was hydriodic acid which was formed, because if to it were added first a little starch no free iodine was manifested, but if then a little iodic acid were added the hydriodic acid and iodic acid at once gave free iodine, which was recognizable by the blue iodide of starch being formed. Mr. Parker might have shown more intelligibly the different stages of the decomposition, by substituting two equations for his one.

Professor Attfield said the meeting ought not to separate without recognizing the large amount of time, trouble and thought which the author had evidently devoted to this subject. He would have said even more in his praise, but being an old laboratory student it would not be becoming in him to do so. With regard to the fundamental reaction to which Mr. Parker had drawn attention, he had only given the equations respecting the commencement and, probably, the end of the reaction, and he would no doubt admit that there were in all probability many stages before the end was reached; and that in the course of those stages probably some ferrous chloride was produced, and also some iodide of potassium.

Mr. Fletcher wished to ask one question. In the equation which Mr. Parker had given he represented two molecules of iodide of iron and one of chlorate of potassium eventually giving free iodine and chloride of potassium. He did not wish to dispute the accuracy of that reaction, but should like to ask how it was that whilst he had an excess of chlorate of potassium present, free iodine could exist in the solution. It appeared to him that probably the extraordinary deficiency Mr. Parker had found in some of his iodine estimations was accounted for by the fact that the excess of chlorate which was of course in his retort was acting on the iodine, and forming iodic acid, and consequently he would never get the theoretical amount of iodine. As regarded syrups, Mr. Parker mentioned that in each case when made by himself according to the B.P. formula the syrup was straw coloured. He did not know whether that was the experience of pharmacists generally, but as a manufacturer he could say that if they sent out syrup of iodide of iron straw coloured, they would soon have it back on their hands.

Mr. Parker, in replying, said that hydriodic acid could not be formed in the syrups to any large extent, because old samples of syrup and solution were only feebly acid; and since HI was decomposed by boiling with $KClO_3$ (probably with liberation of the whole of the iodine) it was evident that the iodine estimations of such samples would be in *excess* of that required by the Fe_2O_3 found, which was never the case; indeed the results detailed in the paper proved that the longer the solution of FeI_2 was kept, the greater is the *deficiency* of available iodine. With reference to Mr. Fletcher's remarks Mr. Parker said that free iodine did not react on $KClO_3$ forming KIO_3, except in the presence of nitric acid, which was required for the intermediate production of HIO_3. This he had proved by distilling 40 c.c. of a solution of iodine with 2·0 grams $KClO_3$; the distillate contained as much iodine as could be obtained by distilling the iodine solution alone. As to the colour of syr. ferri iodidi, Mr. Parker had found that all samples prepared in strict accordance with the pharmacopœial process possessed a slight tint which might be called light straw coloured or very light green, according to fancy, but it was never absolutely water-white. If, however, the solution of FeI_2 were kept for some hours with excess of iron, or if some reduced iron were added, a water-white solution might be obtained; but a considerable loss of iron was thus incurred, and a constitutional change in the iodide appeared to take place, since in such liquors the available iodine was deficient to an extent varying from 4 to 12 per cent., according to the length of time the solution had been kept, whereas, from the tinted syrups it was easy to obtain within 1 per cent. of the total iodine. In his opinion it would be preferable to send out a very slightly tinted syrup of full strength rather than a beautifully water-white preparation which might be from about 8 to 70 per cent. deficient in iron. Mr. Parker drew special attention to the fact that solution of ferrous iodide cannot be kept without considerable loss of iron, because of its important bearing upon the extemporaneous preparation of the syrup by adding a "liquor ferri iodidi" to simple syrup. Such specimens were frequently very weak; one which he had examined during the last few days he had found to be nearly 70 per cent. deficient, while a syrup prepared by himself of the "light straw coloured variety" gave Fe_2O_3 99·3 per cent. and iodine 98·7 per cent. of the theoretical amount. Finally Mr. Parker pointed out that the iodine estimation 1·7 + in the table was an error due to defective apparatus and that the B.P. theory for Fe_2O_3 should have been stated as 0·2030 instead of 0·2055.

The President, in proposing a vote of thanks to Mr. Parker, said he had shown great industry and care in preparing this paper, and also a great love of his work—a quality which promised well for the future. He was glad that the session closed with so earnest and good a paper as Mr. Parker had given them.

The Chairman then drew attention to some glass measures sent by Messrs. Toogood, some bearing the Westminster and some the Marylebone mark.

NORTH BRITISH BRANCH.

The seventh and last meeting of the session was held in the Society's rooms, 119a, George Street, Edinburgh, on Wednesday evening, April 14, Mr. J. B. Stephenson, President of the Branch in the chair.

The minutes of the former meeting were read and confirmed.

The Honorary Secretary announced the following donations:—

To the Library:—*The Australasian Supplement to the Chemist and Druggist*, 'The First Report of the Pharmacy Board' and the 'Pharmaceutical Register for 1879,' from the Pharmaceutical Society of Victoria; *The Journal of the Chemical Society* for April, from Mr. Mackay.

The Honorary Secretary read a letter from Mr. D. B. Dott, expressing that, on account of family bereavement, he had to ask to be excused for not being able to read a paper "On the Solubility of some Alkaloidal Salts," which had been announced for this meeting.

Mr. J. F. King, city analyst, then read a paper on the "Edinburgh New Water Supply: its Composition and Action upon it of Different Filtering Materials as regards Removal of Colour." The paper, which was illustrated by copious diagrams, will be printed in a future number.

The President then formally closed the session in a few remarks, enumerating the papers which had been read at the various meetings, and thanking the members for the great honour they had shown him in continuing him in the chair for three years, and for the uniform indulgence and assistance he had received.

On the motion of Mr. Blanshard a cordial vote of thanks was awarded to Mr. King, and a no less hearty one, on the motion of Mr. Nesbit, was given to the President for his conduct in the chair.

Provincial Transactions.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION OF GREAT BRITAIN.

A meeting of the Law and Parliamentary Committee of this Association was held at the Queen's Hotel, Birmingham, on Wednesday the 14th inst., at 1 p.m.; Mr. Thomas Barclay (Birmingham), President, in the chair.

Present—Messrs. Andrews (London), Arblaster (Birmingham), Bell (Hull), Churchill (Birmingham) Cross (Shrewsbury), Hampson (London), Holdsworth (Birmingham), Jervis (Sheffield), Maltby (Lincoln), Symes (Liverpool), and the Solicitor of the Association.

The Secretary said that the case which had previously been before the Committee in which a member had been threatened with an action for damages for the alleged improper mixing of nitric acid and mercury by one of his assistants had been settled by arrangement.

The President said the Executive at its last meeting passed a resolution suggesting that the Law and Parliamentary Committee should appoint a sub-committee to deal with urgent cases.

It was moved by Mr. Symes, seconded by Mr. Bell, and unanimously resolved:—"That the President and the Members of the Executive residing in Birmingham, with power to add to their number, be appointed a sub-committee to deal with urgent cases."

Communications from members asking for legal advice and assistance were placed upon the table and dealt with by the Committee.

The President said that the next item on the agenda paper was to consider the applications for the secretaryship, to interview several of the candidates for the appointment, and if deemed advisable to provisionally appoint a new secretary.

The Secretary said that acting under the direction of the Executive he had inserted an advertisement in the *Pharmaceutical Journal* and in the *Chemist and Druggist*. Twenty-three applications had been received. One gentleman had subsequently withdrawn his application. A sub-committee, consisting of the resident officers of the Association and Mr. Churchill, had perused the applications and instructed him to communicate with some of the applicants requesting them to meet the Committee on that day. The applications, testimonials, etc., of the candidates were then placed upon the table and perused by the Committee, and the candidates present had an interview with the Committee.

After a deliberation of upwards of four hours it was moved by the President, seconded by the Vice-President, supported by Messrs. Bell, Symes, and others, and unanimously resolved:—"That Mr. W. F. Haydon be reappointed Secretary to the Association."

It was moved by Mr. Churchill, seconded by Mr. Symes, and unanimously resolved:—"That Mr. G. R. Templeman be provisionally appointed Assistant Secretary to the Association, the engagement being terminable at three months' notice from any date, security to be given to the extent of £500."

The Secretary reported having drafted the Fourth

Annual Report of the Executive Committee, to be presented to the members of the Association at the forthcoming Annual General Meeting, and having caused it to be printed and a copy forwarded to all the members of the Executive with a request that they would amend it in any way they deemed desirable and return the amended draft to him.

The amended drafts were laid on the table and each clause of the Report carefully considered and finally approved.

SECOND ELECTION OF GENERAL COMMITTEE.

The following is a list of the gentlemen who are reported by the Scrutineers, Messrs. Laundy and Co., to have received the highest number of votes in the respective districts in which nominations have been made. In cases where an equal number of votes have been given for two or more candidates they are marked equal.

England.

District 1.—Anthony, J. L., High Street, Bedford.
,, 2.—Welch, Charles, 161, King's Road, Reading.
,, 3. Robinson, Messrs. Cox and Robinson, Stony Stratford; Turner, John, Aylesbury; Griffith, Robert, Slough — equal
,, 4.—Throssell, John, Fitzroy Street, Cambridge.
,, 5. Hornby, C. H., Lower Hillgate, Stockport; Bates, W. I., Mill Street, Macclesfield — equal.
,, 6. Singleton, Henry, Winsford, Cheshire; Goode, Charles, 9, High Street, Congleton — equal.
,, 8.—Prockter, John, Penzance, Cornwall.
,, 9.—Thompson, Andrew, English Street, Carlisle.
,, 10.—Greaves, Abraham, Chesterfield.
,, 11.—Frost, George, Corn Market, Derby.
,, 12.—Symons, W., 26, Joy Street, Barnstaple.
,, 13. Wood, W., Bedford Street, Plymouth; Turney, S. B., Union Street, Plymouth; Codd, F., Duke Street, Devonport — equal.
,, 14.—Delves, George, High Street, Exeter.
,, 15.—Groves, T. B., St. Mary Street, Weymouth.
,, 16.—Elliott, Robert, High Street, Gateshead.
,, 17.—Harrison, Jno., 33, Bridge Street, Sunderland.
,, 18.—Robinson, James, Northgate, Darlington.
,, 19.—Cole, F. A., 34, St. Botolph's Street, Colchester.
,, 20. Smith, N., Cheltenham; Jeffrey, T. A., Leamington Pl., Cheltenham — equal.
,, 21.—Stafford, William, Northgate Street, Gloucester.
,, 22.—Barker, C. D., 51, White Ladies Rd., Clifton, Bristol.
,, 25.—Pollard, Henry, High Street, Ryde, Isle of Wight.
,, 26.—Chave, W., Broad Street, Hereford.
,, 27.—Durrant, G. R., Old Cross, Hertford.
,, 28.—Turner, W. M., St. Ives, Hunts.
,, 29.—Green, Robert, Hare Street, Woolwich.
,, 30.—Barnaby, Henry, Star Hill, Rochester.
31.—Bing, E., St. George's Street, Canterbury.
,, 32.—Cotterell, W. H., Dover.
,, 33.—Bagnall, W. H., New Street, Lancaster.
,, 34.—Sharples, George, 7, Fishergate, Preston.
,, 35.—Farnworth, William, King William Street, Blackburn.
,, 36.—Thomas, Richard, Manchester Road, Burnley.
,, 37.—Dutton, Francis, Town Hall Square, Bolton.
,, 38.—Ashton, William, Lord Street, Southport.
,, 39.—Robinson, Ralph, Yorkshire Street, Rochdale.
,, 40.—Hargreaves, H. L., High Street, Oldham.
,, 41. Woolley, G. S., 69, Market Street, Manchester; Slugg, J. T., 242, Stretford Road, Manchester; Benger, F. B., 7, Exchange Street, Manchester; Brown, W. S., Market Street, Manchester; Williams, F. P., 257, Oldham Rd., Manchester — equal.
,, 43. Symes, Dr Charles, Hardman Street, Liverpool; Woodcock, Joseph, Shaw Street, Liverpool; Shaw, John, Gt. George Place, Liverpool.
,, 44.—Clark, W. B., Belvoir Street, Leicester.
,, 45.—Robson, W., Cleethorpe's Road, Great Grimsby.
,, 46.—Maltby, Joseph, High Street, Lincoln.
,, 47.—Pilley, Henry, Strait Bargate, Boston.
,, 48. Hampson, Robert, 205, St. John's Street Road, London, E.C.; Andrews, Frederick, 34, Leinster Terrace, Hyde Park, London, W.; Greenish, Thomas, New Street, Dorset Sq., London; Urwick, W. W., 60, St. George's Road, London, S.W.; Owen John, 51, Holloway Road, London, N.; Pattison, George, 139, St. John's Street Rd., London; Preston, Alfred, 88, Leadenhall Street, London; Slipper, James, 86, Leather Lane, London; Humpage, B., Turnham Green, London — equal.
,, 49.—Young, John, High Street, Newport.
,, 50. Wigg, W. C., 17, High Street, King's Lynn; Atmore, George, 17, High Street, King's Lynn — equal.
,, 51.—Robinson, James, Oxford Hill, Norwich.
,, 52.—Poll, W. S., Regent Road, Great Yarmouth.
District 53.—Bingley, John, Wood Hill, Northampton.
,, 54.—Carr, W. G., Berwick-on-Tweed.
,, 55.—Proctor, B. S., Newcastle-on-Tyne.
,, 56.—Shepperley, George, Long Row, Nottingham.
,, 57.—March, W., Market Place, Newark-on-Trent.
,, 58.—Prior, G. T., Broad Street, Oxford.
,, 59.—Cross, W. G., jun., Mardol, Shrewsbury.
,, 60.—Hillier, Henry, Bridge Street, Bath.
,, 61.—Prince, Henry, Fore Street, Taunton.
,, 62. Blackshaw, Thomas, Burslem; Prince, G. A., Longton; Pickburn, G. H., Kidsgrove — equal.
,, 63.—Averill, John, Market Square, Stafford.
,, 64. Fleeming Wm., Queen Square, Wolverhampton; Brevitt, W. Y., Pennfields, Wolverhampton; Lowe, R. H., Wolverhampton — equal.
,, 65.—Anness, S. R., Westgate Street, Ipswich.
,, 66.—Whaley, Edward, Kingston-on-Thames.
,, 67.—Cortis, A. B., South Street, Worthing.
,, 68.—Vizer, E. B., Church Road, Brighton.
,, 69.—Rossiter, F., George Street, Hastings.
,, 70. Barclay, Thomas, Bull Street, Birmingham; Arblaster, C. J., New Street, Birmingham; Southall, William, Bull Street, Birmingham.
,, 71.—Walker, George, Coventry.
,, 72.—Davis, Henry, Warwick Street, Leamington.
,, 73.—Severs, Joseph, Stricklandgate, Kendal.
,, 74.—Orchard, E. J., Salisbury.
,, 75.—Hollier, Elliott, Market Place, Dudley.
,, 76.—Johnson, T. S., Malvern.
,, 77.—Thompson, Thomas, King Street, Richmond, Yorks.
,, 78.—Middleton, Joseph, Clevedon Terrace, Middlesboro'.
,, 79.—Whitfield, John, 113, Westborough, Scarboro'.
,, 80.—Davison, Ralph, Holgate Hill, York.
,, 81.—Bell, C. B., Spring Bank, Hull.
,, 82.—Greenwood, John, 20, Parliament Street, Harrowgate.
,, 83. Reynolds, Richard, 13, Briggate, Leeds; Stead, T. B., Upperhead Row, Leeds.
,, 84.—Silson, R. W., Church Street, Manningham, Bradford.
,, 85.—Jessop, Jonathan, Halifax.
,, 86.—Robinson, J. R., Westgate, Dewsbury.
,, 87.—Cardwell, James, Bread Street, Wakefield.
,, 88.—Hall, George, King William Street, Huddersfield.
,, 89.—Badger, Alfred, Eldon Street, Barnsley.
,, 90. Cubley, George A., High Street, Sheffield; Jervis, William, Broomhill, Sheffield.

Wales.

,, 91.—Roberts, M., High Street, Bangor.
,, 92. Roberts, Peter, St. Asaph's; Round, W. T., Ruthin — equal.
,, 93.—Jones, Thomas, Bala.
,, 94.—Davies, T. J., Great Darkgate Street, Aberystwith.
,, 95.—Francis, Thomas, Notts Square, Carmarthen.
,, 96.—Drane, Robert, 8, Queen Street, Cardiff.

Scotland.

,, 97.—Kermath, W. R., St. Andrews, N.B.
,, 98. Mackenzie, James, 45, Forrest Road, Edinburgh; Laird, G. H., 40, Queensferry Street, Edinburgh; Raimes, Richard, Jun., Leith Walk, Edinburgh.
,, 99.—Borthwick, A. J., Market Place, Selkirk.
,, 101. Davison, Thomas, Buchanan Street, Glasgow; Kinninmont, Alex., Portland Street, Glasgow; Greig, William, 59, Glasford Street, Glasgow; Currie, John, 479, Sauchiehall Street, Glasgow; McAdam, Robert, Virginia Street, Glasgow.
,, 103. Burn, D. H., Arbroath; Kerr, Charles, 56, Nethergate, Dundee.
,, 104. Strachan, Alex., George Street, Aberdeen; Ritchie, David, Market Street, Aberdeen; Paterson, James, Aberdeen — equal.
,, 105. Bartlett, E., Banff; Sangster, W., Dufftown — equal.
,, 106. Dewar, P. J., Dingwall, Ross-shire; MacRitchie, David, 28, High St., Inverness — equal.

The following "additional members of the General Committee" have also been elected:—

Holdsworth, T. W.	Birmingham.
Churchill, W. J.	Birmingham.
Jones, S. U.	Leamington.
Wade, John	London.
Pearman, H.	Newport, Mon.
Phillips, J.	Wigan.
McNeill, J. H.	Crewe.
Shaw, H. W.	Doncaster.
Storrar, D.	Kirkcaldy.
Ellinor, George	Sheffield

LIVERPOOL CHEMISTS ASSOCIATION.

The twelfth general meeting of the thirty-first session was held at the Royal Institution, on Thursday evening, April 8, the President, Dr. Charles Symes, in the chair.

The minutes of the previous meeting having been read and confirmed, some interesting miscellaneous communications were made by several members.

A paper on "Resorcin and the Dyes prepared therefrom," was read by Mr. Albert Kehlstadt, Ph.D. The author described the production of resorcin, dealt fully with its chemical and physical characters, and passed on to illustrate the formation of the many beautiful dyes prepared from it.

Mr. M. Conroy exhibited a small sample of volatile oil of gentian root (about half a drachm) which he had obtained by distilling 3 cwt. of root. Not a particle of oil separated from the distilled water, and the small quantity of oil exhibited had been prepared by abstracting the oil from the distilled water by washing with ether, and the subsequent recovery of the ether by distillation, at as low a temperature as possible. The oil obtained by this means possesses a powerful odour of the root, is brown in colour, and of the viscosity of castor oil. The sample was too small to enable him to fully examine it, but he hoped soon to be in the possession of more and would then be in a position to do so.

Dr. Symes exhibited and described the working of "An Improved Form of Apparatus for Continuous Extraction." The apparatus consisted of a conical glass percolator which fitted air-tight into a receiving vessel contained in a water-bath. As the percolate passes into the receiver, the menstruum is volatilized by the heat of the water-bath and driven back into the percolator, passing by means of a tube through the centre of the material in the percolator. The percolator lid being dish shaped and filled with ice answers the purpose of an effectual condenser. The apparatus was exhibited working alcoholic extract of cinchona, and the process seemed very complete.

Interesting discussions followed each communication and votes of thanks having been passed to the authors, the meeting closed.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The sixth meeting of the session was held in Anderson's College, 204, George Street, on Wednesday, April 14, Mr. A. Kinninmont, F.C.S., President, in the chair.

The minutes of the previous meeting were read and adopted.

The President then reviewed the work of the session about to close, and in doing so commented upon the various papers read during that period by Messrs. Clarke, Kinninmont, Hunter and Dr. Whittaker.

After the President's remarks it was agreed to hold the annual general meeting about the middle of May, for the election of President and office bearers for the ensuing session, to receive the treasurer's report, and to transact any other business that may require attention.

Mr. John Currie moved a vote of thanks to the President, for his address, which was duly awarded by the members; and there being no other business the meeting closed.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

A meeting of the members of this Association was held on the 13th inst., the chair being occupied by the President, Mr. Fitzhugh, F.C.S. There was a good attendance.

Mr. Warriner, in a short paper, introduced the question of "Present Rates charged for Carriage of Goods," and after considerable discussion the following Committee were appointed—Messrs. White, Warriner, Rogerson, Wilford and Shepperley—to consider and inquire into the present high rates charged for carriage of drugs in hampers, and put themselves into communication with any whom they might think proper, with a view to the reduction of the present high rates and to report thereon to another meeting.

The Honorary Secretary, Mr. R. Jackson then read a circular from the Manchester Chemists' Association respecting the sale of proprietary medicines containing poisons by unregistered persons. In the discussion which followed, it was felt most desirable that such medicines should be sold only by chemists and druggists, but it was suggested that if all proprietary medicines which contained such poisons had to be labelled poison, it would entail considerable trouble if diarrhœa and cough mixtures were under the same regulation. Eventually, however, a resolution similar to the one sent from the Manchester Association was adopted, and the Honorary Secretary was requested to forward it to the Council of the Pharmaceutical Society.

The next subject for discussion was the Thursday afternoon closing movement, which is being adopted by many of the different trades in the town. Several speakers argued in favour of the movement, but it was strongly opposed by others, and several chemists having branch post-offices attached to their business stated they were unable to close in consequence. The proposal to close, therefore, fell through, although a majority of the meeting were in favour of it.

A vote of thanks to the chairman closed the proceedings.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on April 15, Professor H. E. Roscoe, President, in the chair. The following certificates were read for the first time:—E. Rawson, Kamze Lal Dey Rai Bahadour, Tarapwsanna Roy, of Calcutta, and R. G. Watts. The following gentlemen were balloted for and declared duly elected Fellows of the Society, Professor McLeod and Dr. Wright being appointed scrutators:—M. Bechler, A. W. Black, E. C. Copas, W. J. Dibdin, A. C. Fryer, E. C. Graham, C. H. Gimingham, R. Grimwood, W. F. Haydon, H. Liepmann, F. B. Last, W. Robinson, W. Regester, J. W. Stanley, H. H. Slater, A. J. Smith, H. C. Stephens, C. P. Scheibner, J. R. Skelton.

The following papers were read:—

On the Lecture Illustration of Chemical Curves. By E. J. Mills.—The author has contrived for lecture illustration an apparatus extremely concrete in its effect, in which a chemical action or process constructs its curve under the eyes of the observer. It consists of eighteen tall glass cylinders, of about 270 c.c. capacity, which are filled with water and inverted in as many glass troughs, the cylinders being supported at equal distances from each other in a sort of test-tube frame; each inverted cylinder has a 100 c.c. stoppered retort, so arranged that its beak can be made to dip under the mouth of the cylinder, the whole forming a series of gas generators and pneumatic troughs, arranged at equal distances from each other. With this apparatus the author has examined the action of dilute sulphuric acid on zinc and sodic hydrate on aluminium, the two factors which were varied being the strength of the solution and the time during which the action was allowed to take place. Thus equal pieces of clean zinc were placed in each of the retorts, the strength of the acid rising in successive retorts by 3 per cent.; thus various amounts of hydrogen were evolved and collected in the inverted cylinders; the surfaces of the water in the eighteen cylinders were then found to assume a curved line, representing the course of the action. This the author designates a quantity curve. Similarly, by measuring the time during which the action was allowed to proceed by equal increments, another curve was obtained—the time curve.

The errors in the method are pointed out, but a sufficiently accurate general impression will be conveyed of the true curve, as the eye neglects the small variations.

After a few remarks by Mr. W. Thorp, who had seen the experiments in Dr. Mills's laboratory, and who confirmed the care taken to insure identity of conditions as to the zinc, temperature, etc.,

The President called on Mr. W. H. PERKIN to read his paper on—

The Analysis of Organic Bodies containing Nitrogen. (Continued.)—In the previous portion of the paper the author proposed to absorb the oxides of nitrogen formed during the combustion of nitrogenous substances by potassic chromate instead of decomposing them by metallic copper. In the combustion of uric acid, oxide of copper was used; as some of this was reduced, it might be argued that the good results were partly due to the metallic copper and not to the chromate; therefore, to test the process still further, combustions were made with plumbic chromate instead of oxide of copper, and it was found that the potassic chromate did not satisfactorily absorb the nitrous fumes. A quantity of precipitated manganic oxide was now made into a paste with a saturated solution of potassic chromate and the mixture dried and heated somewhat strongly to drive off most of the water of hydration. The efficacy of this mixture was tested by its power of absorbing the red fumes evolved when plumbic nitrate is heated. When the mixture was heated to a dull red heat some of the nitrogen oxides passed, but if kept at a lower temperature the absorption was complete. The mixtures used consisted in one case of 1 part of chromate to 2 of manganic oxide, in others of 2 parts of chromate to 1 of manganic oxide; both mixtures seemed to answer equally well. Combustions with dinitrobenzene and ethylorthotoluidine gave very satisfactory results. The author recommends potassic chromate containing 10 per cent. of potassic bichromate, as the commercial precipitated manganic oxide may contain potash; powdered pyrolusite will not act satisfactorily. In making combustions about six inches of the mixture are placed in the front part of the tube (the oxygen process being used); the whole of the tube is then heated and dried with air in the usual way. The temperature of the mixture is then allowed to fall to about 200—250° C. (in the combustion furnace used by the author about one-fourth of the burners were kept alight and were half turned down); the combustion is then proceeded with in the ordinary way. By re-heating the mixture strongly and passing a current of air the oxides of nitrogen are removed and the mixture is ready for a second combustion. Thus the same mixture has been used seven times. If the organic substance contains sulphur a greater length of the mixture must be used, the back part being strongly heated to absorb the sulphur dioxide and the front part maintained at 200—250° to absorb the oxides of nitrogen.

The President said that all present could appreciate the value of this convenient method. The author had hit on a blot in our methods of organic analysis, and apparently completely removed it.

Dr. Wright commented on the great boon the author had conferred on analysts by the introduction of this method.

The President then called on Professor McLeod to communicate some results obtained—

On the Volatilization of Solids in Vacuo. By W. DOUGLAS HERMAN.—Professor McLeod requiring some pure phosphorus endeavoured to obtain some by distilling ordinary phosphorus in an atmosphere of carbon dioxide, but without success. He then wrote to Mr. Herman, who had been investigating the question, inquiring where his paper on the subject was published. In reply Mr. Herman forwarded the present communication, with a request that he would read it. The paper, however, was incomplete, and Professor McLeod therefore gave an abstract of the paper with a short account of some experiments he had himself made, and exhibited some illustrative specimens. Mr. Herman sealed up some phosphorus in glass tubes containing air and in vacuous tubes. On distillation in the light the phosphorus in the vacuous tubes condensed in minute yellow crystals. When, however, the distillation was conducted in the dark most beautiful colourless transparent adamantine crystals were obtained. The phosphorus was dried with filter paper. The author states that when these crystals were exposed to daylight they became rough and opaque, at the same time yellow or red. As regards the opacity, Professor McLeod has obtained somewhat different results. Mr. Herman also observed that when phosphorus was heated in sealed tubes to 140°, it became surfused, and remained in the liquid state for some months after cooling. This phosphorus turned red in the sunlight; it was interesting to note that the red amorphous phosphorus could therefore be obtained from solid, liquid and gaseous phosphorus by the action of light alone. In one case a crystal of phosphorus was obtained 8 mm. long. Mr. Herman also made some most interesting experiments with sulphur. Sulphur sealed up in vacuous tubes distilled over at the temperature of boiling water, *i.e.*, 11° below its melting point, and condensed in minute drops of liquid sulphur, forming a cloud on the glass. After a time minute crystals appeared, and began to grow, the liquid disappearing *pari passu* until the whole was converted into crystals. Similar experiments were made with iodine, selenium, ammonium chloride, etc. Professor McLeod then gave an account of the experiments he had made. He had sealed up phosphorus in glass tubes, carefully absorbing all moisture by melting the phosphorus in a bulb, connected with a second bulb containing phosphoric anhydride. He had obtained most beautiful crystals, some of which were exhibited. They resembled in appearance diamonds, being perfectly colourless, with an adamantine lustre, perfectly transparent, and from their high refractive index, sparkling with prismatic colours. Professor McLeod had not been able to confirm Mr. Herman's statement that these crystals became opaque in daylight, and thought that this was due to the presence of a trace of water containing a trace of air, as from experiments he had made by distilling some phosphorus, as above described, and then exposing it to the action of boiled water and light, the crystals became red, but remained transparent; if, however, unboiled water was used, a white coating was formed similar to that on the ordinary phosphorus kept under water and exposed to light.

The President had listened with great interest to the lucid explanation given by Professor McLeod. As to the specimens, they would speak for themselves. He hoped Mr. Herman would finish and publish his paper, and especially complete the interesting observations about the volatilization of sulphur.

Mr. WARINGTON then communicated a paper—

On the Determination of Nitric Acid as Nitric Oxide by Means of its Reaction with Ferrous Chloride.—The author has previously communicated some results on the determination of nitric acid by Crum and Frankland's process; with small quantities of nitric acid and in the presence of sugar and other organic matter, the results were always low. Schloessing's method was therefore examined; it consists in boiling the solution of the nitrate in a flask until all air has been expelled, and then boiling with strong solution of ferrous chloride and hydrochloric acid for ten minutes, the nitric oxide is collected over mercury, oxidized into nitric acid and titrated. An atmosphere of carbonic anhydride was then used to displace the air; in this way results were obtained equal to 95 per cent. of the nitrogen taken. When cane sugar, gelatin, etc., were added, the results came too low, but by increasing the quantity of ferrous chloride good results were obtained. Another modification largely used consisted in collecting the gas over caustic soda. As the quantities of nitric acid to be determined by the author were extremely small, being equal to 5 to $\frac{1}{3}$ milligram of nitrogen, it seemed to him best to estimate the nitric oxide given off by gas analysis. A chloride of calcium bath was also introduced for heating the nitrate, the best temperature being 130°—140° C. It was found that however long the mixture was boiled, bubbles of gas were being constantly evolved, due to the introduction of air with the hydrochloric acid. However, with small quantities, 5 and 1·4 milligram of nitrogen, gas = 99 per cent. of the nitrogen was obtained. On analysing this gas, it was found to contain only 95—87 per cent. of nitrogen. It was noticed when sugar was present that much brown fluid distilled over, and on examination it was found that a marked diminution of the gas took place by allowing it to stand over caustic soda, and especially with caustic soda and the brownish distillate, as much as 42 per cent. of nitric oxide being thus absorbed with the caustic soda alone, so the author cannot help thinking that many analyses in which the gas has been collected over caustic soda are in rather a perilous condition. If the gas is analysed at once before much absorption has taken place, the error is not large. The author then described the apparatus which he found to be most convenient. It consists of a double necked globular receiver; from one end passes the delivery tube, through the other a tube for a stream of carbonic anhydride, and a somewhat long vertical tube, furnished with a stoppered funnel at the top for introducing the hydrochloric acid. The air is first cleared out by passing carbonic anhydride for thirty minutes, the acid is then introduced and the solution evaporated to dryness, by the chloride of calcium bath at 130°—140°; the nitric oxide swept out by carbonic anhydride, and analysed. In this way with 1·4 milligrams of nitrogen results = 92—94 per cent. were obtained. Sugar and organic matter have no effect on the results. The author mentioned, in conclusion, that a strong solution of ferrous chloride was extremely useful for absorbing nitric oxide.

Dr. Armstrong suggested the use of the Sprengel pump, instead of a stream of carbonic anhydride to get rid of the air.

The next paper was taken as read —

On the Six Possible Isomeric Dibrom-toluols and other of the Bromo and Bromo-nitro Derivatives of Toluol related thereto. By R. H. C. Nevile and A. Winther.—In the table given by R. Körner in his memoir on 'The Isomerism of the Aromatic Compounds containing six Atoms of Carbon,' the rule is laid down that in introducing one of the halogens, or the nitro group into anilin it takes the para position. Körner's paper deals only with the substitution of the second hydrogen atom in mono-derivatives of benzol, and consequently in this case only with anilin. But it appears to the authors that the rule is of more general application, and that if bromine, or the other halogens, or the nitro group be caused directly to act upon aniline or its homologues, toluidin, xylidin, etc., or probably other amido compounds, the acid group nearly always, if possible, takes the para position to the amido group; if the para position be occupied by any other group, it then takes one of the ortho positions, but under no circumstances can one of the above acid groups be directly introduced into a position meta to the amido group. The authors think that the above rule will also hold good with diamido compounds. Some experiments of Wrobleosky (*Jahrs.*, 1870, 528, and 1871, 450), appear to point to conclusions at variance with the above theory, the authors have therefore repeated his experiments and established the correctness of the above theory against the experiments of Wrobleosky. They obtained a bromo-nitro-toluidine, m.p. 180°·3, having the constitution $\underset{1}{CH_3}\ \underset{2}{NH_2}\ \underset{3}{Br}\ \underset{5}{NO_2}$, the constitution of Wrobleosky's substance, m.p. 139°, being $\underset{1}{CH_3}\ \underset{2}{NH_2}\ \underset{3}{NO_2}\ \underset{5}{Br}$ and ordinary nitro-ortho-toluidine $\underset{1}{CH_3}\ \underset{2}{NH_2}\ \underset{5}{NO_2}$. The authors next consider the dibromotoluol, in which both the bromine atoms are meta to the CH_3 group, and promise a further communication on the dibromotoluol 1, 2, 6, and the tribromo and tetrabromo toluols. The paper is lengthy, and contains detailed accounts of the preparation and analyses of the numerous compounds investigated.

The Society then adjourned to May 6, when the following papers will be read:—"On the Action of Sodium on Ethereal Salts of Phenylacetic Acid," by Dr. Hodgkinson; "Estimation of Nitrogen in Carbon Compounds," by C. E. Groves; "On Sage Oil," by M. M. P. Muir. It was also announced that the discussion on Dr. Tidy's paper on "River Water," will take place on May 20. (The paper will be printed early in May.)

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

Replies.

[394]. In answer to C. J. B., I beg to inform him that one grain of manna to each pill will make them the proper size and consistence.

T. Drawbridge.

[398]. "Junior" will do well to remember in the dispensing of "doctors' prescriptions" not to rely entirely on the order in which they are written; but by using discretion with regard to the nature of the drugs contained in such prescriptions, especially if highly concentrated, will ensure against such unsightly mixtures now complained of.

But if he will reverse the *modus operandi*, and put all ingredients (except tinct. camph. co.) in the bottle, and nearly fill up with aqua, lastly adding tinct. camph. co., "Junior" will obtain a clear mixture *sine* deposit.

Fred. Ellis.

Queries.

[399]. A short time ago I had the following prescription handed me to be made up:—

℞ Acid. Nitric. Dil. . . . . ʒiij.
Extract. Taraxaci Liquid. . . . . ℥iv.
M.

In my experience in several large dispensing establishments and in various towns, it was the usual practice to give "Battley's liquor taraxaci" in such a case as this. I did so in this instance, and the medical attendant expressed surprise.

Can any of your correspondents say if I was right?

D. G.

[400]. I had the following to dispense:—

℞ Acid. Carbolic. . . . . ʒj.
Aqua . . . . Hss.
Ft. lotio.

Lotion for external use. To be applied to the parts, and covered with tinfoil.

Does the prescriber intend the bottle of lotion to be covered with tinfoil, or the parts on which it has to be applied?

Junior.

[401]. I have just had the following prescription to dispense:—

℞ Chlorodyn.		ʒij.
Tr. Senegæ		℥ss.
Vin. Antim.		ʒj.
Mist. Scillæ	ad	℥jv.

M. sig. ℥ss ter in die.

Will you kindly inform me in the next issue of the Journal what is mist. scillæ, and give the formula, if there is one. I may say that it is a Scotch prescription, and has been dispensed in Aberdeen.

K.

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[402]. When pulv. cretæ co. c. opio is prescribed, which should be used, the P.L. preparation, or the pulv. cretæ aromat. c. opio of the B.P.?

JACQUE.

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[403]. E. L. will be glad of the editor's opinion in the following cases:—

℞ Acid. Citric.		℈j.
Quinæ Disulph.		gr. v.
Ext. Taraxaci		ʒss.
Ext. Sarsæ Liq.		℥j.
Aq.	ad	℥vj.

Ft. mist. Dose, ℥ss.

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[404].

℞ Inf. Gent. Co. Conc.		℥j.
Inf. Chirettæ Conc.		℥j.
Inf. Pruni Virgin.		℥j.
Acid. Phosphoric. Dil.		ʒij.
Tinct. Nucis Vomic.		ʒiss.
Syrup		℥ij.
Aq.	ad	℥viij.

Ft. mist. Dose, ℥ss.

In the above mixtures a decomposition takes place; in the first from the presence of acid. cit. and quinia, and in the second from the nux vomica and acid. phosphoric.

What can be done in order to make nice clear mixtures in both instances?

E. L.

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[405]. Will you kindly inform me whether any decomposition takes place in making up the enclosed prescription rolled on the machine by means of mag. carb. pond.?

℞ Plumbi Acet.	gr. iij.
P. Opii	gr. j.
Conf. Rosæ	q. s.

Fit. pil. iij.

CYMRO.

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[406]. What is the best mode of dispensing the following and what appearance should it present?—

℞ Quinæ Sulphat.		gr. xxiv.
Potass. Iodid.		gr. xxiv.
Potass. Citrat.		ʒij.
Pulv. Tragac. Co.		ʒiss.
Vin. Colchici.		ʒij.
Tinct. Card. Co.		ʒiv.
Aq. Chlorof.	ad	℥viij.

M. ft. mist.

C. L. S.

Notes and Queries.

[645]. LOVERS' EVANESCENT INK.—"A. J. Hurn" asked in the *Pharmaceutical Journal* of December 27, 1879, for the formula of this ink. Let him try the following:—"Finest potato starch, 13·5 kilos., and powdered iodine, 1 kilo., are mixed and then rubbed through a sieve, then mixed with 4 litres of water and 1 litre of rectified spirit. The resulting black powder is allowed to stand for fourteen days, then dried and exposed to the air. The dry powder contains 10 per cent. of iodine. The iodide of starch becomes soluble when heated with stirring in an enamelled saucepan over a gentle fire. As soon as the powder is dry the operation is finished, it then emits a pungent smell. From time to time during the heating it must be ascertained whether the powder has become soluble, by heating some of it with water in an iron spoon. At a strong heat it yields a red solution with loss of iodine. In order to purify the powder and make it thoroughly soluble, of a violet tint in cold water, a concentrated solution is made by heating, so that it shows 7–8°. This solution is allowed to deposit for several days, decanted and precipitated with rectified spirit. The precipitate is strained, and dried in the drying closet. If excess of spirit is used in the precipitation, a gummy matter is thrown down, the presence of which is superfluous." A certain firm claims to be the sole manufacturers of the ink. They advertise that writing executed with it gradually fades away and cannot be restored by any chemical, and state "that the time it takes to fade depends on the paper that is used; if written with a perfectly clean steel or quill pen on unglazed paper the evanescence will be more rapid than when written on glazed paper. On some papers it will disappear in a day, whilst on other kinds it will take more than a week." I tried this ink, six weeks ago, on various sorts of paper, and I still find the writing quite visible. It can easily be restored to a jet black by exposing the writing to the fumes of iodine. Perfection has not yet been obtained in the production of this useful ink; there appears to be some chemical either absent or not present in a sufficient quantity to induce a rapid evanescence.

SAMUEL LAWRENCE.

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[651]. PRESERVATION OF EMULSION OF ALMOND OIL.—Can any reader of the Journal inform me of anything to prevent emulsion of almond oil from spoiling, when made with mucilage or alkali?

W. M. P.

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[652]. CHILI PASTE.—Can any reader furnish formula for Chili paste, such as used in hydropathic institutions?

J. W.

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[653]. FLEXIBLE CEMENT.—"Euretes" wishes for a recipe for a flexible cement which would maintain its adhesive virtues at a temperature of 212° F. and when immersed in boiling water.

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[654]. TINCT. CHLOR. MORPH. SCOTIS.—Would any reader give me the formula for tinct. chlor. morph. Scotis?

F. MOORE.

"SOLIDIFIED" BROMINE.—The utility of bromine as a disinfectant agent is now well recognized; but, owing to its liquid condition and difficulty of transportation, it has hitherto been but little used for such purposes. Chlorine, which is a gas, is always available by means of the solid commercial chloride of lime; but a similar method of binding bromine in a compound, which would readily yield it up, has heretofore been a desideratum. A manufacturer of Charlottenburg (Prussia), Mr. Frank, has conceived the idea to cause bromine to be absorbed by so-called "kiesel-guhr," that is, the siliceous marl which Ehrenberg has shown to consist of the microscopic shells of infusoria, and which is also used to absorb nitroglycerin, thus forming the well-known dynamite. The inventor has given to the mixture the inappropriate name "solidified, or solid bromine." In this condition, it is easily applied for disinfecting purposes.—*Pharm. Handelsbl.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE ELECTION OF THE NEW COUNCIL.

Sir,—The evident intention of the letter of "A Member" (of the Council?) is to damage, if possible, Mr. Shepperley's candidature.

It is written with such an air of self-satisfaction, and in such a solemnly grandiose style, that it reminds one of a recent celebrated political manifesto, and I hope sincerely that its aim and object may be as completely frustrated.

The insinuations in it, that Mr. Shepperley has not the knowledge and experience necessary for such a position, are rude and ungentlemanlike in the extreme.

May I ask what Mr. Shepperley has done to merit such treatment as to be asked by this egotistical "Member" to retire from the contest for filling up the vacancies on the Council of the Society? There can be but one answer, and that is, nothing.

Through no seeking of his own, and unfortunately for himself, he happened to be chosen for the attack on chemists' privileges by the Nottingham Medical Defence Association; he was thus necessitated either to pay the penalty for the so-called infringement of the Apothecaries Act, 1815, or defend the trade interests attacked at law. This, thanks to the generous aid rendered by the Chemists' Trade Association, he did successfully, to his own comfort and to the immense benefit of the entire trade, few will question; and, in the language of the "Member's" letter, "happily the question of counter practice is at rest."

The craven fear of the Society of Apothecaries shown by the writer is mean and servile. It is absurd to think that the election of Mr. Shepperley to a seat on the Council would in any way influence the members of an honourable corporation to pursue a different course of action with reference to the counter practice of chemists and lead them to recall their expressed intention of not in the future lending their aid to any more similar prosecutions.

However, Mr. Shepperley's address, which is explicit and straightforward, is before the members, and is one which I believe will command their sympathy and support.

I confidently expect to see that the result of his appeal to the country members will be answered by them in such a manner as will make "A Member" feel that his dictation and unsought-for advice are not acceptable to the majority of our members and associates.

GEORGE JAMES GOSTLING.

Sir,—In accordance with the laws which govern the Society, it is perfectly legal for any member to be elected to the Council, provided he is not a member of the Board of Examiners. In view of this prohibition, which appears to be directed against the entire control of the examinations being in the hands of one body, it seems somewhat anomalous that Mr. Wills should be nominated for election as a member of Council. It is true he is not a member of the Board of Examiners, and is not therefore actually disqualified by law, but, as a professed teacher of candidates for the Society's examinations, is it desirable that he should be elected to take a seat in a body which has as a part of its duties the control of examinations and the appointment of examiners?

Would it not be thought strange if one of the professors at Bloomsbury Square should aspire to a seat on the Board?

A MEMBER.

Sir,—I have been shown a circular, signed by Mr. G. S. Wills, asking for the votes of the members of the Society in the approaching Council election. How far circulars issued by candidates in support of their own claims are a desirable innovation in these elections is a matter I do not wish to enter upon, nor do I desire to question Mr. Wills's qualifications for the office he seeks. Of Mr. Wills personally I know nothing whatever, save what he himself tells us in his weekly advertisement and in his circular: but from the former source I gather that his business consists in preparing students for the examinations of the Society; and this being so, I would ask, is it proper, is it decent, that he should seek to belong to the body whose duty it is to select the members of the examining board?

I do not learn from the circular that Mr. Wills is dissatisfied with the conduct of past Councils, or that there is any new policy he wishes to be the means of inaugurating, so that I trust second thoughts will induce him to withdraw from a position which, to say the least, is offensive to good taste.

AN OLD MEMBER.

VOLUMETRIC ESTIMATION OF ALKALOIDS.

Sir,—Mr. Thresh's letter in your last issue does not touch the point which excited my wonder.

x is so ordinary an expression in chemical papers that its presence in the formula referred to only gave rise to speculation when it was found to distinguish this and another among upwards of a dozen. Wonder supervened on reading that "the results in the fifth column are calculated from the formula, $-3(BiI_3)2(\bar{Q}HI)xHI$;" in other words, that calculations are made from a formula one of the elements of which (x) is of a value unknown to the author. This is the inconsistency which I criticized by a *reductio ad absurdum*, and which Mr. Thresh's letter has done nothing to remove. Will the author show us by an example how he uses the formula? The inference is that the formula actually used was $3(BiI_3)2(\bar{Q}HI)$, but making the calculation on this basis I find that 15 c.c. of the volumetric bismuth solution is equivalent to ·0648 gram quinia and not ·065. A comparison of the third and fifth columns of the table on page 810 indicates other differences of a similar character.

Before seeing Mr. Thresh's letter I had formed the opinion that the formula in question was put down to remind him of an unknown proportion of HI being associated in the precipitate, and that in arranging the materials for his paper the inconsistency of the formula with the expression immediately preceding escaped observation.

300, *High Holborn, London, W.C.* JOHN MOSS.

H. C. H.—(1) *Caltha palustris.* (2) *Mercurialis perennis.* (3) *Lonicera Periclymenum.*

Perfumery Trade Mark.—We have received a letter from the Crown Perfumery Company with respect to the action of *Rimmel* v. *Thompson*, reported on p. 844, in last week's Journal, in which it is stated that the labels complained of had conspicuously printed on them the name of the customer and the name and trade-mark of the Crown Perfumery Company, and no other name or design that was not public property; that the glass also had the name of the company conspicuously blown upon it. We may say that we have no knowledge of the facts of this case further than they may be derived from the report in *The Times*, but that report appears to show that the labels complained of were improper imitations of those used by the plaintiff.

Alpha.—The fragment sent is quillaia bark.

"*Ignor.*"—The nearest approach to the destruction of bone that we are aware of would be effected by burning; if you wished to dissolve the residue it might be done with hydrochloric acid.

"*Socius.*"—There is nothing in the Preliminary Examination that necessitates any special book for the study of arithmetic and Latin. Any good ordinary school book would be sufficient for the purpose.

J. D. M.—*New Remedies* is published by Wood and Co., New York and the home subscription is two dollars.

"*Alsatia*" is recommended to try amylic alcohol.

E. J. Clark.—See the discussion on the impurities in bismuth, and the probability of tellurium being one of them, in vol. vi. of the present series, pp. 420, 440, 501, 561, 620, etc.

E. Yewdall.—Thanks for your note, concerning the subject of which we are making inquiries.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Yewdall, Castle, Carter, A.P.B., M.P.S., Cymro.

"THE MONTH."

In the earlier part of the month the proverbial "April showers" and gentle zephyrs seemed to betoken the approach of an old-fashioned, or perhaps it would be more correct to say an ideal April. The cold north-easterly winds have, however, checked the bursting buds, dried up the earth, and seem to have plunged us back again into the middle of March. The almond, which generally at this time of year presents masses of delicate pink blossom in the London gardens, is hardly noticeable from the sparseness of flowers. Still, according to the calculation of an Isle of Wight correspondent, the flowers in blossom are at least twenty per cent. more abundant than last year, and a "dropping May" will perhaps make up for the loss of time occasioned by the recent cold weather.

Among the plants in flower in the Isle of Wight, this correspondent mentions the woodruff, berberry, *Vinca major*, *Viburnum Lantana* and *Symphytum officinale*, which are certainly in advance of the neighbourhood of London. There also figures on his list the curious root parasite, *Lathræa squamaria*, remarkable for the absence of chlorophyll in its leafless stems and for its singular, branched, tooth-like roots, to which, following the doctrine of signatures, the old herbalists attributed the property of curing toothache. From the appearance of its root it has received its English name of toothwort and its more appropriate German name of scale-root (*schuppenwurz*). The French name is a singular one, "*clandestine.*" From the genus *Orobanche*, to which it is closely allied, it is distinguished by having a four-toothed calyx. The yellow bark of the berberry is still used by herbalists in jaundice. The comfrey root is used to make a mucilaginous demulcent drink, and by bone-setters to form a plaster-like splint; hence its old name of "consolida major" or "great consound."

The leaves of the wayfaring tree (*Viburnum Lantana*) yield a yellow dye, and its astringent berries are used in Switzerland in the manufacture of ink, while the rind of the root furnishes bird-lime. The cellular structure of the young woody shoots is also worth examination under the microscope. Although abundant in calcareous soils this plant is often absent for miles where the soil does not contain lime. Those who are fond of critical botany will find the genus *Barbarea* an interesting one. One of the forms or sub-species is distinguished most readily, according to one of our best field botanists, by the bitterness of its root. The pretty little whitlow grass, *Draba verna*, also presents a large number of varieties.

Those who live in the eastern counties, especially in the neighbourhood of Bardfield, will find the true oxlip, *Primula elatior*, Jacq., in blossom. Few who have not seen this plant in flower can believe that it is a distinct species. Those who have once seen it growing, however, rarely entertain a doubt upon the subject. This plant forms a notable instance, therefore, of the impossibility of conveying in a short botanical description a good idea of the features which distinguish one plant from another. It is distinguished from the common hybrid forms of the primrose by its drooping flowers turned to one side, their peculiar tint, and especially the linear oblong capsules equalling in length the calyx. Indeed Darwin states that the last-mentioned is almost the only botanical character by which it can be distinguished. The fertility of its pollen, and the quantity of the seed it produces, however, show that it cannot be a hybrid. The possibility of chemical differences existing in plants which present hardly any botanical difference can scarcely be questioned. Thus the Japanese mint, except in taste, agrees closely in botanical characters with some varieties of *Mentha arvensis*. The bergamot is by most botanists considered to be only a variety of the Seville orange, while homœopathists declare that the form of *Anemone Pulsatilla*, called *Pulsatilla nigricans*, is much more effective as a medicine than the form common in this country. The cause of these differences is one of the problems of plant life that well deserves the attention of vegetable physiologists.

The botanical student may now fairly begin in earnest his rambles in search of materials. In the woods the Ranunculaceæ are well represented by the delicate wood anemone and the goldilocks (*Ranunculus auricomus*), while the showy marsh marigold is decking the boggy meadows, and in the north the handsome *Trollius europœus*, with its golden cups, is almost as ornamental as a garden flower; the dull hellebores, too, have not quite finished flowering in copses and orchards. The Cruciferæ are well represented by the three British scurvy grasses, the cuckoo flower, the yellow rocket, and a number of garden plants.

In the Herbaceous Ground at Kew there is abundance of material for study in blossom. The curious *Epimedium* in the Berberidaceæ, with its large horn-shaped nectaries and quaternary flowers, should not be overlooked, for its duration is short. A singular Japanese plant *Stylophorum japonicum*, which seems to form a link between the genera *Chelidonium* and *Papaver*, is now in blossom. The leaves bear a strong resemblance to those of *Chelidonium*, while the base of the pistil is enlarged to form a capsule, reminding one of that of the poppy, were it not surmounted by a style. *Uvularia grandiflora* with its singular perfoliate leaves forms a noticeable object in the Melanthaceæ, and a pretty little plant in the Ericaceæ, *Andromeda tetragona*, offers an excellent illustration of the tetrastichous arrangement of leaves. In this singular plant, the small leaves are so closely placed that the plant has the aspect of a Lycopodium, and presents an instance of the curious fact that plants growing in similar situations, although belonging to very different natural orders, have often great similarity of leaf-shape; *e.g.*, willows, oleander and willow herb, and *Isnardia palustris* and *Peplis Portula*. Of rare British plants at present in flower at Kew may be noticed *Draba incana*, *Arabis Turrita*, *Corydalis solida*, *Epimedium alpinum*, *Leucojum æstivum*, *Doronicum Pardalianches*, *Andromeda polifolia*, *Veronica alpina*, *Euphorbia palustris*, *Muscari racemosum* and *Rubus arcticus*.

Of the purely medicinal plants the *Podophyllum peltatum* is full of buds, and the large handsome yellow flowers of *Adonis vernalis* are in full bloom. The latter plant has recently been brought into notice in this country as a substitute for digitalis, over which it is said to have the advantage of not being a cumulative poison. *Rheum undulatum* and asarabacca are also in blossom, and in the Economic House the orange, lemon, tobacco, and one of the Indigo plants (*I. anil*) are sparingly in flower.

At a recent meeting of the Société Botanique de France, M. Poisson read a paper on "The Adaptive Character of Plant Hairs," and stated that in most climbing plants, as Darwin had shown with regard to the hop, *Galium aparine* and *Rubus australis*, the ridges alone of the stem are furnished with stiff hairs whose tips are bent downwards, while, in the intervals between the ridges, on the upper surface of the leaves, and on the inflorescence, etc., the hairs have a forward or horizontal direction. That these hairs are adapted to enable the plant to climb, is, he considers, evident from the fact that in the dwarf varieties of the haricot beans, which do not climb, these hairs have not a downward direction, and that in the Loasaceæ and other families, it is the species which climb that alone present this form of hair. Of course, there are exceptions, such as *Dioscorea*, in which the leaves are glabrous, and the stem hairs not bent downward. M. Poisson proposes to turn to account the fact that, in the majority of cases, climbing or twining plants have recurved hairs, by using it as a means of judging from incomplete herbarium specimens whether the specimen is a climbing plant or not. It may also be of service in determining such a point in drugs of unknown origin.

The recent researches on chlorophyll by Pringsheim are well summarized and reviewed by Professor Ray Lankester, in *Nature* for April 18. It will be remembered that Pringsheim's experiments went to prove that the true function of chlorophyll is to protect the protoplasm of the cell from excessive oxidation, more especially those portions coloured by the chlorophyll, so that the protoplasm of the chlorophyll corpuscles is able to decompose carbonic acid and synthesize the elements of starch, the rays of light allowed to pass through the chlorophyll being those which are most efficient in exciting this process. Unlike hæmoglobin—which possesses the same property of combining with and setting free oxygen when separated from the blood corpuscles as it does when diffused through them—chlorophyll, when separated from the protoplasm which it colours, does not possess the property of decomposing carbonic acid. The fact that the cells containing most chlorophyll form a dense layer on the upper side of the leaf, and so serve to a certain extent to screen the lower side of the leaf where the stomata are usually more abundant, seems to favour this view. Mr. Sidney Vines suggests that it might be possible, if Pringsheim's view be correct, to excite the protoplasm of fungi, by an artificial chlorophyll screen, to decompose CO_2. Professor Lankester suggests that it would be worth while to try it on an etiolated green plant with an artificial chlorophyll screen. Seakale and celery are abundantly grown and *Lathræa* and *Monotropa* are easily obtained, and there is an excellent laboratory at Kew Gardens, so that it may be hoped that this point will soon be settled.

In the *Journal of the Royal Society of New South Wales*, the Rev. G. E. Tenison-Woods contributes some interesting data as to the annual growth of trees. He mentions the fact that a blue gum tree (*Eucalyptus globulus*), known to have been planted eighteen years previously, when cut down was found to have thirty-six concentric rings, *i.e.*, two for every year. As this tree, as well as the stringy bark tree (*Eucalyptus obliqua*) and others, shed their bark twice every year, he concludes that the sap rises twice a year in these trees.

In the *Journal de Pharmacie*, Professor Planchon gives a continuation of his valuable papers on the plants yielding curari. In the April number the microscopical appearance of the stem of *Strychnos Gubleri*, a new species, is figured, and also a leaf, which evidently differs from that of *S. toxifera* in not having the long scattered hairs with which the leaves of the latter are clothed. It yields the curari of the Orinoco.

In the same journal, M. Petit proposes the name kusamine for the new alkaloid which he discovered some time since in a Japanese root used in medicine and described in this Journal (before p. 23). The root yields 2 per cent. of the alkaloid, which has a very bitter taste, is crystalline and non-poisonous.

At a recent meeting of the Edinburgh Odonto-Chirurgical Society, Mr. W. Bowman Macleve introduced to the notice of the members a new anæsthetic, or rather a combination of two well-known anæsthetics. It consists in putting a sponge containing about half a drachm of dichloride of ethidene in the way-tube or supplementary bag of the nitrous oxide inhaler, leaving sufficient space on each side of the sponge for the free passage of the nitrous oxide into and out of the bag. The sensation is said to be more profound and agreeable than when nitrous oxide alone is used; there is complete absence of sickness, while the lividity which renders the administration of nitrous oxide so repulsive to the onlooker is present only, if at all, slightly on the lips. It also produces muscular relaxation rather than the rigidity induced by nitrous oxide.

Bromide of ethyl, or hydrobromic ether, has during the last few years attracted attention in the United States as an anæsthetic and now appears to be coming into notice in this country. It was, however, first introduced in this country as an anæsthetic by Mr. Nunneley, of Leeds, as long ago as 1865, but the cost of preparation then seems to have precluded its general adoption. It is said, according to a paper in the *British Medical Journal*, April 10, p. 565, to possess the following recommendations. It produces more rapid anæsthesia than chloroform and is eliminated more rapidly, and the heart and respiration are less affected than with ether or chloroform, and its odour is more agreeable than that of ether. It is also much less inflammable. Another correspondent of the same Journal, however, states that the odour is disliked by patients, and that it causes giddiness, nausea and headache, which is directly opposed to the statements of others. It also differs from ether in not causing excessive secretion of mucus. According to Dr. Marion Sims, however, bromide of ethyl does not answer well in long operations, nor when disease of the kidney exists. It requires to be given rapidly like nitrous oxide. This body is much more stable than hydriodic ether, which it is almost impossible to keep long free from discoloration. Until, however, a ready means of testing the purity of anæsthetics is available, it is difficult to say how far the disagreeable symptoms may be due to impurities.

In *La France Médicale*, M. Terrillon is reported to have found bromide of ethyl valuable also for producing local anæsthesia; refrigeration is stated to be produced more rapidly than with ether, and the spray may be continued for a long time without causing the irritation of the wound produced by ether.

In the *Lancet*, a few weeks ago, Dr. Hewan called attention to salicylate of quinine as a remedy for rheumatic gout and rheumatism, and gave so good an account of the results obtained that it is now easily obtainable in London.

Chian turpentine also is in great demand, but very scarce. In view of the great variation of the samples to be met with in commerce, it seems highly desirable that the particular kind which Dr. Clay found so successful should be submitted to a careful examination. A specimen of the kind used by that gentleman appeared to be not free from the suspicion of containing Canada balsam, of which it possessed the odour to a certain degree.

Dr. Underwood, in the *British Medical Journal*, gives another instance of the excellent effect of chloride of ammonium in neuralgia. The dose given was 20 grains every three hours.

In a paper in the *Practitioner* for April, attention is called to citrate of caffeine as a diuretic. The author considers it to be "a diuretic of no little value in cardiac dropsy, one too which succeeds at times when digitalis and other diuretics fail." It appears in some cases, however, to cause nausea and headache. Possibly the effervescing preparation of this salt, lately introduced, might be free from this disadvantage.

In the same periodical Dr. T. P. Atkinson recommends the use of boracic acid in diseases having a septic origin, and quotes from Drs. Cossar Ewart and Malcolm Simpson statements to prove that it renders the bacilli of diphtheria innocuous.

Dr. J. Allan, in the *British Medical Journal*, gives an account of a new use for apomorphia. After the use of other means without effect in a case of hysterical coma, which had lasted several days, he injected subcutaneously one-tenth of a grain, and in a few minutes the patient was able to walk home with her friends.

In the same journal a remarkable case of poisoning by 22 grains of strychnine is mentioned, in which the man recovered after the administration of hydrate of chloral, which seems to demonstrate that this substance is the best antidote known for the effects of strychnine.

In the *Medical and Surgical Reporter*, Dr. Traill Green recommends chlorate of sodium for use in medicine in preference to the potash salt. It has the advantage of being soluble in little more than its own weight of water, and is stated by Dr. Green to manifest a more decided remedial effect than the potassium salt.

A curious fact, noticed by Schlaefke, in *Graefe's Archiv*, is worthy the attention of pharmacists, who, if ignorant of it, might be blamed for badly prepared medicaments. It is, that if calomel be applied to the eye, and iodide of potassium administered internally, severe inflammation of the conjunctiva is liable to arise.

Dr. F. Biermann (*Pharmac. Zeit.*, No. 3) recommends oil of fennel for removing or masking the odour of iodoform. From five to eight drops of the essential oil are sufficient to disguise a gram of iodoform.

According to the same paper much of the fennel seed met with in the German market last winter was adulterated with previously extracted fennel, owing to the fact that only a small quantity of fennel of a good appearance was produced last year.

A. Poehl, who has examined the volatile oil of jaborandi, states that the pilocarpene $C_{10}H_{16}$, which distils over between 170° and 176°, is so similar in properties to carvene that he considers them identical.

According to observations of Frickinger (*Dingler's Polytechnic Journal*), Bohemian glass is attacked by sodium tartrate, potassium carbonate, and solution of camphor in alcohol.

Dr. Hieronymus, in the *Pharm. Zeit.*, has pointed out that *Iodina rhombifolia*, belonging to the natural order Aquifoliaceæ, is known in the Argentine Republic under the name of "quebracho flojo," and that the wood and bark are often mixed with those of the red quebracho. Another tree, *Machœrium fertile*, belonging to the Leguminosæ, commonly called "tipa," is also used for tanning purposes under the name of quebracho.

The quarterly *Handels-Bericht* of Messrs. Gehe and Co. for April contains, as usual, some interesting notes. It states that in the absence of quebracho blanco bark (*Aspidosperma Quebracho*), only small specimens of which have yet been received in Germany, it has been necessary to be content with the quebracho colorado wood, of which an extract and a tincture are said to have been in considerable demand. But what is more interesting is the statement that good results have been obtained with these preparations in cases of dyspnœa, as well as in bronchitis, pulmonary phthisis, defective action of the heart, and spasmodic asthma. This is said to be confirmed in the experience of Dr. Penzoldt, who first called attention to the therapeutic properties of the white quebracho bark, who also says it is free from some of the inconveniences attending the use of that remedy. The red wood, however, does not appear to possess the antifebrifuge properties accredited to the white bark. It is also stated that frequently what has been supplied as real quebracho blanco bark has been in fact "copalchi bark."

Referring to coca leaves, Messrs. Gehe say that notwithstanding the war in South America there has been a sufficient supply, but they utter a caution that through insufficient drying and careless packing a considerable proportion have become brown, in which state the leaves are inactive. On the other hand, in the case of jaborandi, they say that the true leaves from *Pilocarpus pennatifolius* are usually brownish and stalky when received, but even in this condition are to be preferred to some beautiful green leaves, free from stalks, which have been recently imported as jaborandi from the province of Matto, in South Brazil. The presence of pilocarpine in the latter leaves is at least doubtful, and they are thought to be probably derived from another Rutaceous genus, or perhaps from the *Serronia Jaborandi*, belonging to the Piperaceæ.

During this year Siam benzoin has been met with somewhat more frequently than usual, though its high price prohibits its use for the preparation of benzoic acid, the enormous demand for which has also caused a rise in the price of Palambang benzoin.

Herr Ladenburg has communicated to the French Academy (*Comptes Rendus*, xc., 874), a *résumé* of his researches upon the Solanaceous alkaloids which contains a few interesting details besides those already mentioned in these columns. He says there can be extracted from belladonna at least two alkaloids, that known as atropine and first obtained in a state of purity by Meyn, and hyoscyamine, the properties of which were described in a paper recently published in this Journal.* The second alkaloid, hyoscyamine, is contained in belladonna in small quantity, and is difficult to isolate, but Herr Ladenburg says it is

* See before, p. 751.

that which is known in commerce as "light atropine," because of its light specific gravity. *Datura Stramonium* he finds to contain principally hyoscyamine, which is identical with the alkaloid hitherto known as daturine, and another alkaloid which is probably atropine, although it has not yet been separated in the pure state. An impure atropine, said to be derived from stramonium, is met with in commerce as "heavy daturine." Henbane contains also two alkaloids, hyoscyamine, and another which is not atropine and of which the composition and properties have not yet been ascertained. Lastly, only one alkaloid has yet been extracted from duboisia, and that is identical with hyoscyamine. Herr Ladenburg therefore thinks it probable that hyoscyamine and the "light daturine" of commerce are capable of rendering the same service as duboisine in ophthalmic maladies.

When hydrochlorate of morphia is heated in twenty times its weight of alcohol a momentary solution takes place, followed by a separation of a heavy granular crystalline mass. As the solution cools more of these crystals are deposited, and eventually the solution solidifies with formation of a dense mass of fine crystalline needles. Upon again applying heat the acicular crystals, which can be readily recognized as hydrochlorate of morphia, redissolve, but the greater part of the granular crystals remain undissolved. If wood spirit be used as the solvent a clear solution is obtained without heat, but after a few minutes a deposition of the granular crystals commences. These crystals have been examined by Hesse (*Annalen*, 202, p. 151), who has found them to have the composition represented by the formula $C_{17}H_{19}NO_3,HCl$; they, therefore, consist of anhydrous hydrochlorate of morphia. When this salt is recrystallized from a little hot water the ordinary hydrated hydrochlorate is deposited upon cooling.

Many kinds of beet sugar, and even well-filtered "thick juice," have been observed to possess the characteristic smell and taste of vanilla. In order to ascertain the nature of this phenomenon, Dr. Lippmann (*Chemiker Zeitung*, No. 12, p. 192) neutralized a concentrated sugar solution and then agitated it with ether. After separation and evaporation of the ether there remained some oily drops, smelling strongly of vanilla, which, however, did not solidify. This residue was treated with bisulphite of soda, heated in a water-bath with sulphuric acid to drive off sulphurous acid, and repeatedly exhausted with ether; after several recrystallizations small white stellate groups of needles were obtained, corresponding in properties and composition with vanillin. A satisfactory explanation of the origin of this vanillin has not yet been offered, but it has been suggested that it is due to the action of lime upon the cellular tissue of the beet during the manufacture.

The evaporation of solutions in ether, chloroform, benzol and carbon bisulphide, according to Liebermann (*Ber. Deut. Chem. Ges.*, 12, 1294), can be rapidly effected in an ordinary desiccator charged with crude paraffin. The paraffin is said soon to deliquesce, but to retain its absorptive property until it has absorbed three times its weight of carbon bisulphide or twice its weight of ether. Experiment has shown that paraffin under suitable conditions will absorb its own weight of carbon bisulphide in four to five hours, of ether in eight to nine hours, and of chloroform in nine to eleven hours. The absorbed solvents may be recovered by distillation.

The curious reaction by which when permanganate of potassium and peroxide of hydrogen are brought into contact in a strongly acidulated liquid they lose all their active oxygen and become converted into the state of protoxide was noticed by Brodie. P. Thenard observed, however, that when the reaction took place at a temperature below zero, although the mixture became decolorized there was no evolution of oxygen as long as the liquid remained cooled. M. Berthelot has been investigating this phenomenon (*Comptes Rendus*, xc., 656), and attributes it to the formation of a colourless compound, permanent at a temperature of $-12°$ and below, but decomposed with evolution of oxygen upon approaching the ordinary temperature. After excluding the possibility of this colourless compound being a higher oxide of manganese, persulphuric acid, or dissolved ozone, he has arrived at the conclusion that it is a higher oxide of hydrogen which, following the old atomic weights, he represents as HO_3 and calls "tritoxide of hydrogen."

The *Chemical News* (April 2) mentions a patent taken out by Messrs. Rickman and Thompson for the manufacture of ammonia from the nitrogen of the atmosphere and the hydrogen of water, which if it realizes the expectations formed concerning it will exercise an important influence on the future of artificial manures. The operation is carried on in a closed brick furnace, having the ash pit closed to regulate the current of air. The deoxidizing material used is the dust of steam coal. In the presence of this at a full red heat the vapour of water is decomposed and the hydrogen combines with the nitrogen from the regulated current of air. But ammonia is decomposed at a bright red heat, therefore, to prevent loss by accidental excess of temperature 5 to 8 per cent. of salt is mixed with the coal. This chloride of sodium being decomposed at a full red heat in the presence of nascent ammonia, chloride of ammonia is formed which is volatilized without decomposition. It is estimated that with a consumption of 20 to 28 lbs. of the mixture of coal dust and salt per hour from 2 to 3 lbs. of ammonium chloride will be obtained.

A paper recently read before the Society of Telegraph Engineers on the effects produced by the immersion of steel and iron wire in acidulated water (*Nature*, April 22), besides its interest in respect to telegraphy, is not without a bearing upon a practice sometimes followed in cleaning iron vessels. Professor Hughes has found that when iron or steel wire is immersed in acidulated water it rapidly becomes brittle, only a few minutes' immersion in water containing 10 per cent. of sulphuric acid producing a very marked effect. This he believes to be due to the absorption of hydrogen in the nascent state, the same result following the exposure of the wire to hydrogen set free by the electrolysis of water. Upon heating the iron wire so rendered brittle to a cherry-red it is restored to its primitive flexibility in a few seconds. Rods of iron a quarter of an inch thick are equally affected when subjected to the action of a sufficient quantity of nascent hydrogen. Iron or steel thus "hydrogenized" is rendered more negative, and whilst in this condition remains free from oxidation. No similar effect has been perceptible in experiments made with copper and brass.

It is generally assumed that gluten exists already formed in various cereals as one of their constituents. But some experiments made by Messrs. Weyl and

Bischoff (*Ber. Deut. Chem. Ges.*, 13, 367) render this problematical, and point to the probability of gluten being formed by the action upon albuminous matter of a ferment contained in the grain in the presence of water. The principal albumenoid in wheaten flour was found to be a substance resembling the myosin of muscle, and this the authors think must be the mother-substance of gluten. As to the identification of the hypothetical ferment nothing certain has been made out, but the gluten-forming constituent appears to lose its activity in the conditions which usually affect the activity of ferments; thus flour kneaded with solutions of sodium chloride or sulphate, or magnesium sulphate, or thoroughly heated previous to kneading it with water, yielded little or no gluten. It may be remarked that the presence of a nitrogenous ferment in the perisperm of the wheat grain was long ago announced by M. Mége Mouriès, but that ferment, which he named "cerealine," was stated to dissolve gluten, and a process for making "whole meal" bread was based upon the preliminary removal of it from the grain.

An allied subject was recently brought before the French Academy (*Comptes Rendus*, xc., 369), by M. Scheurer-Kestner, who called attention to some inedited researches of his father upon the formation of a digestive ferment during panification. He stated that if a paste be prepared by adding a suitable quantity of water to 550 to 575 parts of flour, 50 parts of yeast and 300 parts of finely chopped fresh beef previously boiled for an hour in the water, and be left to ferment at a moderate temperature for two or three hours, at the end of that time it will be found that the meat has completely dissolved and disappeared in the paste. When such dough is baked a bread is obtained which remains unalterable, becoming neither putrescent nor mouldy for years. Mutton, veal or bacon may be substituted for beef, bacon having the advantage of being the least insipid. It was pointed out in the discussion that a similar combination of meat with farinaceous food is met with in "Spratt's biscuits."

Yet more concerning the dissociation of the halogen elements. Messrs. Crafts and Meier, whose criticism of Professor Victor Meyer's results was referred to in the last "Month,' have contributed another paper to the French Academy (*Comptes Rendus*, xc., 690) on the density of iodine at high temperatures. It will be remembered that Professor Meyer found that, commencing at a temperature of about 1000°, the density of the vapour of iodine became reduced until it equalled about two-thirds of its normal density, at which point it remained constant at the highest temperature of a Perrot furnace, estimated at 1570°. Messrs. Crafts and Meier give reasons for supposing that the real temperature was below 1400°, and state that at this point they have observed a density inferior to two-thirds, which Professor Meyer thinks to be the limit of dissociation. In fact, they say that starting at 600° they observed an uninterruptedly progressive diminution of density up to the limit of their observations, and suppose that at a still higher temperature the density might become one-half of the normal density. In other words, if the cause of diminution be a dissociation it may be admitted that the molecule I_2 tends to separate into two atoms.

In reference to a remark made in the recent notice of the second edition of 'Pharmacographia' in this Journal (before p. 766), to the effect that a cheap edition of the work had been published in the United States, a note has been received from Dr. F. A. Castle, the Editor of *New Remedies*, stating that the reviewer is mistaken, no republication of the work having taken place there. It appears that a New York publisher had a correspondence with Professor Flückiger on the subject, but nothing further was done.

Some very good excipients have from time to time been named in these columns. In the employment of any one, the dispenser is guided by several considerations. Sometimes a prescription for pills is mainly composed of powders, having little or no adhesive properties; in this case mucilage of tragacanth may be had recourse to, and more especially if sulphate of iron form one of the ingredients; but if the pills are to be silvered this excipient requires to be used with great judgment, or the covering cannot satisfactorily be accomplished. In many such cases conserve of roses answers the purpose better. Again, conserve of roses may not be admissible when the quantity required to form a suitable mass would make the pills inconveniently large; manna is sometimes preferable to any other, and in the case of sulphate of iron it is sometimes very useful, but the quantity of an excipient necessary to form the mass must be an item of consideration. In choosing an excipient the ingredients prescribed must also be taken into consideration, and the quantity of excipient which these will admit of; moreover, if the pills are to be silvered when finished a firm surface is required for the silver leaf to cover the pill satisfactorily.

The first prescription requiring notice is that of No. 399, where ext. tarax. liq. is ordered. This preparation has on several occasions been referred to. It is not official, and in some establishments suc. tarax. is used, and at others either a preparation of the dried root or a solution of the extract. D. G. is referred to some remarks in "The Month," *Pharmaceutical Journal*, [3], vol. viii., p. 145, No. 10.

Some medical men, and more especially does it apply to those who once dispensed their own prescriptions, have acquired a habit of using the proprietary preparations of some particular maker, and when they discontinue the dispensing of their own medicines, the habit will still adhere to them of ordering preparations which either never had a place in the national pharmacopœia, or have been superseded by others more reliable and more elegant. In cases such as these the prescriber should be referred to, and definite instructions be obtained as to the preparation required when ext. tarax. liq. is ordered in a prescription.

The prescription No. 400 refers to the directions, which are somewhat ambiguous. Carbolic acid lotion is ordered with a direction written thus:—"To be applied to the parts, and covered with tinfoil." "Junior" asks if the bottle or the part to which the lotion is applied is to be covered with tinfoil. There is ample room for a difference of opinion on this point, but it seems very probable that the bottle is to be covered with tinfoil to guard against accident. From the cases recorded of accidental poisoning, arising through mistakes as regards the bottle, it would appear that in many places where medicine is dispensed, mixtures for internal administration and lotions or liniments for external use are put into bottles of the same colour or shape, and it is probable that the prescriber has in this instance added the covering with tinfoil as a preventive of accident; at the same time on the face of it as written, the tinfoil applies to the covering of the parts to which the lotion has been used. If "Junior" does not use poison bottles, he would do well to cover the bottle with tinfoil, and as the directions are for the guidance of the patient, most probably verbal instructions have been given with regard to covering, or otherwise, the parts after the application of the lotion.

The mist. scillæ of No. 401 is most probably some hospital or private formula. It is not unusual to find a hospital preparation in a prescription for a private patient, or a preparation that is kept as a matter of convenience for dispensing in the surgery of a private practitioner, and hence these "misturæ" as met with in prescriptions. When not official reference should be made to hospital formulæ, and many of these find their way into Beasley. There is one among the London Hospital formulæ as follows:—Mist. scillæ: vinegar of squill, 40 minims; pimento water, 1 ounce. But a dispenser would very properly object to the introduction of pimento water into a private prescription through an indefinite preparation. In most of the formulæ either oxymel or vinegar of squill forms the squill ingredient. It would, therefore, be more safe to use oxymel of squills in the proportion of about ʒj to ℥j water as a mist. scillæ for this prescription.

"Jacque" inquires (No. 402), when pulv. cretæ co. c. opio is prescribed, what should be used, the P. L. preparation or the pulv. cretæ arom. c. opio, B.P.? The dispenser must assume that the P. L. preparation is intended. The Pharmacopœia preparation, pulvis cretæ compositus c. opio ceased to be official on the publication of the B.P., and to supply its place a preparation was introduced of the same strength as regards the opium, but in other respects differing in composition, and named pulvis cretæ aromat. c. opio. If the writer of the prescription chooses to ignore the existence of the B.P., with its alteration of formulæ and names, the dispenser must follow him.

In the preface to the B.P. it is stated that, in accordance with the Act, "The British Pharmacopœia, when published, shall for all purposes be deemed to be substituted throughout Great Britain and Ireland for the several above-named Pharmacopœias;" but so strong is the force of habit, that in writing prescriptions the preparations of former pharmacopœias are still occasionally ordered and are required to be kept in every dispensing establishment.

In No. 403 there is no appreciable decomposition from the addition of the quinine dissolved in the citric acid; but if there were, it would not be perceptible in a mixture such as the one in question containing not only ext. tarax., but also ext. sarsæ liq. If a slight separation occurred immediately on the addition of the quinine, a brisk shake of the bottle would produce a homogeneous mixture.

The addition of tinct. nucis vom. to a mixture containing acid, as in No. 404, has been referred to in "The Month" on several occasions. E. L. will find one [3], vol. ix., p. 796, No. 255. The tinct. nuc. vom. being an alcoholic tincture, on its addition to water there is an opalescence, and a separation of resin is determined by the presence of an acid, most of the flocky matter rising to the surface of the liquid. It cannot be altogether avoided, but it may be retarded by the addition of a little mucilage.

No appreciable decomposition will take place in the pill mass, No. 405, if rolled out on the machine with mag. carb. pond. Each particle of the plumbi acet. and p. opii would be covered by the conf. rosæ. But mag. carb. is not the best powder for pills. Ingredients for pills could be named in which the use of magnesia would be attended with inconvenience. Starch powder is more suitable and not incompatible with the usual ingredients which go together to form a pill mass. More than this, magnesia sometimes hangs to a pill and makes an otherwise very moderately sized pill look like a bolus; but this will not occur with starch, and "Cymro" is recommended to lay aside magnesia and let starch take its place.

The prescription No. 406 presents no special difficulties. The pot. iodid. and pot. citras should be dissolved in a part of the aq. chlorof., and the quinine (not dissolved) being rubbed down and suspended in the mucilage made with the pulv. tragac. comp. and the remaining part of the aq. chlorof., this with the addition of the vin. colchic. and tr. card. co. being added to the other ingredients, a mixture, rather thick from the pulv. tragac. co. and pale pink from tr. card. co., will result. There is no apparent incompatibility, and an elegant mixture is formed. There will, of course, be a certain amount of deposit, and a label to "shake" should therefore accompany the bottle. In making such a mixture as this, and the same applies very generally to mixtures, solutions of salts should not be thrown together in a concentrated form, but should each be well diluted before being mixed.

The cultivation of a habit of observation and a little more self-reliance on the part of young dispensers would carry them over most of these difficulties, and would at the same time enable them to grasp those general principles which have from time to time been inculcated in these columns for their guidance in combining the several ingredients of a prescription. A careful study of the prescriptions which are commented on in "The Month," with now and then a practical application of the lesson, should enable a youth, less fortunately situated than some of his elder brethren, to turn out medicines from physicians' prescriptions that would satisfy the writers, and do credit to the often quoted "West End" establishments.

EDINBURGH NEW WATER SUPPLY: ITS COMPOSITION AND ACTION UPON IT OF DIFFERENT FILTERING MATERIALS AS REGARDS REMOVAL OF COLOUR.*

BY J. F. KING, F.C.S.,

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Edinburgh, like most other cities of similar size, ha for many years been rapidly growing both as regards ex tent of boundary and population.

One result of this extension and by no means the most unimportant is that the water supply, which was abundant twenty years ago, was found some few years back to be totally insufficient. In consequence of this scarcity of the necessary element the authorities of our city determined at that time to introduce an additional supply, and the present abundance which we now enjoy is the happy result of that determination. Time would fail me, and indeed it is hardly within the legitimate limits of this short paper, to enter into a description of the different sources from which it was proposed that Edinburgh should

* Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, April 14, 1880.

obtain her new supply of water. Suffice it to say that these were very numerous and the great difficulty the authorities had to contend with was not where to obtain a source, but rather to select the best from the many that were suggested. As the result of much patient inquiry and acting under high professional advice they chose as being, everything considered, the most suitable supply for Edinburgh that which in now known as the Moorfoot water. This water, which is derived in great part from the river Esk, is collected for the use of the city in a magnificent natural reservoir, situated near the Moorfoot Hills, skifully selected and rendered suitable for use by the well known civil engineers, Messrs. J. and A. Leslie. This splendid sheet of water, known as Gladhouse reservoir, is no less than four hundred acres in extent. It holds 1700 million gallons, and could, therefore, supply the city for one hundred and eighty days at a rate of 30 gallons per head per day, without receiving a fresh supply.

This reservoir, which took at least three years to make, is the largest in Scotland if not in Great Britain. I should say that there is another reservoir known as Portmore which holds 250 million gallons, so that the stowage of these two together is no less than 1950 million gallons.

The water as it leaves Gladhouse enters an aqueduct, ten miles long, by which it is conveyed to Alnwick Hill, where it is filtered ready to be dispatched for consumption in the city. This essential operation of filtration is very efficiently carried out by means of four large filters, which are each half an acre in extent and consist of sand and gravel arranged in layers. The water is allowed to flow on to the surface of the filter and by passing through the layers of different materials is freed from almost all the suspended matter which it contains. I will refer to this, however, further on; in the meantime I wish to direct your attention for a moment to the quality of this much abused water. Much has been said and written against the character of our new water supply, but I think that with the exception of colour not much can be said against it as a potable water. It is not too hard nor yet is it objectionably soft. It has no unpleasant taste and I think, judging from the results of analyses which have been made, we may safely come to the conclusion that, excepting colour, it is well suited for all domestic purposes. On this diagram I show you the results of analyses of all these different waters, from which you see that in almost every particular (excepting, as I said before, that of colour), they are nearly just as they should be.

Analyses of Waters.

	Gladhouse.	Tweedale.	City.	Crawley.
Total Residue	4·88	4·00	5·84	11·28
Volatile Residue	1·28	1·04	1·84	...
Saline Residue	3·60	2·96	4·00	...
Lime	1·04	0·88	2·00	...
Magnesia	0·45	0·40	0·16	...
Chlorine	0·76	0·70	0·75	1·04
Saline Ammonia	0·0032	traces	0·0008	0·001
Albuminoid Ammonia	0·0128	0·0040	0·0056	...
Colour	24·85°	7·00°	10·00°	...

Hardness of Waters.

Lancaster	0·10°
Loch Katrine	0·30°
Thirlmere Lake	0·70°
Dee (Aberdeenshire)	1·50°
Ulleswater Lake	1·90°
Manchester	2·70°
Crawley Burn	6·08°
Swanston	6·22°
Colinton	9·17°
Coniston Water	10·36°
Thames	14·30°
Lea	18·20°
Trent	26·50°
Moorfoot	3·20°

The total solid residue, you observe, is by no means excessive, and, moreover, it consists in great part of saline matter, which in turn is composed principally of compounds of lime and magnesia. The item Colour, as it is a somewhat new expression in a report of an analysis of water, and one seldom or never made use of by any analyst save myself, is one which I feel requires a word of explanation. It has always been a difficulty with water analysts how properly to describe or put on record the results of their observations of the colour of water. It has long been felt that the usual mode of describing the colour of water was very faulty, such expressions as almost colourless, faintly yellow, a distinct brown, conveying no definite idea as to the amount of colour possessed by water and, therefore, being of no use for preserving or comparing the results of a water analysis.

Feeling this to be a great inconvenience in my own practice, I devised the extremely simple process which I now use in the examination of waters in which colour is an element of importance and which consists in adding to a given quantity of distilled water a coloured solution, until the distilled water is found to exhibit the same colour as the water under examination; the point at which this takes place being determined by comparing equal bulks of the two waters placed in 12 or 18 inch glass tubes. The only point attended with any difficulty is the manufacture of the coloured solution, and the difficulty here consists in making and keeping this always of fixed strength. This may be done very satisfactorily and accurately by mixing distilled water with a certain proportion of ammonium chloride and adding to the mixture thus produced a carefully measured amount of Nessler's solution, and taking the colour so produced as a standard by which the colour solution can be at any time prepared or verified. In another table I show you the results of the determination of colour by this method in the water supplied to most of our large towns.

Colour of Waters.

Perth (Wells)	4·00°
Paisley (Stanley)	4·55°
Dundee (Clatto)	5·00°
Loch Katrine	6·00°
Glasgow (Gorbals)	6·00°
Loch Ashie	6·50°
Dundee (Town)	7·00°
Perth (River)	10·00°
Paisley (Rowbank)	10·50°
Aberdeen	12·25°
River Ness	13·60°
Dumfries	16·00°
Greenock (Gryfe)	30·00°
Greenock (Loch Thorn)	35·00°

From this table you will perceive that the Gladhouse water as it leaves the reservoir does not hold a very high place in the scale, but when it is filtered, and especially after being mixed with other water ready to be sent into the city, the colour is by no means excessive. I have just to add one word in fairness to the Gladhouse water and that is that the reservoir is not as yet fully seasoned. There is still a quantity of decomposing vegetable matter in the reservoir; this, however, I should think is fast disappearing, so that in the course of a few months there will no doubt be much less colour derivable from this source. One of the main points to which I directed my attention in working out materials for this paper was the action which the different filters now before the public would have on the colouring matter of the Moorfoot water. To ascertain this I procured four filters:—

1. Carbon filter, carbon loose.
2. Carbon filter, carbon in block.
3. Miniature filter such as is used at Alnwick Hill.
4. Spongy iron filter.

The water upon which I made the experiments had a colour to start with equal to 20 degrees. This was then passed through each of these filters when the following results were obtained:—

Action of Filters on Moorfoot Water.

Filters Fresh.

	Slow.	Fast.
Filter No. 1	7·50°	7·50°
„ „ 2	15·00°	15·00°
„ „ 3	19·00°	19·00°
„ „ 4	Not improved.	

Also tried filtering power at slow rate.

These results, however, hardly yield results of much practical importance, inasmuch as they were obtained by using the filters when these were almost quite new. In order to test the lasting power of the filters, which is one of the greatest and most important points in connection with this subject, I allowed a large quantity of water to pass through the filters, so causing a certain amount of the purifying power to become exhausted, before filtering any water for the purpose of comparison.

From experiments made in this way I obtained the following results:—

Filters after Use.

	Slow.	Fast.
Filter No. 1	11·00°	11·00°
„ „ 2	16·00°	16·00°
„ „ 3	19·00°	19·00°
„ „ 4	Not improved.	

Filters after Standing in Contact with Water for One Day.

Filter No. 1	3·50°
„ „ 2	Not improved.
„ „ 3	11·00°
„ „ 4	Not improved.
Chemically Purified	1·50°
Natural Water	20·00°

From these results we are led to the following conclusions regarding the actions of these filters.

No. 1 and No. 2, that is the carbon filters, undoubtedly produce a certain amount of improvement. It will be noticed, however, that they get less powerful as they are more used, and I am fearful that after such filters have been in use for months they may become much less useful. This, however, I have not proved by direct experiment, and therefore I cannot speak decidedly on the point.

One word as to filtering apparatus at Alnwick Hill. The filters here, as I have said, are two acres in extent, there being four filters of half an acre each. The filters are made of sand and gravel, through which the water flows, with the result shown in the colour table. Removing all this colouring matter renders the filters by and by unfit for work, and they therefore require to be cleaned. This cleaning operation, which is carried out on one of the filters every month, is effected in a very neat and ingenious manner by means of a washing apparatus, which consists of a large wooden box (laid on the top of the empty filter), into which the sand, etc., is thrown, and through the bottom of which a powerful stream of pure water is forced. This mixing with the sand thoroughly washes it; the water then flows over the top of the box, carrying with it all the impurities, and leaving behind pure sand, etc. The water is allowed to flow off until it runs away clear. The operation is carried out in as economical a manner as possible, and yet you will not be surprised to learn that this simple operation costs a considerable amount of money, the sum expended in this way amounting to £40 per annum for 1,000,000 gallons per day. These few remarks I have thought to lay before you because, as they give information which is really authentic on a subject which is of vital interest to us all, they may be thought worthy of your attention. I exceedingly regret that the very many and pressing demands on my time have prevented me carrying out a further series of experiments, and so preparing a paper more worthy of your acceptance.

THE SOLUBILITY OF SOLIDS IN GASES.*

BY DR. A. SENIER, F.I.C., F.C.S.,

Demonstrator of Chemistry in the Laboratories of the Pharmaceutical Society.

The researches of De la Tour, and more recently those of Andrews, have shown that there is a certain point of temperature in the case of many gases, and probably in the case of all gases, below which they may be liquefied, and above which they cannot be liquefied, by pressure. Thus, carbon dioxide gas at 32° F. is liquefied by 38·5 atmospheres, at 55·6° F. by 49 atmospheres, and at 87·7° F. by about 76 atmospheres; but at temperatures above 87·7° F. no increase of pressure attainable by Andrews, 150 atmospheres and upwards, produced liquefaction. Again, carbon dioxide gas at, say 86° F., is reduced in volume by gradual application of pressure much more rapidly than air, until when the pressure reaches some 76 atmospheres liquefaction occurs. If then the pressure be constant and the temperature be increased to a point just above 87·7° F., the liquid changes to the state of gas without material alteration of volume and without sudden absorption of heat. Conversely, if the temperature be again reduced gradually to 86° F., the liquid state is again resumed, and without any material alteration in volume or sudden disengagement of heat. This point of temperature, above which the carbon dioxide is a gas even under very great pressure, and below which it may be liquefied by a comparatively slight pressure, was termed by Andrews its critical point.

The critical point of carbon dioxide gas is 87·7° F., according to Andrews; that of alcohol is 454·3° F., carbon disulphide, 523·3° F., and carbon tetrachloride, 532·1 F., according to Hannay and Hogarth. Water has a critical point above 773° F., as observed by De la Tour, and at that temperature, under great pressure, he found that the water gas exerted a solvent action upon the glass tubes so great as to almost preclude the possibility of such experiments. The critical points of oxygen, hydrogen, nitrogen, etc., are doubtless at very low temperatures, temperatures which, however, Cailletet and Pictet were able to command in their brilliant researches, so fresh in the memory of physicists and chemists.

Let me recall, parenthetically, the definitions proposed by Andrews for the terms gas and vapour. I do so because it appears to me that these valuable suggestions have been largely overlooked by our text-book writers. In place of the old unscientific notion of gas and vapour, Andrews proposed that a body above its critical point should be called a gas, and that the term vapour should be applied to bodies at temperatures below their critical points, but under such pressure that they are still aeriform. Thus vapours are aeriform bodies which can be liquefied by pressure alone, which is not the case with gases. Steam is a gas above about 773° F., and under any pressure which has been attained. Below 773° F. and above 212° F., it is a vapour under ordinary atmospheric pressure. Carbon dioxide is a gas above 87·7° F., and under any pressure which has been attained; but below that temperature it is a vapour under ordinary atmospheric pressure. Oxygen, hydrogen, nitrogen, etc., are gases under atmospheric conditions of temperature and pressure.

When it is considered that this critical point is a fixed one in the case of each gas under conditions of temperature and pressure both varying with the gas, and when we remember that the liquefying point (boiling point) is only a constant under identical conditions of pressure, it is evident, I think, that the former being constant amidst greater variety is the more important of the two; that is to say, more important in its bearings upon chemistry as a science. The exact determination of critical points

* A Report on Physical Chemistry, being the substance of a lecture delivered before the School of Pharmacy Students' Association, April 8, 1880.

then may be expected, as has been the case in respect to vapour densities, to enrich science with new general truths, *i.e.*, with new laws.

In his determination of the critical point of carbon dioxide, Andrews found the transition from liquid to gas, and from gas to liquid, to be very difficult to observe exactly. He was obliged to rely upon the surface line of the liquid, its refractive power, its entering into ebullition under reduced pressure, etc. Now it occurred to Hannay and Hogarth* that as solids were not usually supposed to be soluble in gases, if they were to convert a liquid in which was previously dissolved a solid, non-volatile at the temperature to be employed, into a gas in a sealed tube the solid might be precipitated at the critical point, and thus serve as a valuable experimental implement, an indicator by means of which the critical point might be accurately observed. If, however, precipitation did not occur, and other actions, possibly chemical, did not interfere, they appear to have foreseen that the new fact of the solubility of a solid in a gas would be established.

In order to test these hypotheses Hannay and Hogarth resorted to experiment. A solution of potassium iodide was made in alcohol and a strong tube about half filled with the solution was sealed in the blowpipe flame and subjected to gradually increasing temperature to about 716° F. At this temperature, some 280° F. above the critical point of alcohol, where of course the liquid state had long ceased to obtain, as well as throughout the experiment, no precipitation occurred. In other experiments it was shown that the critical point was only raised very slightly by the solution in the liquid of non-volatile solid matter; and hence there can be no question that in the experiment just described the alcohol was in a truly gaseous state. I have repeated this experiment† using a small heavy glass tube in which was sealed solution of potassium iodide. This was heated inside a glass cylinder in a current of hot air, the temperature of which was allowed to rise gradually to far above the range of a mercurial thermometer. The striæ which appear at the peculiar transition state, and which have been so exactly compared by Andrews‡ to the appearances produced when two fluids of different densities are allowed to mix, were well marked and the phenomenon of solution of the solid iodide in the gaseous alcohol was observed. My experiment, or I should say experiments, have been conducted, I believe, under conditions not identical with those which obtained in the experiments of Hannay and Hogarth, and thus while they give me no reason to doubt the substantial accuracy of the facts arrived at by those experimentalists, they have also given me what appear to be other facts previously unknown, which I propose to investigate more fully. Hannay and Hogarth were able, by means of a special apparatus, to introduce a crystal of potassium iodide into alcohol gas and observed that complete solution took place. Sudden variation of pressure, however, caused separation of some of the iodide in the solid and, what was most remarkable, the crystalline state. Substantially the same results were obtained in the case of other solvents and other solids. In some cases, however, chemical action occurred. An attempt was made to obtain sodium in solution in gaseous ammonia and in hydrogen, with results in the case of the latter solvent if not absolutely conclusive at least very encouraging.

Hannay and Hogarth then have established as truth one of their hypotheses, that a solid is dissolved by a gas. They have shown that this is not by any means an isolated fact and no doubt further experiments will show that it is a very general one.

Many facts not directly concerned with the hypotheses under examination were observed, and which may well prove the starting points for new fields of discovery. One of these has been alluded to already,—the fact that when under sudden variation of pressure and also under certain conditions of chemical action a solid is thrown out of gaseous solutions, the precipitate is crystalline. By an application of these facts Hannay claims to have crystallized carbon. The matter has been the subject of a "preliminary note" read before the Royal Society, and chemists are now awaiting full details of the experiment before an absolutely satisfactory conclusion can be arrived at.

* *Proc. Royal Soc.*, xxx., 178.

† This experiment was shown by the author at the Students' Association Meeting.

‡ *Phil. Trans.*, 1869, 575.

QUINIC ACID, QUINONE, AND THEIR DERIVATIVES.*

BY O. HESSE.

Quinic Acid.—The quinic acid employed in this investigation was chemically pure, and was prepared from the calcium salt by decomposition with oxalic acid, according to the method which has been previously described by the author. By evaporation of an aqueous solution of quinic acid, the greater part of the acid quickly separates in a crystalline form, but the mother liquor still contains amorphous quinic acid, and the author states that the presence of a very small quantity of a foreign substance is sufficient to hinder the crystallization. The amorphous acid can easily be converted into the crystalline form by purifying its calcium salt with animal charcoal, then proceeding as before described. Quinic acid contains no water of crystallization, and the author draws attention to this fact because from a misconception of his earlier statement on the subject Graebe has assumed the formula of quinic acid to be $C_7H_{12}O_6+H_2O$.

Tetracetyl quinide $C_7H_6(C_2H_3O)_4O_5$ m. p. 124° (uncorr.), is obtained as an amorphous mass which becomes vitreous on cooling by the action of acetic anhydride on quinic acid in a sealed tube at 170°. It is purified by melting it repeatedly in hot water and finally washing it with cold water. On being dried in the air it is obtained as a white powder, which is insoluble in cold water and soluble with difficulty in hot water. It melts in boiling water and is gradually decomposed by longer heating its aqueous solution, which then becomes acid. Its aqueous or alcoholic solution becomes turbid on being cooled, and the anhydride separates in granular crystals. The formula as above assigned to this body was confirmed by it yielding the anhydride (quinide) $C_7H_{10}O_5$ when boiled with magnesia, and quinic acid when decomposed with lime, the author having previously shown that quinide is converted by the action of lime into quinic acid.

Action of Bromine on Quinic Acid.—By the action of bromine on an aqueous solution of quinic acid, an acid is obtained which the author had named carbohydroquinonic acid, on the supposition that it yielded hydroquinone when heated. But it was afterwards shown that the black precipitate which this decomposition product gave with ferric chloride was a pyrocatechin compound; hence the name of the acid was altered to carbopyrocatechuic acid. Strecker subsequently obtained the same acid by fusing piperinic acid with caustic potash, and named it pyrocatechuic acid, and to him is improperly ascribed the discovery of this acid.

The author has repeated his former experiments, and this time on a large quantity of pyrocatechuic acid, which had been prepared as before by the action of bromine on quinic acid, and he now finds that hydroquinine is not produced, as he had previously assumed. When operating with a large quantity of pyrocatechuic acid the decomposition does not proceed very smoothly; a carbonaceous mass is formed whilst phenol and pyrocatechin distil over.

In addition to pyrocatechuic acid another acid is produced by the action of bromine on quinic acid. It can be obtained by evaporating the product of the reaction to a syrup, agitating it with ether, then treating the ether residue with lukewarm water in which the new acid is insoluble, but which dissolves the pyrocatechuic acid. It can be purified by re-crystallization from boiling water. It crystallizes in colourless laminæ or in

* Abstract of a paper in *Liebig's Annalen*, 200, 232—255.

needles, which dissolve with some difficulty in boiling water and are almost insoluble in cold water, but easily dissolve in ether. It carbonizes when heated, giving pungent fumes and a brown coloured distillate which solidifies to a radiated crystalline mass and, like the original substance, gives no coloration with ferric chloride. Its hot saturated solution gives no precipitate with lead acetate but a considerable quantity of a yellowish white precipitate with basic lead acetate. The composition of this substance has not yet been ascertained, but it is said to be a bromine derivative.

Action of Concentrated Hydrochloric Acid on Quinic Acid.—Warm concentrated hydrochloric acid quickly dissolves quinic acid, but without decomposition; but when heated with it at 140—150° in a sealed tube it is converted into hydroquinone and paraoxybenzoic acid.

Graebe obtained pyrocatechuic acid by the action of potassium hydrate on quinic acid, and the author states that a similar result ensues by using sodium hydrate, and that neither oxysalicylic acid nor hydroquinone carbonic acid is produced.

Quinone.—As an addendum to his former remarks on this substance the author states that it is somewhat readily soluble in boiling petroleum ether, but very readily so in boiling ligroin (*sic*), and as the greater part of the quinone recrystallizes out on cooling in beautiful yellow prisms, these solvents serve as a ready means of purifying this substance.

The author is unable to confirm the statement of Sarauw, that diacetylhydroquinone is formed by the action of acetic anhydride on quinone. He is of opinion that quinone is to be regarded as the aldehyde of quinonic acid in this way :—

Hydroquinone.	Quinone.	Quinonic Acid.
$C_6H_6O_2$	$C_6H_4O_2$	$C_6H_4O_4$
Alcohol.	Aldehyde.	Acid.

Hydroquinone.—In consequence of a statement by Hlasiwetz and Habermann (*Liebig's Annalen*, 175, 62), with regard to the melting point of this body, the author has repeated his experiments and he now gives the melting point as 168—169° (uncorr.) instead of 172—173° (uncorr.). Hydroquinone is insoluble in boiling petroleum benzine, almost so in boiling chloroform, the chief part of it separating again from the latter on cooling. It forms no compound with phenol. Its concentrated aqueous solution gives a dark green or almost black precipitate of quinhydrone with ferric chloride or sulphate.

Quinhydrone is very easily soluble in slightly warm water, and this solution, unless disturbed, has a great tendency to remain saturated without crystallizing. Although in all cases the aqueous filtrate from the quinhydrone has a strong odour of quinone, yet it is impossible to obtain a complete conversion of hydroquinone to quinone by this method, nor even by heating the hydroquinone with ferric sulphate in a sealed tube at 80—100°. Quinone is, however, obtained in considerable quantity by the action of concentrated nitric acid on hydroquinone; by continuing the action of the nitric acid oxalic acid is produced.

Diacetylhydroquinone, m. p. 121° (uncorr.), is, contrary to the statements of other observers, an odourless and stable substance, even after long keeping.

Dinitrodiacetylhydroquinone, m. p. 94°, has been prepared and was of interest to the author, as he hoped that by the substitution of NH_2 for NO_2 in this compound a substance of the formula $C_{10}H_{12}N_2O_4$ would be obtained; in fact, a body which would stand in near relation to chitenin, $C_{19}H_{22}N_2O_4$, the dihydroxylquinine of Kerner. It was easily reduced by zinc and hydrochloric acid, yielding a base which, however, had no resemblance to chitenin or to any other alkaloid. In the free state this base was very unstable; its alcoholic solution gave a cherry red colour with ferric chloride.

Dipropionylichydroquinone, m. p. 113° (uncorr.), which crystallizes in colourless laminæ, and its mononitro-derivative, m. p. 86°, crystallizing in pale yellow leafy crystals, have been obtained, and are described in detail.

Quinhydrone.—As is well known, this substance dissolves very easily in warm water, but it is partly decomposed thereby into quinone and hydroquinone, the solution acquiring the characteristic smell of quinone. It dissolves in hot glacial acetic acid apparently unaltered, and crystallizes out on cooling in greenish black plates or prisms. It is insoluble in hot or cold petroleum ether and in ligroin. It is soluble with extreme difficulty in boiling chloroform, crystallizing out on cooling in small plates; but by this treatment the greater part of the quinhydrone is decomposed into quinone, which is carried away with the chloroform vapour, and into hydroquinone, which separates in colourless crystals. When heated it evolves bluish violet fumes and gives a bluish black sublimate.

The author does not agree with the structural formula assigned by Graebe or Wichelhaus to this body, but is of opinion that quinhydrone is to be regarded as a compound of one molecule of hydroquinone with one molecule of quinone, as by the action of acetic anhydride on it at 160—170° diacetylhydroquinone and quinone were obtained, the former approximating to the theoretical quantity. Phenoquinone, $C_{18}H_{16}O_4$, and methylquinhydrone, $C_{20}H_{20}O_6$, or $C_6H_4O_2.2C_6H_4$ $(OHOCH_3)$, have been examined and the above formulæ assigned them by the author, who disputes the accuracy of the formulæ $C_{18}H_{14}O_4$ and $C_{20}H_{18}O_6$, as given them by Wichelhaus.

THE PERCENTAGE OF EXTRACTIVE SUBSTANCES SOLUBLE IN ALCOHOL, AS A CRITERION OF THE PURITY OF SPICES.*

BY MAX BIECHELE.

The author employs the following method:—A flask of about 120 c.c. contents, is fitted with a cork, through one of the two holes in which passes the stem of a funnel of about 7 c.m. diameter; through the other, a tube leading to the top of an upright Liebig's condenser. Five grams of the spice to be tested, previously dried at 30° C., are placed on a filter, which should not quite fill the funnel, covered with a disk of filter paper, and absolute alcohol poured through until the flask is half full. The funnel is then covered with an inverted funnel, the stem of which has been broken off, leaving an aperture, through which is passed the lower end of the condenser. The alcohol in the flask is then heated to boiling, and maintained at that temperature, until the prolonged percolation of the condensed alcohol through the spice has removed all soluble matters, and the filtrate is colourless. The filter, with its contents, is then partially dried at 100° C., the contents removed to a weighed porcelain dish, thoroughly dried at 100° C., and again weighed. The volatile character of many of the extractive substances (essential oils, etc.) renders it impossible to estimate the residue from the evaporation of the alcohol. Proceeding by the foregoing method, the author has obtained the following percentages of extract from pure spices:—

Cloves	33·50
Cassia bark	26·60
Cinnamon (Ceylon)	23·90
Caraway seed	33·87
Fennel „	38·20
Black pepper	19·87
Long „	37·00
White „	16·87
Red „	18·13
Coriander seed	14·88
Star-anise „	25·68
Anise seed	36·24
Clove pepper	22·68
Mace	37·60
Nutmegs	32·70

* *Corr.-blatt d. Vereins analytischer Chemiker*, 2, 70. Reprinted from the *Journ. of the Amer. Chem. Soc.*

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INDUCED ELECTRICITY AND ITS APPLICATIONS.

A FEW weeks ago Dr. C. W. SIEMENS entertained the members of the Royal Institution with an account of the dynamo-electric machine, its history and some of its applications. The latter are of such a nature as to present a striking contrast between the significance of the knowledge possessed at the present day and that of some fifty years since, when FARADAY first observed that an induced current was set up in a coil surrounding the armature of a permanent magnet when the armature was forcibly severed from the magnet. So diverse and important are some of these applications that it would scarcely be possible to give a better illustration of the way in which the abstract scientific results and observations of to-day may be developed into furnishing the means by which daily necessities of ordinary life are to be provided for in the future.

FARADAY'S actual observation, made known to the members of the Royal Institution in 1831, was itself only the realization of a theory at which he had previously arrived by *à priori* reasoning as to the necessary production of the induced current under the conditions named, but that current was so slight and of such short duration that seven years elapsed before he could detect its existence with the instruments then at his command.

One of the peculiarities of the induced current, in which it differs from a galvanic current, consists in the very important circumstances that, though only feeble and instantaneous, it is the immediate outcome of the expenditure of mechanical force and that, by repeating the operation of severance by suitable mechanical arrangements, a rapid succession and an aggregation of currents can be produced and directed through a metallic conductor so as to produce in it all the phenomena of a continuous current of great magnitude. As Dr. SIEMENS described it, the single current of FARADAY'S original experiment might be compared to a single rain drop, itself of little power in falling, but which, when repeated often over the surface of an elevated plateau, becomes capable of giving rise at first to streams and then to a mighty river and source of power such as the Falls of Niagara.

Further study of the conditions under which the induced current is produced showed that the force expended to that end bore a definite relation to the force obtained and that mechanical force and electric current were mutually convertible, and then attempts were made to utilize the induced current, as for instance by WHEATSTONE in 1844, though without any practical success, until much time and thought had been devoted to the subject by those who followed in the wake of the great discoverer. One important step in this direction was made by Dr. WERNER SIEMENS in 1856 by the construction of an apparatus with which a succession of currents could be aggregated and a continuous current of considerable power produced. Further advance towards the production of powerful effects by the accumulation of magneto-currents was made by HOLMS and WILDE, when steam power was applied for the purpose, and by means of the machine constructed on the dynamo-electric principle attributable to WERNER SIEMENS and WHEATSTONE. The first machine of this kind brought before the Royal Society in 1867, by Dr. SIEMENS, differed from magneto-electric arrangements by substituting in the place of permanent magnets electro-magnets excited by the current produced by the rotation of the armature or helix of the machine itself.

The advantage of this electro-magnetic machine consisted in its accumulative action and the power of the current produced. Various improvements were then effected by PACINOTTI, GRAMME, and others, by adaptations of the principle upon which it was constructed, and ultimately one devised by Dr. SIEMENS admitted of a further increase in the strength and steadiness of the current being realized.

Among the applications of the dynamo-electric current, one of the first to be noticed is the transmission of power, and in Dr. SIEMENS' lecture this was illustrated by the working of a circular saw receiving its motion from a dynamo-electric machine placed in the basement of the Royal Institution, and receiving in its turn motive power from a gas engine. By this arrangement it was shown that 60 per cent. of the engine power expended could be turned to account at another place, and that in this way natural sources of power, such as waterfalls, might be made available for supplying motive power at distances of even twenty or thirty miles, or power might be transmitted to the depths of mines by the establishment of a stout leading wire connected with an electro-motor on the bank.

The propulsion of tramway cars upon railways is another application of the dynamo-electric current that has been effected by Dr. SIEMENS, and practically worked last year in Berlin. One of the carriages forming the train is fitted with an ordinary dynamo-machine and another machine is worked on the ground by engine power. The current is conveyed by a central rail or conducting rope and the return current is completed through the side rails of the tramway. In this way, thirty or forty persons can be conveyed at a speed of ten or twelve miles an hour, and the train can be started or stopped by moving a handle as required. A line of this kind is shortly to be constructed at the Crystal Palace.

The interest attaching to the electric light at the present time is entirely due to the comparatively cheap rate at which the electric current can be produced by the expenditure of mechanical power and by the combustion of coal for hat purpose, instead of the combustion of metallic zinc in the galvanic battery, and this is another of the applications of the induced current which has an important future. Incidentally, Dr. SIEMENS referred to the misconception prevailing as to the utilization of the electric light, and he pointed out that while glow lights could never equal the electric arc in economy of result, greater efficiency could be obtained from a powerful electric arc than from divided arcs, and therefore the development of electric lighting should be sought in the direction of creating powerful centres of light rather than by its subdivision.

Properly applied, the electric light is much cheaper than gaslight, but it is not likely to supplant gaslight for purposes where great subdivision is indispensable. By burning a thousand feet of gas in burners and consuming the same quantity in a gas engine giving motion to a dynamo-electric machine feeding an electric light, it has been shown by Dr. SIEMENS that about twenty times the luminous effect would be produced in the latter case if the working arrangements were sufficiently perfected. For lighting halls and large places, therefore, the electric light is, in Dr. SIEMENS' opinion, three or four times cheaper than gas.

The production of heat in the electric arc admits of the application of the dynamo-electric machine for the fusion of refractory metals. Assuming that a good steam engine converts nearly 15 per cent. of the heat energy of coal into mechanical effect and that 80 per cent. of that effect could be converted into electric energy to be expended without loss in an electric furnace, Dr. SIEMENS considers that 12 per cent. of the total energy of coal would be conveyed to the material to be melted—a result far exceeding in economy that of the best furnace yet constructed. In an experiment made to illustrate this application of the induced current two pounds of steel melted in the space of about twenty minutes.

The application of the electric arc to the ripening of fruit, etc., lately experimented upon by Dr. SIEMENS is one of the most recent and most surprising results arrived at yet, and though the cost of the light as produced by the aid of steam power would be too considerable for other than special cases, the cost would be very much less considerable in places where water power could be made available.

POISONOUS PIGMENTS.

THE attention of the public has again been directed to this subject within the last few months by the report of numerous cases in which it is alleged that injurious effects have been produced by arsenical wall paper and other articles in general household use. The subject is no less important than obscure, and it is therefore deserving of thorough investigation. With this object the Council of the Society of Arts has appointed a Committee to inquire into the practicability of preventing the use of arsenic in any processes by which it is allowed to remain in finished goods, and to obtain evidence as to the effect upon various trades of a total prohibition of the sale of articles containing arsenic. This inquiry will naturally raise the question whether the alleged influence of arsenical wall paper, etc., is sufficiently well founded. The Council of the Society of Arts, with a view of promoting the object in view, has issued to manufacturers of colours, dyers and others using colours in their manufacturing operations, a circular, asking for information on certain specific points. As connected with this subject, we may call to mind the recent statement of a foreign chemist, that glucose artificially prepared from amylaceous materials by means of sulphuric acid always contains arsenic, this ingredient being derived from the pyrities used in making sulphuric acid. Considering the vast extent to which artificial glucose is used in brewing, the presence of even a trace of arsenic in it may be of some importance.

BOTANICAL LECTURES AND DEMONSTRATIONS AT THE GARDENS OF THE ROYAL BOTANIC SOCIETY.

IT will be seen, by reference to the advertisement of the School of Pharmacy of the Pharmaceutical Society of Great Britain, that Professor BENTLEY will commence his lectures and demonstrations on Systematic and Practical Botany, at the Gardens of the Royal Botanic Society, in Regent's Park, on Saturday morning, May 8, at 8 o'clock. The lectures will be continued on the succeeding Friday and Saturday mornings, till the end of July.

ROYAL BOTANIC SOCIETY.

THE second spring exhibition of flowers was held in the Gardens of the Society at Regent's Park on Wednesday, the 21st inst., and the number of visitors amounted to upwards of sixteen hundred. Notwithstanding the chilling influence of the east wind and the low temperature, which compelled the band and the majority of the visitors to keep within the conservatory, the exhibition was a very successful one, and the display of choice flowers was at least equal to that of other occasions.

ROYAL SOCIETY.

AMONG the fifteen candidates for the Fellowship of this Society who have been selected by the Council, and recommended for election on the 3rd of June next, we notice the names of Professor ATTFIELD and Dr. W. A. TILDEN.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH.

ANNUAL MEETING.

The annual meeting of the North British Branch of the Society took place in the Society's Rooms, 119A, George Street, Edinburgh, on Tuesday, April 20, at 12 o'clock; Mr. J. B. Stephenson, President of the Branch, in the chair.

The President opened the meeting by asking the Honorary Secretary to read the—

ANNUAL REPORT, 1879–80.

The Council of the North British Branch of the Society beg again to submit their annual report.

Since the date of their last report the operations of the Society continue to be prosecuted steadily and satisfactorily without anything noteworthy occurring of a special character.

The Council have procured a renewal of the lease of the present premises for five years. Although the accommodation is somewhat scanty, as has been previously pointed out, still the advantages of the present premises, both as regards their character and locality, as well as the difficulty of bettering ourselves in any of these respects, coupled with the formidable objections to a removal, formed the ground of a strong recommendation, to which the Council in London at once gave effect in re-taking the premises.

The museum and library have been enriched by the addition of various specimens and books, and are still largly taken advantage of. During the past year there have been 1091 visitors during the day and 691 in the evening, for the purpose of study, making 10,151 from the opening of the rooms for that purpose.

Books have also been lent out from the library to the extent of 143 volumes; and the Council rejoice to believe that by these means they are in this department carrying out one of the primary purposes of the Society, viz., promoting the education of its members.

The Council also submit the result of the issue of special tickets to lectures on materia medica and chemistry. During the year 23 pupils took advantage of these tickets, and it is very gratifying to report that two of these have distinguished themselves, one having carried off the principal prize in Dr. Craig's materia medica class, and the other being second in Dr. S. Macadam's theoretical chemistry. Every information in connection with the summer courses will be obtained by applying to the Honorary Secretary at the Society's Rooms, 119A, George Street.

The Scottish Board of Examiners has met as usual since the date of last report, on fourteen days in all; and they have had before them 7 Major, 131 Minor, and 6 Modified candidates. Of the Minor 59 were rejected, constituting a percentage of 45. There were 63 candidates for the Preliminary examination in Edinburgh during the year. The number of candidates for both the Minor and the Preliminary examinations is considerably greater than last year.

As may have been observed in the Journal, a deputation is to visit Edinburgh during the April Examinations here, which take place in the last week of the month, and this Council have only to express their desire to accord them a hearty welcome, and their confidence, based on former experience, that the visit will be instrumental in promoting the very desirable end for which these deputations were appointed, viz., the effecting a thorough unity of action and sentiment on the part of the two Boards.

There have been seven evening meetings during the past winter, at which the attendance has been quite satisfactory; and the papers read have been uniformly interesting and instructive, and have been printed *in extenso* in the Journal. The Council have to thank their friends, both those belonging to the Society and outside of it, who have so kindly assisted them on these occasions.

Since the date of the last report the question of weights and measures has made considerable progress towards settlement. Owing to the action of the Council in London, the apothecaries' weights have all been legalized, and although there are still some points connected with the measures upon which there appears to be some difference of opinion as to the full bearing of the Act, this Council believe that, in future, measures will most probably be verified and marked by the makers, as they observe has already been done by some parties in London, so that the difficulty and loss to retail chemists will be restricted to any incorrect measures they may have at present in stock. It is true that, although the Act itself is compulsory, some local authorities may yet be very slow in obtaining standards and setting their inspectors to work, still it is the interest of all to have weights and measures so correct that in event of any visit being made officially no one need be annoyed. Of course when district officials receive their instructions it will enable druggists to send existing measures to be verified and if found correct they will be marked in the proper manner, and thus prevent, in many cases, the destruction of those measures in present use.

The Council regret that the decision in favour of the Society and against the London and Provincial Supply Association, Limited, upon which they had in their last report to congratulate the Society, has quite recently been reversed in a higher court. The case has, however, been very properly carried by the Council of the Society to the House of Lords, the ultimate court of appeal, and this Council fondly indulge the hope that, in this last resource, it may be decided in accordance with the whole scope and spirit of the Pharmacy Act of 1868, and that thus an evasion of its provisions on the ground of the party being a corporation, and not expressly specified in the Act, may be prevented.

The Council have to submit as usual the result of the voting, which has been tabulated on the sheet laid on the table.

It was with much regret that they received a declinature from Mr. H. C. Baildon upon his nomination for election. Mr. Baildon has been for so many years associated with all the operations of the Branch of the parent Society that the Council think it proper to take this opportunity of recording their sense of the value of all that Mr. Baildon has done for pharmacy, and especially in connection with the proceedings of this Branch of the Society; and they express a wish that he may yet be spared to assist them in their deliberations and to forward what was the original object of the association. Mr. Baildon was one of its earliest members, and has been unceasing in his efforts to further its best interests.

The report, on the motion of the Chairman, was unanimously adopted.

The President then submitted the result of the voting for the Council for 1880–1, when it was found that the following gentlemen had been elected:—

Mr. William Ainslie ....Edinburgh.
Mr. George Blanshard............ ,,
Mr. Thomas Davison ....Glasgow.
Mr. Daniel Frazer .... ,,
Mr. William Gilmour ....Edinburgh.
Mr. David Kemp ....Portobello.
Mr. W. R. Kermath ....St. Andrews.
Mr. A. Kinninmont...............Glasgow.
Mr. G. H. Laird ....Edinburgh.
Mr. G. D. Mackay .... ,,
Mr. Alexander Napier........... ,,
Mr. John Nesbit ....Portobello.
Mr. A. Seath.........................Dunfermline.
Mr. J. B. Stephenson ....Edinburgh.
Mr. J. R. Young .... ,,

In connection with the election the President stated that 212 voting papers had been sent out, and of these 83 had been given effect to. Two of the papers were informal. All the papers in connection with the nomination and election of the Council were submitted to the meeting.

Mr. Daniel Frazer (Glasgow) proposed the re-election of Mr. J. B. Stephenson as President, and the election of Mr. John Nesbit as Vice-President. Mr. J. R. Young, in seconding the motion, took occasion to refer to the great attention which the President had given to the business of the Branch during his tenure of the office. The motion was also supported by Mr. Kemp (Portobello) and cordially adopted.

Messrs. Stephenson, Napier and Young were re-appointed Auditors.

Mr. John Mackay was unanimously re-elected as Honarary Secretary.

BOTANICAL PRIZE FOR 1881.

A Silver Council Medal is offered for the best Herbarium, collected in any part of the United Kingdom, between the first day of May, 1880, and the first day of June, 1881; and should there be more than one collection possessing such an amount of merit as to entitle the collector to reward, a second prize, consisting of a Bronze Medal, and also Certificates of Merit, will be given at the discretion of the Council. In the event of none of the collections possessing sufficient merit to justify the Council in awarding medals or certificates, none will be given.

Competitors must be Associates or Apprentices or Students of the Society, and under twenty-one years of age.

The collection must consist of phanerogamous plants and ferns, arranged according to the natural system of De Candolle, or any other natural method in common use, and be accompanied by lists, arranged according to the same method, with the species numbered.

The collector must follow some work on British botany (such as that of Babington or Hooker), and state the work he adopts. The name of each plant, its habitat, and the date of collection, must be stated on the paper on which it is preserved.

Each collection must be accompanied by a note, containing a declaration signed by the collector, and certified by his employer, or a pharmaceutical chemist to whom the collector is known, to the following effect:—The plants which accompany this note were collected by myself, between the first day of May, 1880, and the first day of June, 1881, and were named and arranged without any other assistance than that derived from books.

In estimating the merits of the collections, not only will the number of specimens be taken into account, but also their rarity or otherwise, and the manner in which they are preserved, and should a specimen be wrongly named, this will be erased from the list.

The collection must be forwarded to the Secretary of the Society, 17, Bloomsbury Square, on or before the first day of July, 1881, indorsed "Herbarium for Competition for the Botanical Prize." After the Prize Distribution in October, collections will be retained one month, under the care of the Curator of the Museum, for the inspection of persons connected with the Society, and then returned to the collector, if required.

Provincial Transactions.

EDINBURGH CHEMISTS' ASSISTANTS' ASSOCIATION.

The annual business meeting was held on Monday, April 19, in the rooms of the North British Branch, Mr. D. Maclaren, President, in the chair.

The minutes of last meeting having been read and confirmed, the Chairman called upon Mr. Hutton to read the financial statement, which showed a membership of forty-five, giving an income of £5 15*s.* 6*d.*, with a balance from last session of £2 11*s.* 7*d.*, making in all £8 7*s.* 1*d.* The expenditure amounted to £4 2*s.* 9*d.*, leaving a balance in the hands of the Treasurer of £4 4*s.* 4*d.*

The Secretary then read the annual report, from which it appeared that the average attendance at the meetings showed a gratifying increase over the previous session. The papers read during the session had been all contributed by members, and the committee had been able to carry out the printed syllabus in its entirety. The membership showed a falling off of two as compared with last session. Taking all things into consideration the committee did not regard this as any reason for discouragement, but believed that if every member of the Association would make an effort, the membership might be very largely increased.

The President read a letter from Professor Maclagan intimating that the apprentices' prize had been won by Mr. Edwin Reynolds, who was then presented with a copy of Attfield's 'Chemistry.' It was resolved to send a letter of thanks to Professor Maclagan for his kindness in acting as adjudicator.

The following gentlemen were then appointed office bearers for next session:—Mr. J. D. Robertson, President; Mr. W. Aitken, Vice-President; Mr. W. Hutton, Treasurer, and Mr. J. R. Hill, Secretary.

It was resolved to vote the sum of £1 1*s.* to the Benevolent Fund of the Pharmaceutical Society, for the use of the rooms, and to send a letter of thanks to the Council of the North British Branch.

After the transaction of some further matters of detail, the meeting was closed with a vote of thanks to the office bearers and committee for the session just ended.

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association was held at 17, Bloomsbury Square, on Thursday evening, April 8, Mr. R. H. Parker, Vice-President, in the chair.

The President stated that Mr. C. Thompson had kindly consented to defer the reading of his paper, announced for that meeting, to enable Dr. Senier to introduce a second subject into his report upon physical chemistry.

Dr. Senier then proceeded to give his report, which consisted of a lecture with experimental illustrations. The first part of the lecture was devoted to the recent discovery of the solubility of solids in gases, and the researches having a bearing thereon. The substance of this part of the lecture will be found on p. 876 of this Journal. The second part of the lecture consisted of an account of a recent application of phosphorescence, of which the following is a *résumé*:—

A Recent Application of Phosphorescence.

BY DR. A. SENIER, F.I.C., F.C.S.,

Demonstrator of Chemistry in the Laboratories of the Pharmaceutical Society.

It is well known that many bodies possess the property of phosphorescence, that is to say, have the power to a greater or lesser extent of vibrating luminous rays without any appreciable heat after the exciting cause has been removed. Thus many substances continue to emit light when placed in the dark after previous exposure to the sun's rays or to some other sources of light. This phosphorescence by insolation is manifested by bodies generally which are bad conductors of heat, and especially by sulphate, carbonate and fluoride of calcium, shells, petrifactions, the diamond and many organic substances. Bolognian phosphorus, first made in 1602 by calcining barium sulphate, emits a light after insolation, which is said to last more than a day. Similar results have been obtained in the case of Baudoin's phosphorus, made in 1675, by fusing calcium nitrate, and Canton's phosphorus, prepared first in 1761, by calcining oyster shells with sulphur. For most of our knowledge of the subject of phosphorescence we are indebted to Becquerel. He believed that phosphorescence was identical with fluorescence, except that there was a difference in degree respecting the time during which the light continues to be emitted. The phosphorogenic property is known to correspond pretty well with the actinic property of radiation in the position which it occupies in the spectrum. Thus if the dark rays immediately beyond the violet be allowed to fall upon a phosphorescent material, it at once changes their refrangibility so as to bring them within the limits of our visual powers. Thus far the action of the phosphorescent material is similar to that of quinine, but it does more, if placed in the dark it continues for some time to emit rays having colorific properties. Phosphorescence then involves fluorescence; but it is probably not fluorescence only.

It occurred to Mr. Balmain that a phosphorescent material, such as Canton's phosphorus, might be employed advantageously as a paint. Thus we have "Balmain's Patent Luminous Paint," a sample of which I hold in my hand. As a paint simply, it is by no means free from objection. The coarse white powder readily settles from the varnish in which it is suspended, and when the paint is being applied requires frequent stirring. Moreover, the paint is translucent, and several coats do not produce opacity. Through the kindness of Messrs. Ihlee and Horne, of Aldermanbury, the agents for the patentee, I am enabled to exhibit a number of articles coated with this paint. My friend, Mr. Lowe, F.I.C., F.C.S., will assist me in these experiments. It is to be noticed that the various objects emit a bluish luminosity very evident when the gas light is extinguished. It is sufficiently intense to illuminate distinctly near objects, and by the aid of the large framed sheets of glass having on their under surfaces three coats of the paint large print may be made out under favourable circumstances. The bluish tint lasts for an hour or so after illumination by sunlight, or conveniently by burning a fragment of magnesium ribbon, when it disappears leaving a distinct white luminosity for many hours. The life buoy which I exhibit is intended, of course, to float upon water, immersion in which, however, does not affect its luminosity. Diving apparatus has been coated with considerable success. For ornaments and experiments of an amusing nature the paint is well adapted. The framed sheets of glass already alluded to, and which are called Aladdin lamps, are already in use in several places where a faint light is sufficient and where heat is to be avoided—in the gunpowder magazines on board H.M.S. Northampton, etc., etc. By using a concave illuminated surface it is hoped to place an instrument safer even than the Davy lamp in the hands of colliers, to be used at least in times of danger. By its use domestic articles may be readily found in the dark—match boxes, etc. In surgery, for the illumination of instruments in certain cases, I think it may be found of unusual service. Very many other applications of this invention have already suggested themselves, and many more I am sure will yet be found.

After a discussion, to which Dr. Senier replied, a vote of thanks was passed, and the meeting adjourned.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting held April 21, Mr. O. Wallis in the chair, Mr. F. W. Branson read a paper on "Chalk, its Origin and Distribution."

The subject was introduced by the author giving a description of the principal rocks, the probable composition and origin of which were then described, as was also the position of the cretaceous rocks in the series. It was pointed out that the oldest primary rocks contained only the remains of the simplest types of life, and it was not until the comparatively recent upper secondary rocks were reached that fossil mammals and dicotyledonous plants were found associated. Chalk was then shown by means of slides to consist chiefly of the minute calcareous shells of foraminifers, the structure and affinities of living representatives being described; from the occurrence of like organisms in deep seas at the present time, it was concluded that chalk is the dried consolidated mud of an ancient deep sea, which covered the greater part of England and Europe. Data were then given proving the slow deposition of chalk, and lastly charts showing chalk areas were referred to.

After a discussion in which several members took part, the usual vote of thanks was passed.

The paper was illustrated by means of numerous diagrams, microscopic slides and fossils.

SOCIETY OF ARTS.

The Chemistry of Bread-Making.*

BY PROFESSOR GRAHAM, D.SC.

Lecture I.

(*Continued from page* 806).

Starch was known to the Greeks; they called it *amulon*, from α and μύλη, indicating that it was not the product of a mill; they did not obtain starch from grinding the corn, but by bruising wheat, and by the employment of water they obtained this fine flour; and, therefore, they called it flour made without a mill. This Greek word has given rise to the scientific word amylaceous, which is used to indicate bodies which contain starch. The method by which starch is obtained from wheat or potatoes is this:—Formerly, it was entirely by a process of fermentation; the corn was roughly ground or bruised, then steeped in water, and allowed to remain for several day until spontaneous fermentation was set up, and the product of this fermentation consisted, as usual, of carbonic acid gas, and its oxidized derivative, acetic acid. There was also lactic acid, formed by the breaking up of the sugar. This, therefore, was a wasteful process. After the glutinous matter of the wheat had been sufficiently disintegrated and broken down, the whole mass was worked in a bag with water, and in that way the fine starch passed through the minute holes in the bag, and ultimately was subjected to repeated washings, in order to get rid of any trace of albuminous matter or glutinous principles that were left, and then it was dried. The process, however, was not only offensive, from the putrefactive decay which went on, but it was also wasteful. In modern times, by much better mechanical rasping in the case of potatoes, grinding in the case of wheat and other materials employed, such as Indian corn, and rice, the principal amount of starch is obtained; but instead of allowing that to undergo fermentation, in order to decay or break up and get rid of the albuminous matter, caustic soda is employed to dissolve the albuminous matter. Caustic soda and caustic potash have the property of dissolving albuminous matters with great ease. You all know the soapy feel which the alkalies have when you rub them between your fingers, and you can very easily, by means of a solution of caustic alkali, dissolve out from an adulterated sample of wool the whole of the wool and leave only the cotton. It is in this way that the modern starch-maker gets rid of the small quantity of albuminous matter that may still remain in the starch after the grinding and washing process. This alkali dissolves

* Cantor Lectures: Delivered November and December, 1879. Reprinted from the *Journal of the Society of Arts*.

away the albuminous matter, but has no action on the starch itself.

Now, starch, however obtained, consists of minute cells, and these cells differ in size and also in form, according to their origin. The cells obtained from potato are about $\frac{1}{150}$th of an inch in diameter; those of sago are about $\frac{1}{300}$th, the cells obtained from wheat are about $\frac{1}{500}$th of an inch in diameter, and there are many smaller than those of wheat. The cell of potato starch, however, is larger than most; indeed, I think it is only exceeded in size by the cell of the maranta and tous-les-mois arrowroots. All the starches have characteristic appearances under the microscope, and it is on account of the difference of form and the difference in size that we are able to detect adulteration; thus, when ordinary potato starch is mixed with arrowroot, or when some cheaper starch is mixed with sago, we are readily able by means of the microscope, to detect and quantify the adulteration.

Starch is insoluble in cold water. Mr. Lewis—who has kindly volunteered his valuable services as demonstrator in this course—is now performing an experiment which everyone in the room has seen, but which I wish to repeat, having shown that starch will not dissolve in cold water. He is now acting on the starch in such a way, by means of heat, as to cause the little cells to be ruptured, and we shall then have the starch material, called granulose, pass out of the ruptured bag or cell, thus giving a solution or emulsion of the starch.

If to a solution of this boiled starch we add a little iodine, we obtain a blue precipitate, a combination of the iodine and starch, the so-called iodide of starch. With bromine we get, not a blue, but a yellowish reaction. This reaction of bromine on starch is so inferior, and of such very slight value in chemical investigations, that we rarely employ it; but the iodine reaction is remarkably sensitive, and by means of it we are able to detect very minute quantities of starch in various infusions in which these small quantities may exist. If we take some soluble starch, and add to it the liquid, called after its inventor, Fehling's solution, which consists of sulphate of copper, or blue stone, to which Rochelle salt, or the double tartrate of potash and soda is added, and then rendered distinctly alkaline by excess of soda, many organic substances, when added to such a solution as this of Fehling's, have no action, even upon being heated; but in the case of some we shall find there is a distinct action. Now, soluble starch does not produce any apparent action to you. I shall presently show you, when we come to consider one of the sugars derived from soluble starch, that we have a distinct attack upon the oxide of copper, which, in this liquid, is associated with sulphuric acid, as sulphate of protoxide of copper. The oxide of copper is deprived of one half its oxygen, which goes to oxidize the sugar, and a red sub-oxide of copper is formed, which you will presently see.

When soluble starch is examined by means of light that has been previously polarized, a remarkable action takes place. Polarized light is light which has been so acted upon that, instead of the ray of light vibrating in all planes at right angles to the axis of the direction of the ray of light—as when it has been acted upon either by a plate of glass inclined at an angle of 35° 25″ to the incident ray, or by means of tourmaline or a Nicol's prism, or in many other ways—it is compelled to vibrate in two directions only. The vibrations of light are not like those of a knot on a string. If I had a string fastened at the other end of the room, with a knot in it, and caused it to vibrate, the knot would only vibrate up and down in one plane, but with a ray of light the vibrations take place in every direction at right angles to the axis of the ray, so that a section of it would have the appearance of the spokes of a wheel. It is thus different from the vibration of a knot on a piece of string, or of a bladder, or of a boat floating on the ocean where there is a wave motion passing towards the shore. Now, an inclined plate of glass, a crystal of quartz, a Nicol's prism of calc-spar, have all of them, more or less, the power to convert these vibrations into two distinct sets. All these various wave motions are converted into one-half, which vibrates in one plane, and the other half vibrating in a plane at right angles to it. If a ray of light strikes an ordinary sheet of glass at an angle of 35° 25″, half of it will pass through the glass, and half will be reflected, and both halves will be polarized. They will be compelled—no longer to vibrate in an indefinite number of planes, all being at right angles to the axis of direction of the ray—but to vibrate in two planes, the whole of one set vibrating in one plane, and all the rest in the other, both sets of vibrations being in planes at right angles to each other, and also at right angles to the direction of the ray of light. Perhaps, as simple an illustration as any, is to take a wheel of a carriage together with the axle. Let the axle represent the direction of the ray of light, and let the numerous spokes of the wheel represent the numerous planes of the vibrations of ordinary light. These planes are variously inclined to each other, but all are at right angles to the axle, *i.e.*, the direction of the ray of light, in the same manner as the plane of vibration of the knot in the string is at right angles to the direction of the wave track. Now, imagine that the numerous spokes of the wheel are replaced by a $\oplus$ of two bars at right angles to each other, and manifestly also to the axle. In precisely the same manner the numerous planes of vibration of ordinary light are converted into vibrations in two planes at right angles to each other, and of course, also at right angles to the direction of the ray of light. Now, if I have previously polarized our light, and I have by certain means got rid of one-half of the light which is vibrating in one plane, and only use the other portion vibrating in the plane at right angles to it, I then find that if that light is passing through a tube to my eye, that some liquids, *e.g.*, water, would have no action at all, and I should find no difference; but, in the case of other liquids, I am obliged, in order to see the light required, to rotate the instrument either to the right or to the left in order to get the particular light which I had before. All these substances which so act on the plane of polarized light, and cause it to be rotated so that I must turn the instrument to the right in order to see the light, are called dextrorotary bodies. The other substances which rotate the plane of polarized light to the left, are called lævorotary. The amount of rotation brought about by a solution of starch is no less than 216°. In fact, I am obliged to rotate the tube nearly two-thirds round, in order to get the tint which I saw before putting the solution of starch into the tube.

Another interesting matter that I wish to draw your attention to, is the action of soluble albuminoids upon starch. I have here an analysis that represents the chief class of albuminous bodies, such as white of egg, and bodies analogous to it.

There are, no doubt, numerous bodies more or less resembling white of egg in general composition, some being soluble in water, others insoluble. There are considerable difficulties in arriving at the true molecular weight of such complex uncrystallizable substances as the albuminoids, and up to the present, we are unable to assign, with accuracy, any formula to these bodies. According to Lieberkühn, the albumen from white of egg has the following centesimal composition:—Carbon, 53·1; hydrogen, 7·1; nitrogen, 15·7; oxygen, 22·1; sulphur, 1·8, and from this he deduces the formula $C_{72}H_{112}N_{18}SO_{22}$. This, of course, is hypothetical, the probabilities are that the molecular constitution of many of the higher albuminoids is much more complex than is represented by Lieberkühn's hypothesis. Now, on comparing the centesimal composition of starch:—Carbon, 44·44; hydrogen, 6·17; oxygen, 49·39, = 100,—we see that in the albuminoids the carbon and hydrogen amount to 60 per cent. in the carbohydrates of the starch type these amount to 50 per cent. The characteristic difference, however, is in the substitution of nitrogen for a part of the oxygen.

If we take any substance containing an albuminoid, and it will be convenient for our purpose to take an infusion of ordinary malt, we shall find that on the unbroken, unboiled, cells of starch, the infusion of malt will have very little action. The infusion of malt itself contains some sugars, and, unfortunately, it is not easy to obtain, from a vegetable infusion, albuminoids without at the same time having sugar products formed; but at any rate you will be able to see a marked difference between the action which takes place when malt infusion is added to unboiled starch, and when it is added to a starch in which the cells have been previously burst and the granulose matter allowed to exude from the rupture. This is some starch to which malt infusion was added. You saw it was blue before adding Fehling's liquid, and it is blue now, after boiling. In other words, there is nothing that is reducing or taking away the oxygen from the oxide of copper. It still remains the ordinary protoxide. In this other tube, previous to the malt infusion being added, the solution of starch was boiled, that is to say, the starch cells were broken up by boiling, and here you see there is an action on the oxide of copper which must be perceptible at the other end of the room. That is a reaction by which some sugars decompose oxide of copper, robbing it of half its oxygen. This reaction only takes place near the boiling point, so that we are obliged to heat such solutions. You see now the production of a yellow colour, rapidly changing to red.

The reason I have shown you this experiment, is that I shall have occasion to refer hereafter to a very interesting process by which the baker long ago found out, before scientific men were able to tell him anything about it, the importance of using the material called in the trade, "fruit." This is simply potatoes. They do not take unboiled potatoes, but they boil the potatoes thoroughly, so as to entirely destroy the cell wall, and to allow the whole of the matter to exude from the cells; then they add this preparation, together with a small quantity of flour, to the yeast, in order to prepare what they called "ferment." The object in doing so, I shall hereafter explain to you, and it is a most ingenious and able application of empirical science to bread-making, by which as small an abstraction and degradation as possible of the albuminoid matters, and of the starch of the flour, is allowed to take place, and yet a sufficiently abundant disengagement of carbonic acid as is necessary to make a light porous bread is brought about.

Mr. Lewis will now take this infusion of starch and add to it a small quantity of dilute sulphuric acid—hydrochloric acid would do equally well—he will boil it for a short time, and you will find the starch is converted into sugar. You will remember I showed you that Fehling's liquid is not affected by the simple solution of starch, but if we take the solution of starch and boil it for a short time with dilute sulphuric acid, or hydrochloric acid, we shall convert the starch into sugar bodies. I shall have occasion hereafter to direct your attention for some time to the nature of the various sugar bodies—maltose, dextrin, and so on—that are formed in such cases, as they arrive. I shall be able to show that the same action has taken place by making use again of this valuable reagent of Fehling.

If starch be heated to the temperature of about 300° F., more especially if there be a slight quantity of moisture in the starch, it is converted into a substance which is called British gum. We call it dextrin because it differs from the ordinary gum arabic in its action upon the plane of polarized light. Dextrin is called so because it rotates the plane of vibration of polarized light 209° to the right. Here is a specimen of it. Dextrin may be prepared from starch in a variety of ways. The most convenient is to mix 2 parts of nitric acid, or aquafortis, with 300 of water and then apply that very weak acid liquid to 1000 parts of starch. They are thoroughly incorporated and left to dry in the air or by other convenient means. When dry, the substance is heated to the temperature of 220° F. A much lower temperature is sufficient when the acid has been previously employed than when merely dry starch is used. Another method of making dextrin from starch is to take starch, and boil it in a small quantity of water, then add to that, an infusion of malt. The malt converts the starch into a variety of products, but the first action is to convert the starch into maltose—which is a sugar I shall have to describe to you hereafter—and dextrin. So soon as the iodine liquid indicates that the starch has disappeared, or that the whole, or nearly the whole, of the starch has disappeared, it is then rapidly boiled, in order to prevent the ferment in the malt infusion carrying on the hydration of the starch any further, the object being to obtain the gum or dextrin, and not maltose sugar. I said that mere heat would convert starch into dextrin, but much more so if the heat be moist. The Vienna baker, and, imitating him, the Parisian baker, employs this ingenious reaction in the glazing of the beautiful rolls of Paris and Vienna. It is their practice, and it is adopted in London by a few of our bakers, to allow steam from a boiler to be injected into the oven just as the bread is about to be placed in it. This steam, coming in contact with the highly-heated walls of the oven becomes superheated; it is not wet steam, but perfectly dry steam. The bread is, however, wet on its surface, and placed in this atmosphere, and the action of the steam upon the surface of the roll is to cover it with a beautiful layer of British gum, just the same as you will find at the back of postage stamps, which is also made from starch.

Dextrin or British gum, when made by either of the processes I have described, possesses the following properties:—It is a gummy body, resembling in its viscosity the ordinary cherrytree-gum and gum arabic. It is employed largely in calico printing as a thickener, for the purpose of printing on the cloth the necessary mordants and colours. Dextrin is soluble in cold water, and starch, you will remember, is not. A solution of dextrin is precipitated by alcohol—more or less. You see the clear liquid is rendered turbid by the addition of alcohol. Iodine gives with dextrin little or no action.

There are two or three modifications of dextrin—erythro dextrin, which gives a brown tint on the addition of iodine; the others, achromatic dextrins, give no colour reaction, and are, according to Brown and Heron, the most numerous. Dextrin has no action on the Fehling's liquid, that is to say, pure dextrin, but if you repeat the experiment upon ordinary commercial dextrin, you will find there is a little action. This is owing to the mode of preparation. In acting upon starch by means of acid—which I have already shown you is one of the methods for making dextrin from starch—a small quantity of sugar must be formed. On the other hand, if you use the malt infusion, it cannot form dextrin without also forming maltose sugar, and hence, therefore, we have sugar formed as well as dextrin. The chemist has means at his command of separating from the ordinary dextrin the sugar, and also the starch, so as to obtain nothing else but dextrin, and a sample of dextrin so obtained has no action upon Fehling's liquid any more than a solution of starch has.

(To be continued.)

Parliamentary and Law Proceedings.

Result of an Action by an Assistant.

At the Woolwich County Court, on April 14, Before J. Pitt Taylor, Esq., Judge, the case of Holloway *v.* Carter, came on for hearing. This was a claim for a month's salary, £2 10*s*., and a quantity of patent medicines, pills, and other articles, held by defendant, and which were claimed by plaintiff as his property. Mr. Peake, solicitor, appeared for defendant.

Plaintiff said he had been an assistant to defendant, who keeps a chemist and druggist's shop, opposite the Arsenal Station, at Woolwich. He first went to defendant's on September 15, and left on November 13, two days less than the full month. He received one month's warning. Two days before the second month was up, defendant discharged him, and refused to pay him his wages or give up his property. The reason for so doing was that defendant accused witness of robbing him of medicines and pills, and also of selling goods on his own account. His time was his own after eight o'clock at night, and after that hour he used to sell pills and patent medicines on his own account. In his answer to Mr. Peake, he said he got the coated pills (produced) from a chemist named Kirby, in London, but he had no invoice with them. They were not sent to him in the boxes they were now in, but in a tin case, and he put them in the boxes himself. The reason why he put them in boxes was because they were some boxes given him by Mr. Twemlow, who was defendant's predecessor in the business; that he would swear to. They were given to him by that gentleman last August. Mr. Twemlow was not present, but he had seen him the previous day at his place of business in Castle Street, Holborn, London. Some envelopes marked "sudden death to fleas" were produced, which he said belonged to him, and were also given him by Mr. Twemlow when that gentleman left the business. He came into possession of the pills and patent medicines produced when he (witness) was in business in Bermondsey. He could not tell how Twemlow's name came on them, as he did not put it on. A railway blind and sling used for resting the arm in, was then produced, which he swore was in his room when he went into it first.

Plaintiff's brother, Eustace Holloway, swore the goods produced were his brother's; but he contradicted himself so much that the Judge told him to stand down.

At the request of Mr. Peake, plaintiff was recalled, and in answer to questions, said the reason why he only claimed 15 gross of pills and two dozen of patent medicines, when in his room was found 20 gross of the former and three dozen of the latter, was that he did not know exactly how many there were.

That being the plaintiff's case, Mr. Peake said the plaintiff had been selling pills and patent medicines on his own account to persons, and the inference was that he must have taken those goods from the shop of Mr. Carter, his employer, as he should endeavour to show. He then called the defendant.

Mr. John Carter, who said he took the business in September last of Mr. Twemlow, and engaged the plaintiff as an assistant, under a Mr. Rideal, who had charge of the business in his (witness's) absence, he being engaged in town, and not able to get to the shop till late at night. He paid plaintiff £30 per annum, and found his food and lodging, but as he had no room at his own house plaintiff and Mr. Rideal lodged at a Mr. Martin's, at No. 51, Sandy Hill, Plumstead. On the evening of the 10th of November Mr. Rideal told him something, and he gave him certain instructions, which resulted in the boxes of the plaintiff being searched, when in them were found the pills, patent medicines and other things produced. They were brought down to his shop, and the next morning when plaintiff came in, he told him that his services were no longer required and told him the reason why. Plaintiff said the things were his own, and he told him if he could prove it he should have them and his money too. Plaintiff said he bought the pills from a Mr. Kirby, of London, and witness immediately telegraphed to Mr. Kirby, whose answer satisfied him that plaintiff had not bought them of that gentleman. The whole of the medicines were such as the plaintiff could easily get rid of. Defendant further said that he considered it dishonest for a servant of his to sell goods of the same description as he did in his own time.

Charles Rideal, student of medicine, at one time chief assistant to Mr. Carter, related upon oath the finding of the medicines in the plaintiff's boxes, and said he could unhesitatingly swear that they were the property of Mr. Carter.

Defendant called two witnesses to prove that plaintiff had sold them pills of a night after eight o'clock, and that the parcels of medicine sent by the defendant's errand boys from defendant's shop to Sandy Hill, had, by the same boy, been afterwards taken to the house of a person in Burrage Road, who sold pills and other medicines to little shops.

At the conclusion of the case, his honour said he had no hesitation in saying that, in his opinion, plaintiff had been systematically robbing Mr. Carter, and that he had been very properly discharged by his employer. Judgment would be for defendant with costs of defendant, his solicitor, and three witnesses, two of them with subpœnas.—*Kentish Independent.*

Poisoning by Opium.

On Tuesday afternoon, Mr. Harris held an inquest, at Catford, on the body of George Heath, aged twenty-five. It appeared from the evidence that deceased, who had been a teetotaller for several months, was of a very excitable temperament. He resided with his father, and assisted him in his business. Something had occurred to excite the deceased on Saturday, and in the evening he was in the Black Horse, Rushey Green, Lewisham, and drank raw spirits and ale, his usual drink being lemonade. There he parted with a friend named Allbury, saying he should never see him again, and went to the shop of Mr. Reed, chemist, High Road, where he purchased two separate quarter ounces of opium, which he said he wanted for a restless mare. He had often been served with opium for vicious horses. He was seen at midnight to enter his father's stable, and nothing more was seen of him until his father's stableman went on Sunday morning to feed the horses, when he found the deceased lying in the hayloft in an insensible state. Mr. Steele, surgeon, was sent for, and the deceased was removed to his house, where he died at one o'clock the same day. A paper was found in the stable, which was labelled "Opium, Poison."

Mr. Steele said the symptoms were those of poisoning by opium. Four grains of opium would destroy life, but the paper had contained a much larger quantity.

The jury returned a verdict "That the deceased had committed suicide while labouring under temporary insanity."—*Times.*

Obituary.

Notice has been received of the death of the following:—

On the 20th January, 1880, Mr. Richard Lawton Smethurst, Chemist and Druggist, Salford, Manchester. Aged 59 years.

On the 22nd of January, 1880, Mr. Joseph Harrison, Chemist and Druggist, Stanningley, Leeds. Aged 62 years.

On the 1st of February, 1880, Mr. Matthew Tombs, Chemist and Druggist, High Street, Leominster. Aged 65 years.

On the 29th of March, 1880, Mr. William James Lankesheer, Chemist and Druggist, late of Bath. Aged 39 years.

On the 9th of April, 1880, Mr. Epaphroditus Dunn, Chemist and Druggist, Dudley. Aged 61 years.

On the 10th of April, 1880, Mr. Edward Fitt, Chemist and Druggist, Barking, Essex. Aged 69 years.

On the 18th of April, 1880, at Debenham, Mr. Charles Frederick Marchant, Pharmaceutical Chemist, late of the Butter Market, Ipswich. Aged 59 years. Mr. Marchant had been a member of the Pharmaceutical Society since 1846.

Erratum.—In the notice of the death of Mr. T. H. Pickup (before p. 846), it was erroneously stated that he carried on business in Preston. Mr. Pickup served his apprenticeship in Preston; afterwards he established a business in Blackburn, which he conducted for forty years.

Dispensing Memoranda.

Replies.

[399]. In answer to O. G., I should say the physician intended ext. tarax. liquid, which is sold under that name by wholesale houses.

R. A. C.

[399]. I do not wonder at the medical attendant's surprise at D. G's. mixture; and have never in any West-end establishments seen Battley's liquor used for the fluid extract, but a thick ext. tarax. liq. which is sent out by all the wholesale houses.

J. H.

[400]. It must have required a great stretch of imagination on "Junior's" part to think the prescriber meant the bottle to be covered with tinfoil, as his directions are perfectly plain. The lotion is first to be applied to the parts, and then covered with tinfoil. Had it been oiled-silk ordered instead of the foil he would surely never have thought of covering the bottle with that.

J. H.

[400]. The lotion not being affected by light, I should take it for granted that the prescriber meant the parts to be covered with tinfoil to prevent evaporation.

Y. T. R.

[401]. The following is contained in the Pharmacopœia, Aberdeen Hospital:—

Mist. Scillæ.

℞ Syrupi Scill. . . . . ℥ij
Aqua Menth. Pip. . . . . ℥j
Aqua . . . . ℥v
M. ft. mist.

BLOXAM.

A similar answer has been received from "Geo."

[401]. In answer to K., the following is a formula given in Beasley's 'Pocket Formulary' for mist. scillæ:—

℞ Oxymel of Squills . . . . . . ℥iv.
Hyssop Water . . . . ℥iij.
Peppermint Water . . . . . ℥j.
Spirit of Nitric Ether. . . . . ʒss.

J. S. NORMAN.

A similar reply has been received from G. Picknell and J. B. T.

[401]. If K. will refer to Squire's 'London Hospitals' he will find two formulæ for mist. scillæ, viz.—

Acetum Scillæ . . . . ♏ 40.
Aq. Pimentæ . . . . ad ℥j.
And
Acetum Scillæ . . . . ʒss.
Ac. Acet. Dil. . . . . ♏x.
Aq. . . . . ad ℥j..

I should think the latter of these is intended in the prescription.

R. A. C.

A similar answer has been received from R. J. Y.

[401]. K. will find two formulæ given in each of the following works:—Beasley's 'Pocket Formulary,' and Squire's 'Pharmacopœias of the London Hospitals,' for the preparation of "mistura scillæ." As the writer of the prescription did not notify his authority for this "mixture," it would be perfectly justifiable on the part of the dispenser to use either of the forms given in the works mentioned.

C. T. M.

[401]. The following is a formulæ for mist. scillæ, University College Hospital, as given in Beasley:—

℞ Oxym. Scillæ . . . . ℥j.
Syr. Poppies. . . . . ℥j.
Water . . . . ℥iv.
Mix.

G. PICKNELL.

[402]. In answer to "Jacque" I think the B.P. pulv. cretæ aromat. c. opio. should be used.

R. A. C.

[402]. When pulv. cretæ co. c. opio. is prescribed, the P.L. preparation should be used.

D. T. D.

[406]. If C. L. S. were to dissolve the pot. iod. and pot. citras. in half the quantity of aq. chlor., then separately, in a mortar, mix the quinæ sulph. and pulv. tragac. co., and to this add the vin. colch. and tr. card. co., and the remainder of the menstruum ordered (this should then be introduced into the bottle with the other ingredients already in solution and thoroughly agitated, so as to diffuse the quinine), the appearance of the mixture would be "pinkish."

It is evidently the intention of the medical practitioner to administer the quinine in a state of suspension.

C. T. M.

Queries.

[407].
℞ Hyd. Perchlor. . . . . gr. $\frac{1}{20}$.
Pot. Iodid. . . . . gr. $\frac{1}{2}$.
Ext. Aloes Barb. . . . . gr. j.
M. ft. pil. s. q. m. xij.
c. i. o. vel alt. noct.

Will some of your readers kindly inform me what s. q. is intended for?

R. A. CRIPPS.

[408]. I shall be glad to know what was intended by the following:—

℞ Zinci. Phosp. . . . . gr. iij.
Ext. Gent. . . . . q. s.
Ft. pil. mitte xxiv. Cap. j ter die.

If the phosphide is meant, is the dose excessive (9 grains daily), as it must contain a large amount of combined phosphorus; or can either the phosphite or phosphate be meant? I am not aware if these are used medicinally; if they are, I shall be pleased to know their doses. Writer of prescription unknown.

J. H.

Notes and Queries.

[652]. CHILI PASTE FOR RHEUMATISM.—
Olive Oil . . . . 2 lbs.
Powdered Chilies . . . . . $\frac{1}{2}$ lb.

Boil for seventy-two hours and add 6 oz. melted spermaceti. Scent with ol. lavand., q. s.

W. H. BROWN.

[655]. TRANSFER INK.—I have been asked for a recipe (or where such ink can be obtained) for the ink used to draw patterns on paper, which, when they are simply rubbed on silk transfer the patterns thereto for crewel work.

I should be much obliged if anyone will supply me with the information.

APPRENTICE.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Election of the New Council.

Sir,—For one, I fail to see why Mr. Gostling should take up the cudgels for Mr. Shepperley, and hold him up to our gaze as a suitable representative of our interests, or the trade in general.

We look rather to send representative men to the Board —men whom we can look up to, and whose tone and influence will have a tendency to elevate and benefit the body pharmaceutical. Now it seems to me that the qualification —if such it may be called—that this gentleman possesses, is, that he was the victim of the apothecaries' persecution, and I fail to see how, in any shape or form, this fits a man for a seat at the Council. On the contrary, the very *modus operandi* by which Mr. Shepperley carries on his business is one which would be repugnant to most educated pharmacists. Of course, this is purely a matter which concerns himself; but the making everything in the shape of medicine wherever possible into a patent medicine, with a view to assume functions which are the peculiar privilege of the medical profession, and taking refuge in so doing behind the patent medicine stamp (those who have seen the explanatory circular he issues, recommending some particular bottle or powder, from No. 1 to No. 60, for every ailment under the sun, will understand what I mean), would be, in the opinion of most gentlemen, a proceeding scarcely to be emulated, particularly if we are going to endeavour to cultivate a spirit of good will and fraternal feeling with the members of the medical profession with whom we come in contact.

I trust we shall be increasingly careful to select those representatives who will not only study our trade interests, but help to make us respected as pharmacists by other professions.

I think the trade will be more and more disposed to avoid the patent medicine trade and all that pertains to it, in the future, and, if we have any self-respect left, very rightly so too, when one is inundated with circulars from patent medicine proprietors offering "prizes"—forsooth!— to those who will buy a certain quantity, or will prove that they have bought the same in a given time, of their special nostrums. It is high time for the educated pharmacist to cut this class of thing and consign them and their goods and prizes to those who may be attracted by such baits, or to the grocer or draper. For these and other reasons too obvious to need detailing here, let us elect representatives who will really represent what we most value and care to cultivate and conserve.

Pharmacist.

Sir,—I see that my letter, suggesting Mr. Shepperley's retirement, has elicited a reply from an ardent supporter of that gentlemen's candidature. Probably it is his strong partisan feeling which enables him to detect insinuations in my letter, which I myself, and I venture to assert any impartial reader, would fail to find in it. The fact is, I know nothing of Mr. Shepperley personally. For aught I know to the contrary, in experience and knowledge he may be eminently fitted to be a member of Council. The single point which I wished to raise was this, whether it is not extremely undesirable for us to have on our Council the defendant in the most notorious and protracted of counter practice cases. Certainly our placing Mr. Shepperley on the Council would arouse the suspicion of the Society of Apothecaries, in the same way as our raising a memorial to the ex-Prince Imperial in Westminster Abbey is calculated to awaken the distrust of the French Republic. Mr. Shepperley's advocate thinks that our recognition of this fact betrays fear. I don't; but I believe in the maxim "discretion is the better part of valour." We are far more likely to be gainers by a policy of conciliation than by one of irritation and defiance.

In conclusion, I will state, in reply to your correspondent's query, that I am not and never have been a member of Council, nor am I nominated this year: it is only of the Society that I am

A Member.

Sir,—I was not only a subscriber to the special fund of the Trade Association for the defence of the Shepperley case, but obtained several donations for the same object, and of course the action of the Association had my hearty approval. To defend our rights was a very proper course to take, and I have no doubt it met with the approval of chemists generally. But I cannot think it is desirable to place the victor in a position where he may be called upon to ask favours of the very men he so lately successfully opposed. What we now want in the Council are men who will not only use their energies to protect our trade, but do what they can to carry out the intentions of the founders of the Pharmaceutical Society in obtaining for those who have fitted themselves for dispensers of medicines a greater share of that branch than they now enjoy, and I would rather make this a test for fitness of office than any other. R.

Sir,—Having read two letters from two members of the Society, concerning the condidature of Mr. Wills for the Council, I do not think they have shown the slighest reason why he should not be a condidate.

If he were on the Council and one of those who would select the Examiners, he could not possibly influence them in the conduct of the examinations. And he has stated that he does not wish the standard of the examinations to be altered. And from his position as teacher I think he is in every way competent to know the requirements of students. F. G. W.

Volumetric Estimation of Alkaloids.

Sir,—I am sorry to find it is necessary again to reply to Mr. Moss, as my last letter undoubtedly explains all that gentleman does not understand.

The calculations made by myself were exactly the same as those Mr. Moss has made, and the results, expressed to the nearest milligram, are also the same.

As I have frequently reiterated, these results are calculated from the known quantities in the formula—

$$3(BiI_3)2(\overline{Q}HI)x(HI).$$

It may be equally correct to say the results are calculated from the formula,—$3(BiI_3)2(\overline{Q}HI)$, but, inasmuch as the former I believe correctly represents the nature of precipitate, and the latter does not, I prefer my method of expression.

In the original MSS., "xHI" was added to all the formulæ, but I afterwards thought it advisable to add it only to those in which I knew "x" was not "O."

Buxton. John C. Thresh.

Fish in Foul Water.

Sir,—Referring to the article on River Water, March 27, by Dr. Tidy, a statement was made some time since in the *Hants Chronicle* that trout were found to affect sewage in the Ichen and to grow a large size in it. In that case, the presence of fresh water fish in a river would be no guarantee of the purity of the water. Rivis.

F. G. W. does not appear to have sent the whole of his letter.

H. C. H.—(1) *Nepeta Glechoma*; (2) *Rumex Acetosella*; (3) *Veronica Chamædrys*; (4) *Arenaria trinervis*; (5) *Stellaria Holostea*; (6) *Geranium molle*.

Dr. F. A. Castle is thanked for his communication.

W. Kennedy.—Hooker's 'Flora' would be best for a beginner, and Babington for a more advanced student.

"*Assistant.*"—The recipe for the preparation is a trade secret, and the right to the exclusive use of the name has been maintained in a court of law. See vol. viii., p. 578.

A. A. is thanked for his advice. With respect to his query he is recommended to consult a good modern dictionary.

T. R.—Apply to the Registrar under the Medical Act, 315, Oxford Street.

"*An Apprentice.*"—We know of no way of compelling a master to go beyond the terms of the indenture; but perhaps what you cannot claim as a right might be accorded as a favour if proper application were made by yourself or your friends.

A. W. Forster.—Several formulæ for pepsine wine were given in the last volume (vol. ix., pp. 521 and 543).

Communications, Letters, etc., have been received from Messrs. Becket, Norman, Hatch, Ross, Clark, Countryman, M.P.S.

THE BOTANICAL SOURCE OF TONGA.

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society.

Mr. A. W. Gerrard recently placed in my hands a portion of tonga for examination, with the remark that the medicinal properties were in all probability contained in the fibrous portion.

I observed that the fibrous portion occupied the bottom of the little bags containing the tonga, the centre being filled with bark, amongst which a few morsels of broken leaves were scattered. The mode of arrangement seemed to confirm Mr. Gerrard's supposition that the fibrous portion was the most important ingredient.

The fibrous portion was therefore first examined. Under a lens it showed an endogenous structure, and when a small portion was placed under the microscope a few prismatic raphides and a large number of starch granules, some of them collected into small spheres, were observable. The starch granules somewhat resembled in shape those of the common arum, although they were larger in size, and the source of the drug was therefore sought for in the Araceæ.

On referring to Seemann's 'Flora Vitiensis,' the genus of that family most likely to produce a stem like the fragments found in tonga was considered to be *Rhaphidophora*. On comparing the structure of a small cylindrical portion given me by Mr. Gerrard with the specimens of the plants of that genus in the Herbarium in the British Museum, it appeared to correspond with the stem of *R. Vitiensis*, and having been permitted by the courtesy of the keeper of the Botanical Department to examine a fragment of the stem of that plant under the microscope, I found that the starch was of the same shape and size as that of tonga, and like it presented the curious character of agglomeration into little spheres. The prismatic raphides, also, were present as in tonga. In a carefully cut section of the tonga numerous sphæraphides are seen, and here and there a few scattered solitary crystals of a tabular shape. The sphæraphides are present also in the *Rhaphidophora*, but the section of the latter was too small to ascertain the presence of the tabular crystals. The cellular and vascular structure also corresponds with that of tonga. I have therefore no hesitation in referring the fibrous portion of tonga to a species of *Rhaphidophora*. In all probability the species yielding it is *R. Vitiensis*, which Engler, in his recent monograph,* makes a variety of *R. pertusa*, Schott.

Dr. Seemann makes no mention in his magnificent work of any medicinal use for this plant, but Dr. Masters, in the 'Treasury of Botany,' mentions that *R. pertusa* (*Scindapsus pertusus*, Schott) is used as a remedy for rheumatism and skin diseases. So many of the aroids contain an acrid, often volatile principle, that apparently but little attention has been paid to searching for other active principles, and Mr. Gerrard has done good service in showing that one member of this family, although retaining no acridity of taste, possesses an active alkaloid.

The bark which is mixed with the stem in tonga appears to resemble in its sweet and slightly astringent taste that of monesia bark and the "sweet bark" of Queensland; both of these barks are derived from trees belonging to the Sapotaceæ, and it may be presumed the tonga bark is derived from some member of the same family. The fragments of leaves are of exogenous structure, and are probably added as a blind, since they differ from those of the two families to which the other drugs belong, these leaves being present in minute quantity only and often absent altogether from the packets of the drug.

* Engler, 'Araceæ,' vol. ii., p. 244.

THAPSIA GARGANICA, OR BOU-NEFA OF THE ARABS.*

BY C. BLANCHET.

The *Thapsia garganica* is an umbelliferous plant which during recent years has attracted considerable attention in France, it yielding a rubefacient resin that has been made the basis of numerous preparations. Among the Arabs it is now known under the designation "bou-nêfa" (god of health), but in the time of Dioscorides it was called "dritz." In the present day the inhabitants of the Cyrenaican district call it "dérias," and the Kabyles use it under the name "deriés." A few years since it was alleged that the plant known to the inhabitants of the Cyrenaican district as "drias" was the real silphion plant of the ancients, and Dr. Laval, who collected the plant, described it as a new species, to which he gave the name *Silphium Cyrenaicum*. This claim, however, was refuted in an exhaustive treatise by M. Herincq, who demonstrated that the plant was identical with the *Thapsia garganica* of Southern Europe.† The author of the present paper, in the course of a lengthy section on the botany of the plant, expresses his agreement with the conclusions of M. Herincq.

The root bark of the *Thapsia garganica* is largely used as a medicine by the Arabs and Kabyles, internally against leanness, chronic diseases of the lungs and sterility; and externally as a remedy for rheumatic pains, gout, coughs, bruises, eruptions, etc. For internal use the bark, after drying, is reduced to a powder, and this is frequently made into a paste with roasted semolina, flavoured with honey and butter; the paste is called "taminat-bou-nêfa," and preserved for use when wanted. Semolina is also added to water in which fragments of the root have been macerated seven days. The water becomes albuminous, milky, and contracts a decided bitterness and disagreeable taste. Sometimes a tablespoonful of the powder is simply added to a glass of water and taken as a dose. Another plan is to cut the cleaned and dried root into slices which are boiled in a little rancid oil; the oil preserves the active principles and the slices are rejected. A preparation is made also by cooking "couscousso" in the vapour of water in which bou-nêfa has been boiled several hours.

A decoction of the root prepared in closed vessels is used for fumigations. As a purgative, the Arabs and Kabyles boil eggs in a decoction of the fresh or dried roots, one or more being eaten as a dose. Finally, as a remedy in long-standing pulmonary complaints, a drink in which the natives have great confidence is made by boiling fragments of the fresh or dried and cleaned bark in milk, about 150 grams to a litre. It is stated that the natives are not very particular as to the doses of these preparations, and the patients are consequently sometimes purged violently, chronic or acute diarrhœa and even abor-

* Abstract of a Thesis presented to the Montpellier School of Pharmacy. Communicated by the Author.

† *Pharm. Journ.* [3], vol. vii., p. 750.

tion being occasionally the result; no fatal cases, however, have been recorded.

For external use, the natives crush the roots and dry them under the ashes. The roots are afterwards cut into pieces with which the parts affected are rubbed In veterinary medicine the Arabs obtain good effects with an ointment prepared by digesting the fresh or dry root in tar.

The collection of thapsia in Algeria is made exclusively by the natives. It is commenced in December, about a month after the appearance of the first leaves, and is continued to the end of March; it is never extended beyond the appearance of the stem, which takes place about the middle of April. The plant contains the greatest quantity of active principle in January, but the natives in Constantine prefer for their own use the roots gathered in March, though why is not known. Only the roots are gathered, the leaves being cut away. When a sufficient quantity has been obtained, the roots are taken to the nearest stream and washed; an incision is then made longitudinally and the bark is removed from the central portion, an operation that is easily effected when the root is of a suitable age. The central part is rejected, as nearly the whole of the active principle of the plant is contained in the bark of the root. The bark is sometimes brought in by the collectors in the fresh state, and sometimes it is dried by spreading it out in layers, three or four inches thick. When collected in large quantities for a special market the fresh clean bark is worth 25 to 30 francs per 100 kilograms.

The collection is not pleasant work, nearly all those engaged in it returning with faces, arms and testicles puffed up and swollen. The Kabyles, who take less precaution than the Arabs, have frequently the whole body covered with pimples, which suppurate. Sometimes the collectors are seized with fever; but the worst cases are cured in a few days.

The root freshly cut is fleshy and heavy; by drying it loses about three-fourths of its weight.

The root bark of thapsia is not met with in European commerce. In the dry state it occurs in small unequal fragments, 4 to 10 millimetres thick, friable and brownish yellow on the external surface, which is sometimes smooth, and sometimes has more or less deep wrinkles that mark out small, prominent, convex, irregularly quadrilateral spaces. The internal surface is white, chalky-looking, often spotted with red, brownish, and finely striated longitudinally. The fresh surface of a section often exhibits a very clear golden yellow resin, which is found also in the internal crevices of the bark. The fracture is granular and compact. Examined with a glass it appears riddled with closely approximating, concentrically arranged, yellow-walled pores, amongst which is interposed the white chalky-looking tissue that forms the greater part of the mass. The bark retains for a long time the petiolar *débris*, represented by rosettes of fibres.

Together with the *Thapsia garganica* there grows another umbelliferous plant, called by the Arabs "cleka," and by the Europeans "false thapsia." This is referred by the author to *Ferula nodiflora*, Linn. (*F. communis*, Desf., *F. densa*, Delil.). The root of this plant is perennial, fleshy, greyish, nearly black on the exterior, and contains an abundance of an acrid milky juice, devoid of any vesicating action. Deprived of the ligneous portion and dried it presents a great resemblance to the bark of *Thapsia garganica*, and is now largely substituted by the Arabs for it. When the root is in a fresh state this fraud may be detected under the microscope. In the thapsia the primary interior layer of the liber is constituted by a series of broken concentric lines; in the cleka the layer is formed by a continuous line, and the resinous canals, which are regularly distributed, appear especially in the interior, whilst in the thapsia they are found especially in the exterior of the liber layer. When dry these characters can no longer be detected, and dependence must be placed on the colour of the external surface, which in the thapsia is brownish yellow and in the cleka greyish and nearly black. After the barks have been dried a long time, however, exfoliation takes place and the sophistication is difficult to determine.

The first recorded chemical examination of the root of *Thapsia garganica* was made by M. Stanislas Martin, who reported that he had found in it a rubefacient resin, tannin, starch, extractive, lime, ligneous matter and "thapsic acid." The author of the present memoir, however, gives his reasons for suspecting that the "thapsic acid" was really hydrochloric acid. Another analysis of *Thapsia garganica* root was made by M. Yvon in 1877, and was reported at the time in this Journal.* M. Blanchet also has made partial analyses of the dried and fresh bark, 90 per cent. alcohol being used to separate the resin, with the following result:—

	Dried Bark Collected in January 1879.		Fresh Bark.	
Water	0·00		80·70	80·70
Organic Matters	91·85		17·75	
Starch		20·52		4·41
Gum and Colouring Matters		7·32		1·47
Resins		5·55		2·15
Maters soluble in Alcohol and in Water		1·38		2·40
Elements not estimated		57·08		7·32
Inorganic Matters	8·15	8·15	1·55	1·55
	100·00	100·00	100·00	100·00

From these results it appears that the bark from fresh roots, which lose 80 per cent. of their weight in drying, yield 2 per cent. of resin, whilst bark that has been dried one year yields only 5·55 per cent. This M. Blanchet considers to be due to the oxidation of part of the resin, in which state it is no longer soluble in the alcohol. In the absence of a supply of newly dried bark no experiment could be made as to its resin value.

These results, however, do not quite agree with those reported by other authors. M. Beslier,† following the process of the Codex, obtained from the fresh roots about 2 per cent. of resin, from the same roots dried in a stove at a moderate temperature an average of 10 per cent., and from the bark, completely dried, about 15 per cent. On the other hand, M. Nielli, treating the fresh roots with 90° alcohol, obtained an average yield of about 4½ per cent., whilst the dried bark only yielded a little more than 5 per cent. According to this last result, as at least four parts of fresh bark are required to make one part of dry bark, there would be a great loss of active substance during drying. It appears, however, that as a matter of convenience,

* *Pharm. Journ.* [3], vol. viii., p. 162.

† Soubeiran's 'Traité de Pharmacie,' vol. ii., p. 192.

and to avoid loss of alcohol, M. Nielli uses the dried bark in manufacturing operations.

Some comparative experiments made to ascertain the relative value of 90 per cent. alcohol, ether, and carbon bisulphide as solvents of the resin showed that the alcohol was the best solvent, ether came next, and carbon bisulphide last.

When the brown thapsia resin is treated in a capsule with boiling water it softens and nearly liquefies. In this state it may easily be divided by stirring with a glass rod; it then takes a lustrous yellowish colour, which it retains on cooling and loses after a fresh treatment with alcohol. Upon heating it in a water-bath, also, it regains its brown colour, but more slowly. When the resin was maintained during six hours at a temperature of 100° C. M. Blanchet found that it became more compact and darker in colour; after cooling its adherence to the capsule was stronger, but the resin did not become brittle, as described by some authors. 25 grams, thus heated, lost 1·80 gram of its weight.

Pure thapsia resin is brown; it has an acid reaction, which it communicates to distilled water after a few minutes' contact at boiling temperature. The resin burns with a bright flame. When treated with sulphuric, nitric or hydrochloric acid in the cold it gives no marked reaction.

The directions in the Codex for the preparation of the thapsia resin are to wash the bark with hot water, dry and cut it, and then to treat it several times with boiling 90° alcohol until it is completely exhausted; the liquors are afterwards united and the alcohol distilled off by means of a water-bath. The residuary resin is purified by redissolving it in cold 90° alcohol, filtering the solution, and distilling until the residue has acquired the consistence of honey, in which state it is suitable for the preparation of the plaster and revulsive sparadrap.

M. Nielli, a pharmacien, of Philippeville, Algeria, who prepares this resin on a large scale, uses cold water instead of hot to wash the bark before drying, and after the first distillation submits the resin to repeated washings with boiling water until extractive and gummy matters are completely removed, and then treats it with 96° alcohol. M. Nielli operates upon the bark ground to a coarse powder in a special apparatus constructed of copper, as it has been found that the resin determines a rapid oxidizing action on vessels made of iron.

The advantage of this treatment of the crude resin with boiling water will be evident when it is mentioned that according to M. Martin the thapsia resin met with in commerce sometimes contains as much as two-fifths of its weight of matters soluble in water.

During the treatment of the resin an aromatic odour *sui generis* is disengaged, which is not disagreeable. This is due to a very volatile essential oil, which is soluble in alcohol, slightly soluble in water, and more soluble in ether, which separates it, on agitation, from water. The oil communicates to ether a magnificent blue colour.

The activity of the resin is so excessive that in spite of all precautions, during the treatment with alcohol, and especially during the evaporation of the alcohol, it is impossible entirely to prevent inconvenience to the operator. Even to remain a few minutes in the place where the operation is being carried on is sufficient sometimes to provoke a rather painful feeling of heat, which is localized generally in the neck, the eyelids and below the lobes of the ears.

The reducing of the bark to a coarse powder and the handling of the latter to put it into the apparatus, are the operations that require most care and are most dreaded by the Arab workmen.* It is very difficult to persuade the workmen to undertake the work a second time, as from the first hour it causes a very intense swelling, notwithstanding that they fasten cloths closely across their mouths and nostrils.

According to M. Blanchet thapsia plaster applied to the skin exercises a special action. The skin is irritated, heated and reddened, and becomes the seat of an extremely lively itching. This is followed by an eruption of very numerous and closely approximated miliary vesicles, full of purulent serous matter. When the application has been continued for only a short time, the vesicles continue to develop during some days, then they wither, assume a darker colour, dry and form small thin scales that soon exfoliate. When the action of the resin is continued for a longer time the vesicles become confluent, burst, and together form an ulcerating and suppurating surface, but without any true blister, in which the action of this resin is distinguished essentially from that of cantharides. The ulcerated vesicles dry up after a few hours and become covered with light squamæ that fall off without leaving any trace on the skin. The application of thapsia plaster is said to be beneficial, especially where it is desired to produce a revulsive effect in rheumatism, bronchitis, pleurodynia, pleurisy, etc., the length of the application being made dependent upon the amount of effect desired to be produced.

There is a formula given in the Codex for the preparation of the "sparadrap revulsif." Another formula, given by M. Desnoix, is as follows:—

Colophony	1500
Elemi	1250
Yellow Wax	1800
Turpentine	500
Thapsia Resin	550

Melt the colophony, elemi and yellow wax, add the turpentine and thapsia resin, strain through linen and spread.

A resin is also obtained by treating the "cleka," or "false thapsia," with 90° alcohol. It is yellowish-brown and, like thapsia resin, is soluble in alcohol, ether, and carbon bisulphide. This resin is, however, entirely without rubefacient effects. It gives no characteristic reactions with sulphuric, nitric or hydrochloric acid.

THE DIGESTIVE FERMENTS, AND THE PREPARATION AND USE OF ARTIFICIALLY DIGESTED FOOD.†

BY WILLIAM ROBERTS, M.D., F.R.C.P., F.R.S.

Lecture I.

Digestion has been usually regarded as the special attribute of animals. They receive into their alimentary canal the food which they require for their sustenance in

* A form of apparatus used by M. Lallemand has already been described in the present series of the Journal, vol. ix., p. 144.

† The Lumleian Lectures, delivered before the Royal College of Physicians.

a crude form. It is there subjected to the action of certain ferments which transmute its elements, by a peculiar chemical process, into new forms which are fitted for absorption. Looked at in this restrictive sense, plants have no digestive function. They possess no alimentary canal, nor any vestige of a digestive apparatus. But when the matter is examined more profoundly, it is seen that plants digest as well as animals, and that the process in both kingdoms of nature is fundamentally the same.

In order to understand this generalization—which was first propounded by Claude Bernard, and constitutes one of the most important fruits of his splendid labours* —it is necessary to recognize digestion under two types or conditions, namely, a digestion which takes place exteriorly at the surface of the organism, and a digestion which takes place interstitially in the interior of the organs and tissues.

Exterior digestion is that common process with which we are familiar as taking place in the alimentary canal of animals, by which the crude food introduced from without is prepared for absorption.

Interstitial digestion, on the other hand, is that more recondite process by which the reserves of food lodged in the interior of plants and animals are modified and made available for the purposes of nutrition.

These two types of digestion are essentially alike, both as regards the agents and the processes by which they are carried out, and, although one type of digestion is more developed in the animal kingdom, and the other type more developed in the vegetable kingdom, both types are represented in the two kingdoms, and bear witness to the fundamental unity of the nutritive operations in plants and animals. I shall only be able to indicate in outline the facts and arguments on which Bernard sought to establish these propositions.

Exterior Digestion.—We all know that the alimentary canal is simply a prolongation of the external surface; that the skin is continued, at each extremity, without a break, into the alimentary mucous membrane. Accordingly, the processes which take place in the digestive tube are, strictly speaking, as much outside the body as if they took place on the surface of the skin. Upon this inner surface, if I may so call it, are poured out the digestive juices, charged with the ferments which are the special agents of the digestive processes. This is the common condition of exterior digestion as it occurs in animals; but it is not the only condition. Among some of the lowest members of the animal series, a permanent alimentary canal does not exist. In the amœba, any portion of the exterior is adapted for the reception of food. The morsel sinks into a depression formed on the surface at the point of impact; it is digested in this improvised stomach, and the indigestible portions are expelled through an improvised anus.

Among plants, exterior digestion is a much less prominent feature than among animals; but examples of its occurrence and evidence of its importance are not difficult to point out. In the lowest orders of plants—fungi and saprophytes, which are devoid of chlorophyll—exterior digestion is probably a function of prime necessity. In all likelihood, their carbon-containing food is only absorbed after undergoing a process of true digestion. The transformation of cane sugar by the yeast-plant is a striking example—though a distorted one—of exterior digestion. Cane sugar is a crude form of food both to plants and to animals, and requires to be transformed into invert sugar (a mixture of equal parts of dextrose or grape sugar and lævulose or fruit sugar) before it can be made available for nutrition. The yeast plant is no exception to this rule, and, when placed in a solution of cane sugar, it is under the necessity of transforming that compound into invert sugar before it can use it for its profit in fermentation. This transformation is effected by a soluble ferment attached to the yeast-cell, which can be dissolved from it by water. We shall see later on that a similar ferment exists, for a similar purpose, in the small intestine of animals, having the same property of changing cane sugar into invert sugar.

Even among the higher plants, exterior digestion is not quite unknown. The function may be said to be foreshadowed in the excretion of an acid fluid by the rootlets of some plants, which serves to dissolve and render absorbable the mineral matters in their vicinity. But genuine and most remarkable examples of this type of digestion occur among the so-called insectivorous plants, of which Mr. Darwin has given so interesting an account. In the sun-dews, the plant, by a peculiar mechanism provided on its foliage, seizes the insects which fortuitously alight on its leaves. A stomach is extemporized around the prey, into which is poured out a digestive fluid. The prey is digested, and the products absorbed, in essentially the same manner as in the gastric digestion of animals.

Interstitial Digestion.—Both animals and plants lay up reserves or stores of food in various parts of their tissues for contingent use, so that, if you suddenly withdraw from them their food-supplies, neither animal nor plant immediately dies—it lives for a certain time on its reserves. But, before these reserves can be made available for the operations of nutrition, they must first be converted from their inert and mostly insoluble state into a state of solution and adaptability to circulate in the nutritive fluid which constitutes the alimentary atmosphere of the protoplasmic elements. This conversion of inert store-food into available nutriment is brought about —certainly in some, presumably in all, cases—by the same agents and processes as the digestion which takes place in the alimentary canal of animals, and it is this identity in the agents and the processes which Bernard insisted on as the proof of the fundamental identity of the two kinds of digestion.

The storing up of food is carried on to a larger extent in the vegetable than in the animal kingdom, owing to the intermittent life of most plants. In their seeds, tubers, bulbs, and other receptacles, are laid up stores of albumen, starch, cane sugar, and oil—designed primarily for the growth and nutrition of the plant or its offspring —but which are largely seized on by animals and utilized for their food. Owing to their more continuous life, animals store up food less than plants. Nevertheless, they accumulate stores of fat in various parts of their body—of animal starch (glycogen) in their livers and elsewhere, and of albumen in their blood. Birds also store up large quantities of albumen and fat in their eggs.

The transformation of store-food has been followed out most completely in regard to starch, its congener glycogen, and cane sugar. Bernard worked out this subject with marvellous minuteness and success. It has long been known that the transformation of starch into sugar in germinating seeds was effected by diastase, and that a similar ferment, existing in saliva and pancreatic juice, performed the same office on the starchy food of animals. It has also been proved that the stores of starch laid up in the tuber of the potato and in various parts of other plants are changed at the periods of budding and growth in the same way, and by the same agent. Bernard showed that animal starch or glycogen is stored up largely, not only in the liver, but in a variety of other situations, and especially that it is widely distributed and invariably present in large quantities in embryonic conditions. In juxtaposition with the glycogen is found a diastatic ferment which transforms it into grape sugar, as it is required for the active operations of growth and nutrition.

The stores of cane-sugar which exist in the beet-root and in the sugar-cane are transformed or digested in like manner into invert-sugar when the plants enter on the

* Claude Bernard, 'Leçons sur les Phénomènes de la Vie,' tome ii.; edited after his death by Dastre. Paris: 1879.

second phase of their life—the phase of inflorescence and fructification. Here, again, it has been proved that the converting agent is a soluble ferment, the same ferment which, as already mentioned, is attached to the yeast-cell, and the same ferment which exists in the small intestine of animals for a similar purpose.

The transformation of store-proteids and fats has not been followed out with the same success as that of starch and cane sugar. But the evidence, as far as it goes, and analogy, point to the conclusion that the stores of albuminous and oily matters contained in the seeds, bulbs, and other receptacles of vegetables are subjected to a digestive process before they are made available for the nutritive operations of the plants, and that the changes thus effected are of the same nature and accomplished by the same agents as those which take place in the digestion of proteids and fats in the alimentary canals of animals.

I have, I think, said enough to show the scope of the evidence and the analogies from which Bernard deduced certain far-reaching generalizations, which I have ventured to summarize in my own language in the following propositions:—

1. Digestion, or the process by which crude food is changed into available nutriment, is a function of capital importance in every form of active life. 2. This function is exercised partly on food brought into proximity with the surface of the organism (exterior, chiefly intestinal digestion) and partly on reserves of food laid up in the interior of the organism (interstitial digestion). 3. The agents concerned in this function and their mode of action are essentially the same, whether the organism be a plant or an animal, and whether the action takes place in the interior of the tissues or on the general or intestinal surfaces.

General Characters and Properties of the Digestive Ferments.

The essential work of digestion is carried out by a remarkable group of agents, called soluble or unorganized ferments. These are found dissolved in the several digestive juices or secretions, which are thrown out on the path of the food as it travels along the alimentary canal. The physical and mechanical processes to which food is subjected in the mouth and stomach are all purely introductory or preparatory, and are solely intended to facilitate the essential work of digestion, which consists in the action of the digestive ferments on the alimentary principles.

The number of distinct ferments employed in the digestion of the miscellaneous food used by man is not accurately known; but there are at least seven or eight of them. The accompanying table presents in one view a scheme of the several digestive secretions or juices, and the ferments which they contain, together with an indication of the action of each ferment on the several alimentary principles.

Table of the Digestive Juices and their Ferments.

Digestive Juices.	Ferments contained in them.	Action on Food Materials.
Saliva	Salivary diastase or ptyalin.	Changes starch into sugar and dextrin.
Gastric juice . .	*a.* Pepsin.	Changes proteids into peptones in an acid medium.
	b. Curdling ferment.	Curdles the casein of milk.
Pancreatic juice	*a.* Trypsin.	Changes proteids into peptones in alkaline and neutral media.
	b. Curdling ferment.	Curdles the casein of milk.
Pancreatic juice (*continued*)	*c.* Pancreatic diastase.	Changes starch into sugar and dextrin.
	d. Emulsive ferment.	Emulsifies and partially saponifies fats.
Bile	(?)	Assists in emulsifying fats.
Intestinal juice .	*a.* Invertin.	Changes cane sugar into invert sugar.
	b. (?)Curdling ferment.	Curdles the casein of milk.

An examination of the table shows that a long and complicated series of ferment-actions is required to accomplish the digestion of our food. Starch is attacked at two points—in the mouth and in the duodenum—by two ferments, salivary and pancreatic diastase, which are substantially identical. Albuminous matters are also attacked at two points, in the stomach and in the small intestine; but here the two ferments—pepsin and trypsin—are certainly not identical. The ferment, of which the only known characteristic is to curdle milk, is found in the stomach and in the pancreas, and I think also in the small intestine. The bile is not known to possess any true ferment-action; but it assists, by its alkalescent reaction and by its physical properties, in emulsifying and promoting the absorption of fatty matters. The ferment which transforms cane sugar, strange to say, is not encountered until the food reaches the small intestine.

The known digestive ferments all belong to the class of soluble or unorganized ferments. They are sharply distinguished from the insoluble or organized ferments, of which the type is yeast, in not having the power of self-nutrition and self-multiplication. All living organisms possess this power either in a dormant (potential) or in an active (kinetic) state. Soluble ferments cannot therefore be said to be alive; but they are exclusively associated with living organisms, and take an essential part in their vital operations.

The digestive ferments are all the direct products of living cells, and may be regarded as detached repositories of cell-force. They are quite unknown in the domain of ordinary chemistry. Their mode of action bears no resemblance to that of ordinary chemical affinity, and has a distinctively physiological character. They do not derive their marvellous endowments from their material substance. They give nothing material to, and take nothing material from, the substance acted on. The albuminoid matter which constitutes their mass is evidently no more than the material substratum of a special kind of energy—just as the steel of a magnet is the material substratum of the magnetic energy—but is not itself that energy. This albuminoid matter of the ferment may be said to become charged, at the moment of elaboration by the gland-cells, with potential energy of a special kind, in the same way that a piece of steel becomes charged with magnetism by contact with a pre-existing magnet. The potential energy of the ferment is changed into the active form (*i.e.*, becomes kinetic) when it is brought into contact with the alimentary substance on which it is designed to act.

The chemical and physical characters of the digestive ferments appear to be tolerably uniform. In composition, they resemble proteid substances, and contain carbon, oxygen, hydrogen and nitrogen in the same or somewhat similar centesimal proportions as albumen. But, as not one of them has yet been obtained in a state of absolute isolation and purity, this is, strictly speaking, a matter of inference rather than an ascertained fact. They are all soluble in water; they are all diffusible, though with difficulty, through animal membranes and parchment paper. They are also capable (all those I have tried) of passing through porous earthenware by filtration under pressure; but some of them pass through readily, and others with the utmost difficulty, and only in the smallest proportions. They are precipitated from their watery solutions by absolute alcohol; but, unlike other proteids (peptones excepted), they are not truly coagulated by alcohol. When the alcohol is removed, the ferments are still found to be soluble in water, and to retain their activity unimpaired. They are coagulated and rendered permanently inert by the heat of boiling water, and, when in solution, they are coagulated and destroyed by a heat of about 160° F. (71° C.).

Each digestive ferment has its special correlative alimentary principle, or group of principles, on which alone it is capable of acting. Diastase acts exclusively on amylaceous substances. Pepsin and trypsin act only on the azotized principles; the emulsive ferment of the pancreas is only capable of acting on fatty bodies; the inversive ferment of the small intestine has no activity except on cane sugar.

The changes impressed on alimentary principles by the digestive ferments are not, chemically speaking, of a profound character, and they affect much more the physical state of these principles than their chemical composition. In the main, they are processes of deduplication and hydration, and the result is to render the substances operated on more soluble and more diffusible, to diminish their colloidal state, and to make them approach, or even to reach, the crystalloid state. This does not appear to be an invariable event, however. Cane sugar is a marked exception; it is converted in the small intestine into invert sugar (a mixture of equal parts of grape sugar or dextrose and fruit sugar or lævulose). But invert sugar, though more highly hydrated than cane sugar, is neither more diffusible nor more soluble.

It does not appear to be absolutely true that all food requires digestion before it can be absorbed. Fat is largely taken up by the lacteals in its unaltered state, except in so far that it is finely divided or emulsified. Grape sugar (dextrose) is not known to suffer any digestive operation, but to be absorbed unchanged. Perhaps it would be more correct to say that grape sugar is an article of food predigested for us by the agency of plants.

Although the mode of action of digestive ferments is special and peculiar, the results of that action are not peculiar, but can be obtained in other ways by ordinary chemical forces. By long continued boiling in water—and more rapidly by boiling with acidulated water—starch is converted into dextrine and sugar, and albumen is changed into a substance resembling peptone. The peculiarity of the action of ferments consists in this: that the ferments are able swiftly and without violence to produce changes which by ordinary chemical agencies can only be produced either by strong reagents or by long continued and very slow action of weaker reagents. It is interesting to remark that the changes produced in food by digestion are, in their ultimate results, very similar to, if not identical with, those produced by protracted cooking.

The Preparation of Artificial Digestive Juices.—The study of the digestive ferments has been immensely facilitated by a method first introduced by Eberle. Eberle discovered that an aqueous infusion or extract of the digestive glands possessed the same properties as the natural secretions or juices of those glands. The reason of this is, that the glands which secrete the digestive juices contain within them a reserve stock of their respective ferments. Accordingly, when the glands are infused in water, their reserve stock of ferments passes into solution. These infusions or extracts then constitute artificial digestive juices, which operate in a flask or beaker in the same way as the corresponding glandular secretions act in the alimentary canal. Solutions of organic matters are, however, extremely perishable; they pass quickly into putrefaction. In order to obviate this inconvenience, and to obtain an extract which is always handy for use, various preservative means have been employed. Bernard used carbolic acid; other have used glycerine or common salt. These preservatives, although perfect for the purpose intended, have a pronounced taste which it is impossible to get rid of. I have made a good number of experiments on this point. As the ultimate object I had in view was to obtain a solution which could be administered as a medicine by the mouth, or which could be employed in the preparation of artificially digested food, I sought for a preservative which had either little taste or smell, or one which was volatile and could be got rid of by vaporization. After a good many trials, I adopted the three following solutions as, on the whole, the best suited for the purpose:—

I. *Boracic Solution.*—This solution contains 3 or 4 per cent. of a mixture of 2 parts of boracic acid and 1 part of borax. An extract of the stomach or of the pancreas made with this solution keeps perfectly, and has little taste and no smell. For experimental purposes, this extract is, I believe, all that can be desired; it is neutral in reaction and is chemically inert. It answers well also for administration by the mouth when the dose does not exceed 1 or 2 tea-spoonfuls. But when larger quantities are required for the preparation of artificially digested food, and when food thus prepared has to be used day after day in quantity sufficient to sustain nutrition, larger quantities of boracic acid and borax are taken into the stomach than that organ can always comfortably tolerate.

II. *Dilute Spirit.*—The second solution is water mixed with 12 or 15 per cent. of rectified spirit. This solution makes a most excellent extracting medium, and the quantity of spirit in it is so small as rarely to be an objection to its use. In the preparation of artificially digested food, a final boiling is usually requisite, and in this final boiling the alcohol is dissipated. On the whole, this is, perhaps, the most generally useful of the three solutions.

III. *Chloroform Water.*—Chloroform dissolves in water in the proportion of about 1 in 200; these are the proportions employed in the preparation of the aqua chloroformi of the British Pharmacopœia. This forms a perfect solvent for the digestive ferments, and its keeping qualities are unrivalled. But, though the quantity of chloroform dissolved is so minute (about 2½ drops in a fluid ounce), it communicates a somewhat powerful smell and taste to the solution. This taste and smell are agreeable to most persons, but not to all. It is, however, quite easy to get rid of the chloroform. If the dose to be used be first poured into a wine-glass or saucer, and left exposed to the air for three or four hours, the chloroform passes off almost entirely in vapour, and leaves behind a simple aqueous solution of the ferments; or, if the solution be employed for the preparation of artificially digested food, the chloroform, being very volatile, disappears in the final boiling. It is, perhaps, well to mention that chloroform water has the property of reducing Fehling's solution, and that this property has to be taken into account in making experiments on digestion which involve testing for sugar.

Alimentary substances fall naturally into three well-marked groups; namely, carbohydrates, proteids, and fats. I propose to consider the digestion of the three groups in the order here indicated. I have, however, no intention of dealing systematically with these subjects, but rather to take up certain points and questions in regard to which I have myself made observations, or which have a bearing on the preparation of artificially digested food and its administration to patients. I shall treat the digestive transformation of starch in some detail, because this has been worked out almost to completeness, and because it probably furnishes a type which will hereafter be of service as a guide to the study of the more complex problem of the digestion of proteids.

(*To be continued.*)

The Pharmaceutical Journal.

SATURDAY, MAY 8, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE ANNUAL REPORT.

THE course of events since the last anniversary of the Pharmaceutical Society has not been marked by any of those features of interest and agitation which result from the discussion of subjects concerning which there are differences of opinion among the members of the trade which the Society represents. For this reason pharmaceutical affairs have been characterized by a tranquillity approximating to dullness. Consequently, the Annual Report of the Council, which will be in the hands of members by the time this issue of the Journal reaches them, is brief and limited to the recapitulation of those proceedings which present the greatest degree of interest to the general trade as well as to members of the Society.

In legislative matters the only thing that has occurred to affect chemists and druggists has been the inauguration of the new system by which the weights and measures used by them are legalized and made subject to certification and inspection. Notwithstanding the delay in preparing standards requisite for the purpose, and in determining certain questions as to the mode in which apothecaries' weights should be stamped and graduated measures tested, it appears that these standards are now in the hands of many local inspectors and fit for use, so that chemists and druggists as well as manufacturers of weights and measures will have no difficulty in putting themselves in conformity with the law. At the same time it is to be noted that there is no ground for apprehending vexatious interference or any attempt to make the provisions of the Weights and Measures Act press harshly upon those who have been brought within their purview. On the contrary, the authorities of the Board of Trade have been most considerate and obliging in their response to the representations of the Council, and they have done everything in their power to prevent inconvenience.

The steps taken during the past year to enforce the provisions of the Pharmacy Act, 1868, have led to inquiry into a large number of complaints received by the Registrar, and while it is satisfactory to learn from the report of the Council that the result has been generally a discontinuance of the offences complained of, the fact that in twenty-one cases it was necessary to have recourse to legal proceedings is no less evidence of the utility of the Act. In regard to this point, however, the crucial question still remains open, and the report of the Council can only refer to the prosecution of the London and Provincial Supply Association as involving a question still unsettled. Mr. MACKNESS, the individual originally proceeded against by the Council for carrying on business in violation of the Pharmacy Act, having sought protection by merging his proprietorship in a limited liability company, has now come forward as the representative and champion of the co-operative stores, and disputes the illegality of the sale and dispensing of poisons by public companies, or corporations, as they are termed in legal phraseology. The decision given in his favour by the Lords Justices, some weeks ago, is perhaps the most important event of the past year in regard to chemists and druggists and their relation to the public. So much has this been felt by the Council that it has been determined to continue the proceedings by instituting the final appeal to the House of Lords, and among the reasons which have led to the adoption of this course reference is made in the report to the doubts expressed by the Lords Justices BRAMWELL, BAGGALLAY and THESIGER, as well as to the very forcible remarks embodied in the judgment of the Lord Chief Justice when he decided a former hearing of the case in favour of the Pharmaceutical Society by upholding the application of the Pharmacy Act against associations or companies no less than against individuals.

As regards the various pharmaceutical examinations, the conduct of which forms one of the most important duties of the Society, the experience of the past year has been most encouraging. From the increasing number of candidates for the Preliminary examination, the Council infers that the importance and desirability of passing this examination prior to apprenticeship is now being more generally recognized. During the year 1879 there were one hundred and thirty-four candidates for the Major examination as against eighty-one in the previous year. This circumstance tends to show that there is a growing appreciation of the higher grade of qualification, though its acquisition is still a voluntary matter, and that there is less reason than hitherto for regret that so many of those passing the Minor examination should be content with tha alone.

The desirability of maintaining the identity of the examinations in London and in Edinburgh has within the last few years led to a periodical interchange of visits by deputations of the respective Boards of Examiners to Edinburgh and to London, while the examinations are in progress, and only last month such a deputation from the London Board was present during the examinations held by the North British Branch. As yet no formal report of this visit has been presented; but we have reason to believe that when it appears it will not leave any doubt that the examinations are conducted with equal care in both places.

The financial position of the Society, as represented by the balance sheet issued, together with the Report of the Council, is decidedly satisfactory, inasmuch as it shows a continued increase in the revenue of the Society, but the contributions to the Benevolent Fund during 1879 were somewhat less than those of the previous year. This may be in part due to the depression in trade, and in part also to the special efforts made in 1878 to augment the Fund. At any rate it is satisfactory to learn that the Council has no reason to apprehend decrease of interest in the prosperity of the Fund, which has done and is doing so much to relieve the necessities of unfortunate members of the trade. At the same time it is pointed out that year by year the permanent engagements of the Fund are increased by the additions to the number of annuitants, and that it is not even yet possible to comprise in those additions all of the candidates that are approved. In order to show the extent of the good work done by the Fund, it may be stated that the amount required for payment of annuities this year is £1015, and taking the amount granted for casual relief as approximating to £700 a year, the total expenditure this year will be upwards of £1700.

The Society's Museum has, during the year, been enriched by many valuable additions, among which may be mentioned, in the first place, the materia medica and other specimens transferred from the India Museum collection, through the kindness of Sir Joseph Hooker, in compliance with the representation of the Council that if these valuable objects were placed in the Museum of the Pharmaceutical Society they would be specially accessible to persons interested in them, and thus become of great utility.

The Library of the Society has continued to augment by presentations and by the constant addition of books recommended in various ways and approved by the Committee that watches over it, until it is now reported to contain about seven thousand volumes. Among other acquisitions, that resulting from the application of the legacy left by Daniel Hanbury deserves especial mention, since it enriches the Library with a number of highly valuable works of reference. A new catalogue of the Library is now in course of preparation, and copies of it will shortly be sent to all Members of the Society and Associates in Business. Copies of it will also be supplied to Associates and Apprentices of the Society on application. An Index of the ten volumes of the Pharmaceutical Journal from July, 1868, to July, 1878, has been published during the past year, and each Member and Associate of the Society can obtain a copy, free of charge, on application to the Secretary.

Besides the matters above mentioned, the Report of the Council refers to the successful character of the evening meetings held in London and Edinburgh, and points out that these meetings have afforded useful opportunities for the consideration and discussion of various interesting subjects. It also states that the formal acceptance of the Hanbury Memorial Fund Trust has been completed, and a die prepared for a medal, to be offered for competition every other year "for high excellence in the "prosecution or promotion of original research in the "natural history and chemistry of drugs." We may suggest in reference to this offer that it ought to prove a powerful incentive to the production of really valuable papers at the evening meetings of the Society, since the award of the Hanbury medal by the Council is precisely the kind of recognition appropriate in such a case, and a reward that the recipient might justly be proud of.

The election of members of Council, which is one of the most important duties to be performed by members of the Society, will this year be marked by the introduction of a novel feature. We have now become somewhat used to candidates' addresses to the constituency, and from what we have noticed in some of these addresses it must be admitted they often have the merit of furnishing voters with a means of judging as to the manner of man who solicits their support. But this year the issue of addresses is accompanied by correspondence in which the merits of candidates are discussed, *pro* and *con.*, some writers protesting that certain candidates are disqualified for becoming members of Council, while others assert the opposite. Of course those who hold the one opinion or the other have a right to speak their mind, and we have no desire to take further part in the controversy than that of placing the circumstances clearly before our readers, since they involve questions of considerable importance.

The candidates for election as members of Council who have been commented upon as unsuitable for that position are Mr. Shepperley and Mr G. S. Wills. The former was objected to by "A Member" upon the ground of the notoriety he acquired some years ago in connection with the acrimonious disputes about "counter practice," and it was urged that since his candidature for election to the Council of the Pharmaceutical Society might excite the suspicion and antagonism of medical men and thus prejudice the interests of his brethren he ought to withdraw from the contest. Mr. Gostling, of Stowmarket—who is not, as we have been requested to state, the Mr. Gostling, of Diss, that is now a member of the Council—denounced this suggestion as conveying rude and ungentlemanlike insinuations, and he maintained that as Mr. Shepperley was successfully defended by the Chemists' Trade Association, he is therefore a suitable representative of the trade. To this "A Member" replied, disclaiming any insinuation prejudicial to Mr. Shepperley, and pointing out that he only desired to raise the question whether it was not extremely undesirable to have on the Council the defendant in the most notorious and protracted of counter practice cases. He also repudiated fear of the Society of Apothecaries, but thinking discretion the better part of valour looked to a policy of conciliation as more likely to be advantageous than one of irritation and defiance. A "Pharmacist" took exception to Mr. SHEPPERLEY, even if he could be regarded as the "victim of apothecaries," because he thought the "patent medicine" development of pharmacy adopted by Mr. SHEPPERLEY as his *modus operandi* was scarcely to be regarded as compatible with a representative man suited to make pharmacists respected.

Another correspondent on this subject said that though he had subscribed to the special fund of the Trade Association, and otherwise supported the defence of Mr. SHEPPERLEY, he could not think it desirable to make the victor in that litigation a member of the Council and a representative of the trade.

The objection raised by "A Member" and by an "Old Member" to the candidature of Mr. WILLS for election as a member of Council was chiefly based upon the circumstance that he is a professed teacher of candidates for the Society's examinations, and upon the opinion that he was thereby disqualified from taking a seat in the Council which has the control of examinations and the appointment of examiners. Another objection raised by Mr. REYNOLDS, in the letter which appears this week in our correspondence columns, is based upon the possible, if not probable, prejudice to the privileges of the Pharmaceutical Society that might result if such a "breach of propriety" were committed as electing the head of a pharmaceutical school to fill the position of a member of the Council. With this recapitulation of the points of the controversy respecting the eligibility of Mr. SHEPPERLEY and Mr. WILLS, we leave the question in the hands of the electors for decision.

TRANSPARENT SOAP.

WE have received several communications in reference to this subject which seem to show that there is a desire for information as to the reason why the transparent soap imported from abroad has been subjected to duty. The fact is simply that alcohol is used in the preparation of this soap and it contains in the finished state a considerable amount of alcohol. Consequently, it is liable to import duty on this account, and if it were not subjected to duty British manufacturers would be placed at a disadvantage, since they would have to use in the preparation of this soap duty paid spirit and could not compete with foreign makers. Methylated spirit, on account of its disagreeable odour, would probably be unsuited for the purpose in most cases and for the preparation of fancy soap especially.

We notice that, to prevent misunderstanding which might arise upon this subject, British manufacturers of transparent soap are issuing notices to their customers that for the present the price of the home-made soap will remain unchanged.

DEATH OF MR. CRACKNELL AND OF MR. CORTIS.

WE very much regret to have to record the death of Mr. CHARLES CRACKNELL, on Wednesday last, the 5th inst. The connection of Mr. CRACKNELL with the Pharmaceutical Society dates from a very early period in its history. He was one of the earliest pupils in the School of Pharmacy, and in March, 1844, received the first prizes for Chemistry and for Materia Medica, this being the first occasion on which prizes were given by the Society for those subjects. In 1845 Mr. CRACKNELL became a Member of the Pharmaceutical Society. In June, 1851, he was appointed an Examiner, and he performed the duties of this office during the long period of nearly twenty-four years, until the end of the year 1874. During the ensuing four years, from May, 1875, to May, 1879, Mr. CRACKNELL served the Pharmaceutical Society as a Member of the Council.

We also regret to have to report the death, at the age of seventy-six years, of Mr. CHARLES CORTIS, of Worthing. Mr. CORTIS joined the Pharmaceutical Society at its foundation, and for many years past has given his services to it as Local Secretary.

FIRE AT A WHOLESALE DRUGGIST'S.

OUR readers will be sorry to learn that a very serious fire, attended with loss of life, has taken place at the warehouse of Messrs. HODGKINSONS, STEAD and TREACHER, in Aldersgate Street, by which their premises and stock have been entirely destroyed and great damage done to the neighbouring houses. According to the evidence given at the inquest, the fire appears to have originated by the breaking of a bottle of oil of aniseed near a gas flame, but whether this was accidental or the consequence of an attempt to melt the oil by the gas flame was not clearly made out. There have now been so many destructive fires in wholesale druggists' warehouses that special attention is likely to be drawn to the matter, and we perceive that it was discussed, on the motion of Mr. INNES, at a meeting of the Metropolitan Commissioners of Sewers in Guildhall, with the result that it was resolved to refer the matter to the Sanitary Committee to report upon.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A MEETING of this Association will be held on Thursday next, the 13th inst., at 8.30 p.m., when a paper will be read by Mr. W. ELBORNE on "The Preparation of Tinctures." A Report on Analytical Chemistry will be made by Mr. A. F. DIMMOCK on "VORTMANN'S Method for the Detection and Estimation of Chlorides in the Presence of Iodides and Bromides."

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, May 5, 1880.

MR. GEORGE WEBB SANDFORD, PRESIDENT.

Present—Messrs. Atkins, Bottle, Churchill, Frazer, Gostling, Greenish, Hampson, Hills, Mackay, Richardson, Robbins, Squire, Symes and Williams.

The minutes of the previous meeting were read and confirmed.

The PRESIDENT stated that he had received letters from Mr. Schacht and Mr. Savage, apologizing for not being able to attend that day.

ELECTION OF COUNCIL.

Personal Explanation.

Mr. GOSTLING stated that a letter having appeared in the *Pharmaceutical Journal*, of April 24, signed by a gentleman having the same surname as himself, referring to the candidature of a certain gentleman for the Council, he thought it desirable to state most explicitly that he was not the writer of that letter, nor in any way responsible for it.

The PRESIDENT said he never thought Mr. Gostling was the writer of the letter.

Withdrawal of Mr. Butt.

The PRESIDENT said he had received a letter from Mr. Butt, who had been nominated to serve on the Council, expressing a desire to withdraw. He was sorry to receive such an intimation, because he thought Mr. Butt would have made a very useful member. The Council, however, could only act on that gentleman's wishes.

ROYAL BOTANIC GARDENS.

The Secretary reported that a letter had been received from Mr. Sowerby, Secretary to the Royal Botanic Society, stating that he would lay the application for the usual permission to Professor Bentley's students to visit the gardens before the Council.

HONORARY AND CORRESPONDING MEMBER.

The following gentleman was unanimously elected an Honorary and Corresponding Member of the Society:—
Surgeon-Major W. Dymock, Bombay.

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Ashmead, John Stubbings.
Carruthers, Robert.
Cox, Frederick John.
Howell, Edmund.
Jones, William Harris.
Maben, Thomas.
MacEwan, Peter.
Powrie, Percival Chamberlain.
Shepherd, John William.
Thompson, John Tatham.
Williams, James Edward.
Williams, William.
Wimpenny, John McMillan.
Winfrey, Richard.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Carruthers, Robert ....Dumfries.
Cook, William Richard ....New Swindon.
Cox, Frederick John ....Nottingham.
Cox, Joseph ....Calcutta.
Fawcett, Christopher Airey ...Natal.
Jones, William Harris ....Friley Bridge.
Leach, Isaac ....London.
Maben, Thomas ....Hawick.
MacEwan, Peter ....Dundee.
Powrie, Percival Chamberlain...Mossel Bay.
Presslie, Robert Dowell ....Aberdeen.
Shepherd, John William ....Settle.
Shirley, Stephen Shillito ....London.
Tyrrell, John Walter ....London.
Warren, William ....London.
Williams, William ....St. Clears.

Chemists and Druggists.

The following registered Chemists and Druggists, who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Adams, Rowland ....Leyton.
Ellis, Frederick...................London.
Franklyn, Thomas ....Leyton.
Taylor, John ....London.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Bartlett, Geo. Fredk. Handel...London.
Beaven, Alfred George ....London.
Booth, Thomas ....Weaste, nr Manchester.
Bourne, Charles Matthew K....Boston.
Bowen, Ebenezer ....Pontardulais.
Bridge, George Edward ....Southsea.
Capern, Francis Thos. Mesmer...Weston-super-Mare.
Corden, Fredk. Wm. Walter ...West Cowes.
Cousens, John Stather............Eckington.
Cowap, Samuel Evan ....Midhurst.
Daniel, John ....Bristol.
Forster, Francis Alexander......London.
Fryer, John ....South Stockton.
Garside, Samuel Arthur ....Ormskirk.
Gregory, Walter ....Bristol.
Higgs, Alfred ....Kingston-on-Thames
Holdcroft, Francis Joseph ......Leek.
Hoult, Joseph Emanuel ....Cheadle.
Hughes, Evan ....London.
Hughes, Thomas Ignatius J. ...Liverpool.
Jesser, Alfred Henry ....London.
Jones, Thomas Pryce ....Llanidloes.
Lyle, William ....Berwick-on-Tweed.
McCormick, Frank Henry ......Manchester.
McNicol, John ....Hillhead.
Maudson, Beresford Frederic H.South Norwood.
Millar, James Hean...............Broughty Ferry.
Morley, John Thomas ....Ripley.
Murchie, William Gardiner......Lockerbie.
Nichols, Arthur Fitzroy ....Warboys.
Padley, William ....Hull.
Parris, Thomas Watkin ....Southsea.
Partington, John James ....Walsall.
Patterson, James ....London.
Phillips, John James ....Ashton-under-Lyne.
Redfern, John ....Bath.
Ridding, William ....London.
Ridley, Thomas....................Brampton.
Rundle, Charles ....London.
Smith, Frederick Adolphus......Darlaston.
Smith, John Thomas ....Wellingborough.
Sutcliffe, George Hargreaves ...Bacup.
Taylor, John ....Bolton.
Thompson, Mark Foggit.........Glasgow.
Truman, Henry Vernon ....Sunbury.
Wakefield, John ....Birmingham.
Williamson, Bamford, junr. ...South Shields.

Modified.

Allden, John.........................London.
Carter, John ....Woolwich.
Coates, Henry ....York.
Fewster, William Longwood ...Dewsbury.
Hey, Walter Thomas ....York.
Mickle, Edward ....Liverpool.

ASSOCIATES.

The following, having passed their respective examinations, and tendered (or paid, as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Minor.

Bamforth, Joseph..................Manchester.
Bennett, Charles Joseph ....Widnes.
Bentley, John Thomas............Hull.
Blagg, Eli ....Hanley.
Bolton, Frederic William ......London.
Callander, William Wright......Exeter.
Cheal, Harry Alexander ....London.
Davidson, Peter ....Insch.
Elborne, William ....Grantham.
Goodchild, Alfred Clarke ......London.
Hardwick, Arthur ....Sheffield.
Hall, Alfred Lee ....Winchcombe.
Hebblethwaite, George Arthur.Hull.
Hogg, Robert William............Gateshead.
Horne, John ....Wednesbury.
Jacks, David Russell ....London.
Johnson, Edward ....Stockport.
Jones, Charles ....Ashton-under-Lyne.
Milne, Andrew ....London.
Morgan, William ....St. Clears.
Nethercott, Walter John.........Stroud.
Oliver, Henry Charles Hewitt...Maidstone.
Owles, Charles Edward ....Bungay.
Palmer, James Spencer ....Penzance.
Parkes, Harry Charles............Fareham.
Parsons, James Vincett ....Icklesham.
Playford, Frederick William ...Holt.
Ramsay, David Robertson ......Dundee.
Richards, Randolph Hutchings.London.
Seward, George Halifax ....London.
Simpson, Robert George ....Stowmarket.
Venables, Samuel Henry.........Wellington (Salop).
Welford, Richard ....Blackburn.
Wilding, George James ....Preston.
Wright, Eli ....Tipton.

Modified.

Orton, Edward Arthur............Marston Gabbett.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Adams, Henry George............Maidstone.
Armstrong, John ....Langholm.
Bellamy, Robert Arthur ....Bedale.
Bird, Frederick Chas. John ...Bath.
Campbell, Charles ....Manchester.
Chadwick, Charles Edward......King's Lynn.
Chaplin, John Henry ....Wakefield.
Crarer, Edward.....................Blairgowrie.
Cryer, Joseph ....Liverpool.
Davies, Daniel ....Newcastle Emlyn.
Dodsley, Charles Edward ......Mansfield.
Drew, Walter Clarke ....London.
Evans, Hugh Thomas ....Carnarvon.
Fooks, Henry ....London.
Forbes, James A. B................London.
Furmston, William Arthur......Wycombe.
Gilbert, Charles George ....Walthamstow.
Goodliff, George ....Huntingdon.
Hall, Charles Hurd ....London.
Heald, Alfred Francis............Burnham, Bucks.
Hinde, Albert Henry ....Lowestoft.
Holloway, Charles Terry.........London.
Horsey, Herbert Vaughan ......Southampton.
Jackson, Richard Herbert ......Hull.
James, Morgan William.........Llandovery.
John, Benjamin ....Narberth.
John, William ....Narberth.
Leech, John Frederick............Tideswell.
Lloyd, Edwin Henry ....Ashby-de-la-Zouch.
Mackereth, George Hemsworth.Thorparch Grange.
Metcalfe, James ....Bradford.
Milne, Alexander ....Montrose.
Morse, Frederick Bartho.........London.
Nicholson, Richard Thomas ...Maidstone.
Nowers, Lawrence Edward......Lydd.
Ogle, John Henry..................London.
Puckey, Courtenay ....Herne Hill.
Rickards, Henry W...............London.
Shapcott, William Henry P. ...London.
Smith, John Henry ....Cromford,
Smith, Sidney ....Bromsgrove.
Swain, Eliza ....London.
Taylor, Francis William.........Newport Pagnell.
Tregellas, Clifton Pari ....London.
Tucker, Thomas ....London.
Wing, John William ....Colsterworth.
Wingrave, Arthur ....Coventry.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

RESTORATIONS TO THE REGISTER.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

James Cartwright, 4, Belvedere Terrace, Hedon Road, Hull.

Michael Charles, 1, Albert Street, Cloudsley Road, Islington, London, N.

Thomas Franklyn, 3, Cuba Villas, Russell Road, Leyton, Essex.

THE VISIT OF THE DEPUTATION TO SCOTLAND.

It was resolved that the members of the London Board of Examiners who had attended the examination in Scotland last month be severally paid the usual examiner's fee for each day on which they attended the Board.

Mr. BOTTLE asked if the President had any report to make on the visit.

The PRESIDENT said he thought it was too early to make any remarks on this subject, as the members of the Board of Examiners who attended would no doubt present a report.

Mr. WILLIAMS though it was usual for the President to make a short statement.

The PRESIDENT said he had no objection to state generally that the visit had been very satisfactory. He would not for the reason just stated give any opinion on points of detail, but he believed there would be no adverse opinion in any way. He need hardly say that their friends in Edinburgh and Glasgow received the members of the deputation most cordially, and did everything possible, not simply for their comfort and enjoyment, but everything they could to give the deputation the best opportunity of seeing the conduct of the examinations from beginning to end and the general arrangements of the Society. He believed that at an early date a motion would come before the Council for authorizing some cleaning and painting to be done at the Society's rooms in Edinburgh.

THE ANNUAL REPORT.

The Council then went into committee to revise the draft Annual Report, which was considered and finally approved, and ordered to be issued with the Voting Papers.

REPORTS OF COMMITTEES.

LIBRARY, MUSEUM AND LABORATORY.

The Committee recommended that copies of the Index be sent to the provincial associations and to the medical and public libraries to which the Journal is now sent.

The Professors had attended and reported on their respective clases.

The Librarian's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
March	Day	292	19	8	12
	Evening	186	17	2	9

Circulation of books.	Town.	Country.	Total.
No. of entries	167	73	240
Carriage paid	£1 12s. 0½d.		

The following donations to the Library had been reported, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

American Pharmaceutical Association, Proceedings, 1878, vol. 26. From the Association.

Böhlendorff, H. v., Ein Beitrag zur Biologie einiger Schizomyceten, 1880.

Koroll, J., Quantitativ-chemische Untersuchungen über die Zusammensetzung der Kork-, Bast-, Sclerenchym- und Markgewebe, 1880.

Liborius, P., Untersuchungen über die Wurzelfasern von Rhinacanthus communis, 1880.

Pfeil, T., Chemische Beiträge zur Pomologie, 1880. From Professor Dragendorff.

Friedländer & Sohn, Bibliotheca historico-naturalis et mathematica, 1880. From the Compilers.

Pharmaceutical Society of Ireland, Calendar, 1880. From the Society.

Pharmaceutical Society of Victoria, Annual Report, 1880. From the Society.

Pharmacy Board of Victoria, First Report, 1880.
— Pharmaceutical Register for 1879. From the Board.

Radcliffe Library, Oxford, Catalogue of Books added during 1879. From the Radcliffe Trustees.

Sadler, J., Report on Temperatures during the Winter of 1878-9. From the Royal Botanic Garden, Edinburgh.

School of Pharmacy Students' Association, Papers read, Session 1878–9. From the Association.

The Committee recommended the purchase of the following works for the Library:—

Bibliotheca Chemica, 1840–58.
Bibliotheca Chemica et Pharmaceutica, 1859–70.
Carter, R. B., Eyesight, Good and Bad, 1880.
Huxley, T. H., The Crayfish, 1880.
Johnson, C. P., and J. E. Sowerby, Useful Plants of Great Britain.
MacMunn, C. A., The Spectroscope in Medicine, 1880.
Molimbrochius, A. V., Cochlearia Curiosa, or Curiosities of Scurvygrass, 1676.
Morton, W. J. T., Manual of [Veterinary] Pharmacy, 8th ed., 1880.
Oliver, D., Illustrations of the Principal Natural Orders of the Vegetable Kingdom, 1874.
Parkes, E. A., Manual of Practical Hygiene, 5th ed., 1878.

The Curator reported the average attendance in the Museum to have been, Morning 11: Evening 3.

The following donations to the Museum had been received:—

Japanese Belladonna Root. From Messrs. Hearon, Squire and Francis.

Pure Iodide of Potassium. From Messrs. Geo. Atkinson and Co.

Papaw Leaves, Yellow Bonduc Seeds, Japanese Belladonna Root, Sweet Bark from Australia (Achras species). From Messrs. T. Christy and Co.

Specimens of the bark of *Ptelea trifoliata*, *Abies balsamea*, *Rhamnus Purshiana*, *Æsculus glabra*, *Diospyros virginiana*.
Specimens of the Root of *Pterocaulon pycnostachyum* and *Polymnia Uvedalia*.
Specimens of the Herb of *Frankenia grandifolia*, *Penthorum sedoides*, *Lycopus virginicus*, *Gentiana quinqueflora*, *Erecthites hieracifolius*.
Specimens of the Seeds of *Uraria triloba*. From Messrs. Parke Davis and Co.

Bark of *Cinchona Officinalis*, var. *pubescens* (containing 6 per cent. of quinine and 5 per cent of cinchonidine), and "China Cuprea." From Mr. J. E. Howard, F.R.S.

Specimens of Morocco Drugs belonging to the late Dr. Leared. From Mrs. Leared.

Specimen of the Capsicum pods from which Natal Cayenne Pepper is prepared. From Mr. H. J. Savory, Griqualand.

Specimen of "Tonga" as imported. From Mr. A. W. Gerrard.

The following donation to the Herbarium had been received:—

Specimens of *Shorea hypochroa* and *Shorea Henryana*, with portions of the bark and resin. From Dr. Pierre, Director of the Botanical Gardens of Saigon, Cochin China.

At an adjourned meeting the Committee had considered the questions referred to it by the Council at its last sitting regarding the payment for papers read at the Evening Meetings of the Society in Edinburgh, and also before provincial associations, when published in the Journal, and had resolved unanimously to recommend the Council to discontinue the practice of paying for papers read at the meetings of the Pharmaceutical Society.

The Curator had reported the applications he had received from persons desirous of exhibiting apparatus, etc., at the Annual Meeting. Also, that an application had been received from the Leicester Chemists' Association for specimens of materia medica.

The Council went into committee to consider this report, and afterwards resumed.

Papers read at Evening Meetings.

Mr. MACKAY wished to make a remark on the portion of the report which referred to the payment of papers read at the Evening Meetings. It appeared that in future Edinburgh and London would be placed on the same footing, but he could not help feeling that the subject was one of great importance, and that the present position could not be too thoroughly understood. He wished to ask if it was to be understood that all papers read at the Evening Meetings be not only not paid for, but that the papers became the property of the Society, and being its property that the papers should be published *in extenso* in the Journal. If that were so, the other question which immediately arose was this, that if certain papers read at Evening Meetings were not published, then the Society was placed in a very invidious position. In other words, if the Society undertook not to pay, but received manuscripts suitable for reading at Evening Meetings, then it took possession without fee or reward of the labours of such men, and that being so, were the papers, after having appeared in the Journal, to be considered the property of the authors? If this were made a hard and fast line, a good many who might be working in an original groove would feel themselves rather unjustly used. Was the Editor to be put in the position of receiving a paper on the tacit understanding that it would be paid for, and then simply because it was to be paid for, that it was not to be read as a communication? These matters should be looked fairly in the face, because the Journal might be deprived of some very valuable papers. Its pages must be filled, and the Society trusted to filling them very much with papers read at the Evening Meetings. Supposing that some night there were not sufficient matter for the Evening Meeting, other than that which had been already accepted by the Editor as a contribution to be paid for. Was the mere fact of those papers being so accepted to prevent their being read? If it were not so, he should be glad to be set right, and it was really important to know whether that course should be adopted. If that were the decision, he should ask the Council to appoint some committee to act in Edinburgh, for the purpose of passing papers which, when read, should be printed *in extenso* in the Journal. In no other way would the invidious distinction in printing some papers and not printing others be got rid of.

Mr. Hampson said the Committee took all these points very fully into consideration. It was felt that it would be impossible for the Society to pay for papers read in Edinburgh, Bristol and elsewhere, unless it had some control over the selection or rejection of the papers. He must say that some papers had occupied the pages of the Journal, which had been read in Edinburgh, which he should take exception to, but this question was surrounded by many difficulties, and the only solution appeared to be to do as other societies did, and not pay for papers read at the meetings. The honour of reading a paper before the members of the Society and its publication, was something, and that was a sufficient reward for the majority of contributors. It was quite clear then that these papers should not be paid for; but it was also clear that if a gentleman chose to send a paper to the Journal and the Editor considered it of sufficient importance to print and pay for it, he got a reward of another kind. But the gentleman who read the paper at their meetings had the advantage of getting it fully discussed, and more interest manifested in it; and this was an important distinction between the two courses of procedure. There were certain advantages in each, but it would be clearly seen that the only proper arrangement was the one proposed.

Mr. Williams said this question was very well thrashed out in committee. He had always been of opinion that the Society ought not to pay for these papers. He had occasionally read a paper, but so strongly did he feel on the subject, that he always handed over the payment to the Benevolent Fund. He was quite aware that the Council was formerly induced to come to a resolution to pay for the papers, because there was rather a dearth of papers at the time, and it was thought many writers of good papers sent them to the Journal instead of reading them at the Evening Meetings, so that they might get payment. He did not think experience had really supported that supposition. He believed the Society would get quite as good papers and as many as were wanted, by simply relying on the *esprit de corps*. The papers paid for were naturally of another character, and were generally the work of gentlemen who made it more or less their business to write on scientific matters. With respect to the papers read before the North British Branch coming up to be necessarily published in the Journal, he thought it would be a dangerous thing to lay down a hard and fast rule, binding the Editor absolutely to publish every paper sent to him which had been read before the North British Branch. He did not consider that the Editor was absolutely bound to print every paper read in that house; and he knew that in the case of other learned societies papers were frequently read which the publication committee did not think proper to publish. It should be simply a question whether it was a benefit to the Journal to publish a paper, and the interests of the Journal should not be sacrificed to any fancied ideas as to a right at law. At the same time it was obvious that, as a rule, papers read before the Society either in London or Edinburgh would be published.

Mr. Symes, being one of those who moved the resolution which caused this inquiry, wished to say that in so doing he in no way advocated payment for papers read at the Evening Meetings or before provincial associations. He simply thought it was unfair to endow the papers read at the Society's meetings, and that local societies should have to use their efforts to get papers which could not be paid for. He should decidedly support the recommendation of the Committee that no papers be paid for at all which were read at the Evening Meetings of the Society. He was not going into the question of provincial societies, because the Committee did not seem to have reported on that. The recommendation, if carried out, would place everyone on terms of equality, and he did not think the Society would seriously suffer. He took it the North British Branch was quite competent to appoint any committee it pleased to look at the papers submitted to it. The Editor should have some discretion as to the publication of papers sent to him.

Mr. Frazer said he had always opposed the payment for scientific papers read before the Society. He never believed that the Society would not get papers of value without paying for them, and he had the same impression still. With reference to the point raised by Mr. Mackay he thought it might be understood that papers read at the Evening Meetings did not necessarily become the property of the Society. If that were settled, the Editor could then go to the writer of a paper, if he thought it valuable, and ask permission to insert it, and pay for it as a contribution. He did not think the papers read at the meetings should become the property of the Society, and the Editor might say, "I will take this one, and pay for it, but not that." Let the Editor fill the Journal from any source he pleased.

Mr. Squire thought the fact of a paper being read at an Evening Meeting and not published would not prevent it being handed to anyone else to publish, if he would pay for it.

Mr. Mackay said the discussion all proceeded from the understanding that a paper read at an Evening Meeting became the absolute property of the Society.

The President said such a paper was the property of the Society to this extent, that the Society acquired a right to publish the paper; but it did not retain the copyright. He constantly received papers published in other journals and read at meetings, from the writers of those papers, and he had known some of them collected and published as a book. He could not imagine that any Council would say the paper belonged to the Society and should not be republished by its author.

Mr. Greenish took it that everything published in the Journal was the property of the Society. He recollected instances where permission was asked and obtained to republish papers. He wished to point out the difficulty in which the Editor was placed. A paper might be sent him from a foreign correspondent who was accustomed to receive payment, which he, as a member of the Evening Meetings Committee, might think desirable to have read at the Evening Meeting, especially if, as might be the case, there were no other papers to be brought forward. It would be very hard in such a case to deprive the writer of his remuneration. That was just the point he wished to clear up.

Mr. Hampson said the Editor would accommodate himself to the new conditions.

Mr. Symes thought the Editor had no right to do what Mr. Greenish had suggested.

Mr. Greenish said Mr. Williams had spoken very strongly against receiving payment for a paper, but he could not accede to that view. A paper might be got up in an hour or two, or a man might spend two or three months' time upon it and more money than he would receive for it.

Mr. Atkins was very glad the Council was coming to a conclusion not to pay for papers read at Evening Meetings. He was sorry to find that it did not seem to see its way to any solution of the difficulty that a paper having been read at an Evening Meeting was disqualified for being paid for. He would rather have no Evening Meeting for six months than go on paying for papers for them, and was glad that Mr. Frazer had held that view so long. The point Mr. Greenish had raised was of importance, that if a paper were read at an Evening Meeting it could not be paid for anywhere, either in the Society's own Journal or elsewhere. That would certainly go a long way to deprive the meetings of papers. He thought it would be desirable to leave the management of the Journal entirely distinct from the conduct of the Evening Meetings. Let the Council keep to the idea that it would not pay for papers read, but let it be in the discretion of the Editor to pay for papers published in the Journal.

Mr. Robbins agreed with Mr. Greenish that it would be desirable to leave the question to the Editor whether a paper should be paid for or not.

Mr. Hampson thought the Council had better adhere to the resolution.

Exhibition of Apparatus, etc.

Mr. Symes wished to say a word about the Exhibition at the Annual Meeting. He was very pleased to learn that forty-three applications had been received for space to exhibit; and the arrangements seemed to be going on very well, except that he found the Curator in this dilemma, that he was without an assistant. It seemed that the young man who had been assisting the Curator had left, and, as he understood, the Committee did not think proper to allow him an assistant on the present occasion. A large amount of responsibility and work had been thrown on the shoulders of the Curator, which he was anxious to carry out well, and he (Mr. Symes) thought it a great pity the Committee did not deem it desirable to allow him an assistant. He would therefore recommend that the Committee be requested to reconsider the matter, or that a resolution be passed empowering the Curator to get such assistance as was desirable.

Mr. Williams said there was no such application before the Committee.

The President said the Curator reported that his assistant had left, and applied to the Committee for authority to engage another, but the Committee considered that the engagement of the assistant in the museum was only temporary, and could not recommend at present that another be appointed. So far as engaging an assistant for the purposes of this Exhibition, he did not think it was necessary at all, and he was very much surprised that the Curator should have put any such complaint into the hands of Mr. Symes. The Curator's application ought to come before the Library Committee, which met every month. The assistant was appointed twelve months ago for a special reason, which no longer existed, and, as he had left, the Committee thought it better to leave it to the new Council to appoint a successor, if it thought fit.

Mr. Symes said it was not a complaint by Mr. Holmes by any means; it was simply that he went to ask him how the Exhibition was going on, because he had written a great number of letters privately about it, and was much interested in its success. He asked the Curator what he was doing, and so on, and the Curator simply told him of the dilemma he was in, which he (Mr. Symes) thought was justifiable on his part. He should not have brought the subject before the Council if he had thought it would be accepted as a complaint, because it was nothing of the kind. The circumstance having come to his knowledge he brought it forward because he thought it was the duty of the Council to see that this matter was efficiently carried out.

Mr. Richardson said he was very glad that there appeared to be a prospect of success for this Exhibition, but he deprecated the remarks of Mr. Symes, as the subject should not have come forward in this way. As it had been mentioned, however, he thought some temporary assistance ought to be given to Mr. Holmes in order to make the Exhibition as successful as possible. All over the country these exhibitions were becoming common, and he looked forward with great anticipation to the re-introduction of an Exhibition in connection with the Society this year, and thought it would become of very great importance in future years to chemists at large. In his own town there had been an exhibition of gas apparatus, which he believed would cause a revolution in the town in the consumption of gas for domestic purposes.

Mr. Hampson said he should be sorry for Mr. Symes's remarks to be misunderstood, and he thought the explanation he had given was satisfactory. It was simply a fact elicited in conversation, and if the absence of an assistant was likely to be prejudicial to the success of the Exhibition, it was desirable that some temporary assistance should be given.

Mr. Gostling said it struck him that if the Curator really required such assistance he would ask for it, and that, in all probability, up to the present time he had got through his work satisfactorily. If he should require assistance, as no doubt he would, it would be quite within his province to apply for such temporary help at the next committee meeting, which would take place next Monday.

Mr. Greenish rather regretted to find this discussion raised. It so happened that this last month the Committee had had two meetings, at the first of which he was not present, but at the second there was certainly no application of the kind. At the meetings of the Library Committee the Professors and the Curator attended and entered freely and fully into conversation, and the proceedings were by no means formal or formidable. If any application for an assistant were to be made he should much prefer its coming before the Committee in the regular way.

Mr. Williams said what took place respecting the assistant which appeared in the report of the Committee had nothing whatever to do with the Exhibition. The assistant was appointed some time ago to assist in arranging the Hanbury Museum and some special work which was now done. The young man had left and it was simply a question whether it was desirable to appoint a permanent assistant. The Committee decided that there was no necessity for so doing. The question of temporary assistance in carrying out the Exhibition never came before the Committee at all, or no doubt it would have made a recommendation one way or the other.

The President said the Curator had only been five days without an assistant, and there were two porters who would do what he required.

Mr. Symes said he had not brought forward the matter as a grievance, but if he had been on the Committee he should have looked upon it in the same light as if it were a matter occurring in his own business, and he should have said to himself, was it wise to lose an assistant just when his work was being doubled? The Council knew the Curator always had his hands pretty full, and it did not seem wise to let his ordinary work accumulate while he was attending to this Exhibition.

The President said the Committee would meet next week, when Mr. Holmes, if he had anything to say, could bring it forward.

Mr. Atkins moved an amendment—

"That the reading of papers at Evening Meetings of this Society does not necessarily disqualify that paper for payment if published in the pages of the *Pharmaceutical Journal*."

The President said this was an abstract resolution which might leave the Council in a difficulty.

Mr. Mackay said it was opposed to the whole spirit of the recommendation of the Committee.

The amendment not being seconded, the resolution for the adoption of the report and recommendation of the Committee was agreed to.

Admission of Persons not connected with the Society to the Exhibition.

Mr. Symes then moved—

"That all registered chemists and druggists be admitted to the Museum and any other portion of the Society's building used for the purpose of the Exhibition on the day previous to and the day following the Annual Meeting."

He said the only reason for excluding the Wednesday was that it would be inconvenient to have strangers present when the Annual Meeting was being held.

Mr. HAMPSON seconded the motion, which was carried unanimously.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow of a registered chemist and druggist, in business up to the time of his death, in March last.

£10 to the widow of a former member, who has had two previous grants of like amount.

£10 to the widow of a member who died in 1870. She has had six previous grants.

£5 to the widow of a registered chemist and druggist who had been thirty years in business.

£15 to an associate, aged 29, suffering from ill health, and unable in consequence to earn his living.

£5 and a surgical instrument to a registered chemist and druggist, suffering from an accident and ill health.

Another case was ordered to stand over for further inquiries.

The report and recommendations were received and adopted.

HOUSE.

The report of this Committee only consisted of a recommendation for payment of certain accounts connected with repairs to the building.

GENERAL PURPOSES.

The report of this Committee included the usual letter from the Solicitor reporting the progress of certain cases which had been placed in his hands.

Several other cases of alleged infringement of the Pharmacy Act had been brought under the notice of the Committee and in some of them it was recommended that the Solicitor be instructed to take proceedings.

The Council went into committee to consider this report. On resuming—

The report and recommendations were received and adopted.

PORTRAIT OF MR. DANIEL BELL HANBURY.

The PRESIDENT read a letter from Mr. Thomas Hanbury, saying that he had employed an Italian artist to make a copy of a portrait of his father, Mr. Daniel Bell Hanbury, which he begged leave to present to the Society. The painting was brought into the Council room, and was considered to be a very faithful likeness.

On the motion of the PRESIDENT, seconded by the TREASURER, a cordial vote of thanks was passed to Mr. Thomas Hanbury for his kindness.

THE ADMINISTRATION OF POISONS TO HORSES.

Two memorials were presented to the Council, one from the Lincolnshire Association for Preventing the Administration of Poisonous Drugs to Horses, and the other from the Lincolnshire Chamber of Agriculture, praying that certain articles, viz., hellebore, butter of antimony, oil of vitriol, spirits of salts, nitric acid, and salts of copper, should be placed in the schedule of poisons, as they were frequently given to horses by farm servants and grooms, contrary to orders, and often with fatal effects.

On the motion of Mr. WILLIAMS, the memorials were referred to the General Purposes Committee.

An application from a member to have a duplicate copy of his diploma, which had been destroyed by fire, was also referred to the Library, Museum and Laboratory Committee.

REPORT OF EXAMINATIONS.

April, 1880.

ENGLAND AND WALES.

April	Candidates. Examined.	Passed.	Failed.
Major, (14th)	7	3	4
,, (15th)	7	3	4
,, (21st)	7	2	5
,, (22nd)	6	4	2
	— 27	—12	—15
Minor, (14th) . . .	20	8	12
,, (15th)	21	6	15
,, (16th)	23	11	12
,, (21st)	21	10	11
,, (22nd)	20	8	12
	—105	—43	—62
Modified, (22nd) . . .	1	1	0
Totals	133	56	77

SCOTLAND.

	Candidates. Examined.	Passed.	Failed.
Major, (28th)	3	2	1
Minor, (28th)	11	7	4
,, (29th)	11	7	4
	—22	—14	—8
Totals	25	16	9
Preliminary Examination .	356	204	152

11 certificates received in lieu of Preliminary examination:—

1 University of London.
3 University of Oxford.
4 University of Cambridge.
3 College of Preceptors.

EXAMINATIONS IN EDINBURGH.

April 28 *and* 29, 1880.

Present—Mr. Sandford, President; Mr. Schacht, Vice-President; Messrs. Ainslie, Borland, Gilmour, Kemp, Kinninmont, Stephenson, and Young.

Messrs. Benger, Brady, and Gale were present as a deputation from the Board in London.

Professor Maclagan was present on behalf of the Privy Council.

MAJOR EXAMINATION.

28*th.*—*Three* candidates were examined. *One* failed. The following *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Maben, Thomas ....Hawick.
MacEwan, Peter ....Lochee.

MINOR EXAMINATION.

28*th.*—*Eleven* candidates were examined. *Four* failed. The following *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Adams, John........................Glasgow.
Boyd, Samuel ....Dumfries.
Cairns Thomas Bourhill ....Edinburgh.
Currie, William Little............Glasgow.
Fowler, George.....................Tewkesbury.
Fraser, John ....Chester.
Gowans, John Bruce ....Perth.

29*th.*—*Eleven* candidates were examined. *Four* failed. The following *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Illingworth, George Skeen ......Aberdeen.
Macdougall, Rea Ireland ......Edinburgh.
Murchie, William Gardiner......Lockerbie.
Paterson, Alexander Clarkson...Edinburgh.
Peat, Joseph ....Accrington.
Priestley, Walter Herbert ......Barnstaple.
Wilson, William Wallace ......Glasgow.

STATEMENT OF ATTENDANCE OF MEMBERS OF COUNCIL ON COMMITTEES FOR THE YEAR 1879-80.

	Committees held once a Month or oftener.		Committees held occasionally.				
	Finance.	Library, Museum, and Laboratory.	House.	Benevolent Fund.	General Purposes.	Special Committees.	Total Number of Attendances.
Number of Committee Meetings held.	12	14	10	11	10		
Atkins (*Salisbury*)	*	*	*	*	0	*	0
Bottle (*Dover*)	*	8	5	7	4	1	25
Churchill (*Birmingham*)	*	*	*	6	8	*	14
Frazer (*Glasgow*)	*	*	*	*	0	*	0
Gostling (*Diss*)	9	10	5	*	9	1	34
Greenish (*London*)	*	11	7	10	8	8	44
Hampson (*London*)	*	8	3	9	10	3	33
Hills (*London*)	*	8	4	*	0	2	14
Mackay (*Edinburgh*)	*	*	*	5	6	0	11
Richardson (*Leicester*)	7	*	*	*	7	*	14
Rimmington (*Bradford*)	*	*	*	3	7	*	10
Robbins (*London*)	*	14	10	11	8	3	46
Sandford (*London*)	2	12	8	10	9	10	51
Savage (*Brighton*)	9	*	*	*	8	*	17
Schacht (*Clifton*)	8	2	2	3	9	3	27
Shaw (*Liverpool*)	*	*	*	4	5	*	9
Slipper (*London*)	0	*	*	*	0	*	0
Squire (*London*)	7	7	5	*	7	3	29
Symes (*Liverpool*)	10	*	*	*	10	2	22
Williams (*London*)	*	14	9	10	10	6	49
Woolley (*Manchester*)	*	*	*	7	6	1	14

* Not appointed on this Committee.

NUMBER OF ATTENDANCES OF MEMBERS OF COUNCIL AT COUNCIL MEETINGS FOR THE YEAR 1879-80.

Atkins, Samuel Ralph	12	Hills, Thomas Hyde	12	Schacht, George Frederick	10
Bottle, Alexander	11	Mackay, John	7	Shaw, John	9
Churchill, Walter John	10	Richardson, John George Fredk.	9	Slipper, James	1
Frazer, Daniel	9	Rimmington, Felix Marsh	7	Squire, Peter Wyatt	7
Gostling, Thomas Preston	10	Robbins, John	11	Symes, Charles	11
Greenish, Thomas	10	Sandford, George Webb	11	Williams, John	10
Hampson, Robert	11	Savage, William Dawson	10	Woolley, George Stephen	8

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The thirteenth general meeting was held at the Royal Institution, on Thursday evening, April 22, the President, Dr. Charles Symes, in the chair.

The minutes of the previous meeting were read and confirmed, and the following donations announced:—The current numbers of the *Pharmaceutical Journal*, from the Society; and the *Canadian Pharmaceutical Journal*, from the Editor.

A paper was read by Mr. Thomas Williams, F.C.S., on "The Metallurgy of Spiegeleisen and Ferro-Manganese, and their Employment in the Manufacture of Steel." The paper was discussed by Messrs. A. Abraham, Kehlstadt, Mason and Symes, at the close of which a cordial vote of thanks was passed to Mr. Williams.

The President then delivered his valedictory address as follows:—

Valedictory Address.

One of the penalties to be paid by those who aspire to the presidency of this Association is that they deliver a valedictory address, and it is not my intention on the present occasion to question the prudence of this arrangement; it was so ordered by our predecessors and, we will, if you please, just now accept matters as we find them. Happily, the custom which imposes this address also provides a programme, and it is my duty this evening briefly to review the work of the session, and to bring before you any other matter of importance, which might have escaped notice during our sittings.

At the commencement of the session, we considered our position, and I endeavoured to point out the individual and joint responsibilities of the members, and urged that if we were to maintain our position amongst kindred societies, and serve faithfully our day and generation in the special profession to which we belong, this responsibility must not be lost sight of. That such position has been fully realized, and that some efforts have been put forth, a *résumé* of the work of the session will show.

Mr. Johnson first gave us an interesting paper, on "Some Improved Forms of Apparatus," useful alike to the chemist and pharmacist, and which well illustrated how the application of mechanical ingenuity to daily laboratory work will facilitate operations which are otherwise tedious.

Mr. Conroy, on the same evening, gave us some interesting particulars concerning a sample of "Fictitious Scammony," which was being offered in the market, and described in detail the method he had used for its analysis and such precautions as were found necessary for obtaining accurate results.

Mr. Mason next gave us an exhaustive paper on "Menthol and Thymol," substances which have of comparatively recent date created some amount of notice, if not sensation, amongst members of the medical profession and pharmacists. The author regarded menthol as a liquid, having the composition $C_{10}H_{14}O$, and menthol camphor—the solid body, $C_{10}H_{20}O$. The discussion which followed showed that some difference of opinion existed on these points; but all agreed that the paper was an important one, and dealt most fully with a subject of considerable interest.

Mr. Conroy's second paper, "On Fucus Vesiculosus," was one specially suited to the time at which it was read. The advertisement columns of our newspapers everywhere bore evidence of American enterprise by the puffing of a nostrum called "Anti-fat," which was identified with this particular substance. The mere advertisement (however extensive) of a proprietary article would scarcely have justified an elaborate chemical investigation, but the medical profession took to prescribing different preparations of the fucus, and their journals descanted on its merits and demerits, so that it became the duty of the chemist to deal with its composition, which Mr. Conroy did in a very satisfactory manner, and although the sensation has so soon passed away his work stands for reference on future occasions. The paper concludes with a formula for a fluid extract, or liquor, which possesses whatever medicinal properties the plant may contain.

At our fifth meeting we joined the literary, scientific and art societies of Liverpool in an associated *soirée* at St. George's Hall. By contributions from its own museum and the help accorded by several manufacturing firms, the Chemists' Association was enabled to make an excellent display of chemicals, apparatus, etc.; these, with Mr. Mason's lecture, enabled us to provide our full quota of the entertainment which, as usual, passed off very satisfactorily. It seems to puzzle some of our metropolitan friends as to how such a gathering, amounting to over 3000 persons, can be brought together and entertained with the various subjects on the programme with perfect harmony and to the gratification of all. I can only assert that it was so, and feel assured that reminiscences of the very pleasant evening still linger in the minds of those who attended.

Mr. Davies, in a very interesting paper, dealt with "The Chemistry of Tanning," a technical subject of considerable commercial importance. After reviewing briefly the progressive stages (not very numerous) which led up to the present methods, he dealt more fully with "The Chemistry of the Tannins," which up to the present time is by no means fully worked out, chiefly on account of the difficulty of obtaining them in an absolutely pure state without decomposition. Indeed the excellent epitome of all that is known scientifically on the subject tended to show how much remains to be done.

The lecture was well illustrated with the various substances used in the art.

The seventh meeting was occupied by our own conversazione, held as formerly in this building, and at which Mr. Davies delivered a lecture on "Gases and Vapours." The subject was most *apropos* to the occasion, seeing that scientific men have recently been and still are specially engaged in investigating these forms of matter. Such a lecture in such able hands, and so fully illustrated with good experiments, was, I scarcely need say, a complete success, and contributed largely to make the whole proceedings so. The attendance was scarcely equal to former occasions, but this was accounted for chiefly by its having been held so near to the associated *soirée*, and at a time when festivities of the new year were attracting our friends to scenes of more excitement and gaiety. It has been thought worth our consideration whether we should not merge our own conversazione into the associated *soirée*, and concentrate the whole of the energy, which we now divide, into the one.

Mr. Kehlstadt at our next meeting gave us an excellent, though short paper, on his special branch of technology—"Coal Tar and its Distillation." This we well know is a subject of almost interminable interest, since the once waste body has become such a mine of wealth; the products now obtained from it are truly legion. It has been well said that in coal we have the sun's heat in bygone ages stored up for our present use, and we may add with equal truth his light also, resplendent with its gorgeous display of prismatic colours, when developed under the influence of chemical agencies.

Following this we had a paper in which I endeavoured to sketch, from my point of view, the relationship which existed (and still exists) between the "Pharmacist and the Pharmacopœia," with a view of showing the necessity for the former receiving official recognition in the revision the latter. It has been thought by some persons that in this we are asking more than is our due, and even an undoubted friend and well-wisher to pharmacy, desiring to judge the matter impartially, says:—"We have no more right to dictate as to the contents of the Pharmacopœia than has a cook as to how a dinner shall be prepared and served." Now this is an excellent simile; but anyone who will take the trouble to think it out will doubtless see that the conclusions are entirely in our favour.

Mr. Astrup Cariss, at very short notice, came forward with a paper on a subject with which he has identified himself for some years, viz., "The Relation of Chemistry to Sanitation." He pointed out the frequently occurring want of chemical knowledge on the part of those who had to direct sanitary matters, and the consequent injury to health, and waste of public funds. He gave some interesting examples in support of his statements, and put forth some well matured suggestions, which were calculated to remedy the evil. The paper gave rise to one of the best and most animated discussions we have had this session.

Mr. Haddock followed with a paper on "The Estimation of Copper," in which he reviewed the various processes that had from time to time been proposed for the purpose. He pointed out the defects which characterized most of them, and criticized them in a manner which at once showed his practical acquaintance with the subject. He spoke favourably of the process of Steinbeck, and also of the battery and platinum process of Luckow, considering this latter, with a modification introduced by Mr. Parnell, probably the best known. He regarded also the precipitation of copper by sodium or potassium hydrate as giving very satisfactory results when care was taken in working, and stated it to be the method he usually adopted. The paper was listened to with considerable attention, and was ably discussed.

The next meeting was occupied with three communications and the discussions thereon. One by Mr. Kehlstadt, "Resorcin and the Dyes prepared therefrom." Another by Mr. Conroy, on "Oil of Gentian," a rare product from a common drug, and the third, a description of a "Simple Form of Apparatus for Continuous Extraction."

To-night our late Honorary Secretary, Mr. Thomas Williams, has given us a paper on "Spiegeleisen and Ferro-Manganese, and their Employment in the Manufacture of Steel." The author has identified himself with metallurgy as a branch of chemical industry, and I am sure we have not been disappointed in our expectation of hearing the subject ably dealt with from competent hands.

These, together with some interesting communications of a miscellaneous nature, for which we are indebted to Mr. Conroy, Mr. Mason, Mr. Davies, Mr. Hallawell, and others, constitute the business of the session.

There is a subject which has not come before us in a formal manner to which I wish for a few minutes to direct your attention. It is an investigation which has arrived at a satisfactory stage of progress and has been made known to the world quite recently, viz., that of Messrs. Hogarth and Hannay, which has resulted in the artificial production of the diamond. The experiments of these gentlemen have been conducted on sound scientific principles, and great as is the discovery of the artificial production of the gem, it might be regarded as of secondary importance to the new line of investigation which has been struck out by these able experimentalists and thinkers.

We are all familiar with the solubility of solids in liquids, but an inquiry has now been opened up into the solubility of solids in gases under pressure, and after some amount of patience and perseverance they thus succeeded in getting crystallized carbon. Some idea of the enormous pressure used may be gathered from the fact that tubes constructed on the gun-barrel principle, having a bore of half an inch and an external diameter of four inches, were torn open in nine cases out of ten before sufficient pressure had been attained. A continuation of these investigations will probably throw more light on this new path before we meet again.

A few months since, some members of the Faraday Club, desirous of extending the operations of that body and of increasing its members, called a meeting in this institution to inaugurate the existence of a new society. At first some little anxiety was felt lest this effort at resuscitation on the part of others should affect prejudicially this Association. At present, however, there does not appear to be the least danger of its operations in any way clashing with us, and we have every reason to look forward to a continued prosperity.

Gentlemen, it now remains for me to thank you sincerely for the kind and willing help which you have given in bringing this session to a successful issue and to ask you to appoint my successor.

On the motion of Mr. R. Sumner, seconded by Mr. Edward Davies, F.C.S., a hearty vote of thanks was accorded to the President for the very able manner in which he had filled the chair during the session.

The election of President for next session was then proceeded with, by ballot, and resulted in the unanimous return of Dr. Symes.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The sixth meeting of the session was held at Britannia Chambers on Thursday, April 29. The chair was occupied by the President, Mr. R. FitzHugh, F.C.S., and there was a fairly good attendance of members and associates.

After some preliminary business the President, with a few appropriate remarks, presented the prizes given by Mr. Atherton, F.C.S., and Mr. W. Widdowson for the best essay on "The Art of Dispensing," the first being awarded to Mr. E. H. Judge and the second to Mr W. Gill.

The Chairman then called on Mr. Rayner to read his paper on "Health in the Drug Trade," which consisted of notes on recent correspondence in the *Pharmaceutical Journal* on the longevity of chemists. The writer criticized various letters that had appeared, and expressed his own decided opinion that chemists as a rule, lived as long as any other tradesmen, quoting several local instances where good old age had been attained.

Mr. Bolton, in a few remarks, endorsed Mr. Rayner's opinion, and expressed the hope that the young men, who now enjoyed much more frequent opportunities for recreation than formerly, would use those occasions well, and so tend to improve their health and lengthen their lives.

The President supported those views, and concluded by proposing a hearty vote of thanks to Mr. Rayner, which was seconded by Mr. Wilford, carried unanimously, and suitably responded to.

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, April 22. Mr. H. Allen, Vice-President, in the chair.

Mr. C. Thompson read a paper on "Robert Boyle," of which the following is an abstract:—Robert Boyle, the fourteenth son of the Earl of Cork, was born January 25, 1627. He received his early education at Eton; after leaving he travelled on the continent for six years. He went to Oxford in 1664, where a great deal of his work was done. In 1668 he came to London, where he remained till his death. In 1663 the Royal Society was founded, Boyle being elected on the Council. In 1680 he was elected President, but refused the honour. He died December 30, 1691, and was buried in the churchyard of St. Martin's-in-the-Fields, London. His knowledge was very extensive: he knew seven languages and was well versed in all the sciences, but his research was principally confined to chemistry, which he rescued from the hands of the alchemist and gave a separate footing as an exact science. He published in all about thirty works, but eight or ten of these were not scientific, being devoted to theology. His most important work was entitled 'New Experiments, Physico-mechanical, etc.,' and contained an account of the air-pump which he had constructed and of the experiments made with it. In this work he enunciated the great general truth which he discovered, now known as "Boyle's Law," that "the temperature being constant the volume of the gas is inversely as the pressure." There has been much discussion as to whether this law holds good for all gases. In 1825 Despretz showed that CO_2, H_2S, NH_3 and CN are more compressible than air. Arago and Dulong examined air and found the law was applicable to it. Pouillet then corroborated Despretz's experiments. Regnault found that Boyle's law "was not applicable, as far as his experiments showed, to air, as it experiences a greater compressibility which increases with the pressure." Cailletet has lately repeated the experiments of Regnault, and finds that air after a pressure of eighty atmospheres begins to be less and less compressible, and would finally agree with Boyle's law.

After short discussion a vote of thanks was accorded to Mr. Thompson.

Mr. H. R. Arnold then gave his report on Pharmacy, which consisted in a report on—

Emulsifying Agents.

BY H. R. ARNOLD.

Since my last report upon pharmacy, the number of researches in that domain, as well as the introduction of any particular apparatus applicable to pharmacy, or the number of published papers throwing light upon any pharmaceutical subject, have been few. In February last, however, we were made acquainted with the fact that tinct. senegæ possessed emulsifying properties, while only a few months before we were introduced to a new emulsifying agent in tinct. quillaiæ saponariæ. I therefore thought it would be interesting to know how far either of these tinctures might be carried to any practical use, since the value of substances possessing good emulsifying properties cannot be over-estimated by the pharmacist. I have therefore paid more particular attention to these two tinctures, and in none of the samples have I used mucilage of acacia or tragacanth, as I presume most of us are familiar with the kind of emulsions those two substances form with bodies requiring to be thus treated.

The tinct. quillaiæ was made of the usual strength, viz., 4 ounces of the bark to 1 pint of rectified spirit. The tinct. senegæ was made strictly according to the B.P.

I have taken types of each of the following classes, viz., fixed oils, volatile oils, oleo-resins and resinous tinctures.

As an example of the first class I have taken ol. ricini; here is a mixture containing ½ oz. ol. ricini, emulsified with 20 minims tr. quillaiæ. The next sample contains the same quantity of ol. ricini, emulsified with 5 minims tinct. senegæ. Neither of these could be classed under the head of good emulsions, though the one containing tinct. quillaiæ is decidedly the better of the two. In this third sample is the same quantity of ol. ricini (viz., ℥ss), emulsified with ½ drachm of a solution of soap, made by dissolving 1 part sapo moll., P.L., in 2 parts glycerine and 6 parts water, the whole amount therefore containing rather more than 3 grs. of soap; this presents a very good appearance.

But as in each of these emulsifying agents we have bodies possessing in large quantities active medicinal properties, objection is sometimes made to them on that account, and thus another body must be sought, and one which is, comparatively speaking, inert in all proportions. Such a one is to be found in glyconin (*i.e.*, equal parts yolk of egg and glycerine). This sample has been emulsified by ʒiss glyconin, and is certainly to be preferred to any of the others for its consistency and miscibility, but yields to them in colour.

I have taken ol. tereb. as a type of the volatile oils. 20 minims of this require 20 minims tinct. quillaiæ, for its emulsification; it presents a tolerably good appearance. The same quantity of ol. tereb. may be emulsified with 5 minims tr. senegæ; both emulsions present a similar appearance. This oil may also be emulsified by the addition of a few grains of stearic acid, or ordinary commercial stearin; the emulsion will not, however, keep long without separating, but it is interesting, as showing how in the words of Schischkoff, "the emulsifying body performs its office when its smallest particles exert a sufficient attraction on any one constituent of the fat, even though absolutely indifferent to the remainder." As an example of the oleo-resins, I have taken bals. copaibæ, and I think you will agree with me that neither tinct. quillaiæ nor tinct. senegæ form an emulsion at all comparable with the older and commoner method, viz., with mucilage of acacia. Half a drachm of copaiba requires ½ a drachm of tinct. quillaiæ for its emulsification, and in the case of tinct. senegæ, though it has been stated that 5 minims is sufficient for ½ a drachm of copaiba, this was found not to be the case and was therefore doubled; and I would here just point out that in each case a better result was obtained if the body to be emulsified was added gradually to the emulsifying agent than *vice versâ*.

I now come to the last of the class of bodies I have experimented with, viz., resinous tinctures. Of these I have taken tinct. tolu and an alcoholic solution of Chian turpentine. In the case of the former, tinct. quillaiæ seems to answer very well; but not so with tinct. senegæ, for although so large a quantity as 20 minims of the latter was required for 20 minims tinct. tolu, yet this had not the effect of suspending the resin for any considerable time. With regard to the solution of Chian turpentine, neither tinct. quillaiæ nor tinct. senegæ answers well, the resin soon separating; hence while tinct. quillaiæ might be used for the emulsification of some resinous tinctures, on the other hand, tinct. senegæ seems quite inadmissible on account of its weak emulsifying properties.

Ext. filicis liq. may be made into a very good emulsion with either of these tinctures; yet the quantity of tinct. senegæ here required is rather large; but in such an active remedy that objection might be put on one side. I have now brought before your notice the chief merits of these two new emulsifying agents. Whether they will ever come into general use remains to be seen; but if not, it is interesting to know as much as possible of the capabilities of these two bodies, and the manner in which they act with different substances. So far as I have experimented with them, I fail to see that they possess any advantage over the old emulsifying agents.

The meeting then adjourned.

Dispensing Memoranda.

Replies.

[407]. I take it the letters s. q. should be transposed, the directions would read, translated, a sufficient quantity to make one pill.

W. R. Fowler.

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[408]. As I. H. could not refer to the writer of the prescription, the "phosphate of zinc" would be the best preparation to use; dose of which is from 1 to 2 grains.

"Phosphide of zinc" is administered in much smaller doses, *vide* 'Year-Book of Pharmacy' for 1877, page 272.

C. T. M.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Election of Council.

Sir,—I am sorry to find that a misapprehension has arisen as to my identity with the writer of the letter which appeared in the Journal of April 24, advocating the election of Mr. Shepperley as a member of Council. I beg to state that I am *not* the writer of that letter.

Thomas Preston Gostling,
Diss. *Member of Council.*

Sir,—The electors are invited to cast their votes for a candidate who is engaged in preparing students for the Society's examinations.

If the gentleman in question is blind to the impropriety of his request, I trust that my fellow-electors will not fail to detect the danger to their privileges involved.

Probably the most important act performed by the Council during its year of office is the selection of the Boards of Examiners.

The judicial fairness with which this has been done may have prevented our recognizing the fact, just as accurately adjusted machinery causes no friction or jarring noise. But it is by no means a matter of course that the Legislature should continue to permit the members of the Pharmaceutical Society to elect the whole of the Boards of Examiners for England and Scotland. It is a most honourable privilege, and if the proprietors of establishments for preparing candidates for examination had been members of the Council in 1868, it is safe to say that the privilege would not have been likely to be granted.

It is equally probable that it will be taken away when the Pharmacy Act is next amended if this breach of propriety is committed.

The candidate in question alludes specially to his "personal acquaintance" with pharmaceutical students. If any of the gentlemen alluded to have been intending to give him their votes for this reason, I would beg them to consider if some other mark of their friendship would not be more fitting. If the head of one pharmaceutical school exhibits anxiety for a seat upon the Council, it is doubtless supposed to carry advantages, and for the sake of these, or merely in self-defence, other teachers may make the same claim upon the friendship of their old pupils. It was a good maxim of the copy books—"Avoid the beginning of evil." Let us act upon that advice now.

Leeds. Richard Reynolds.

The following is the letter referred to as having been sent to the President by Mr. Butt, in explanation of his retirement as a candidate for a seat on the Council:—

"To the President and Council of the Pharmaceutical Society of Great Britain.

"Mr. President and Gentlemen,—At the time I accepted nomination as a candidate for election to the Council I hoped that, if elected, I might further certain objects which I believe to be desirable.

"It appears, however, probable that the representation at the Council table of the views I hold—in common I believe with the majority of the electors—would be imperilled by too great a division of votes at this election, and I have, therefore, determined with your permission to withdraw from the contest.

"I am anxious that my withdrawal should not be understood to imply that I do not still desire election to the Council, but I consider I can best serve the Society at the present moment by taking the step I now propose.

"13, *Curzon Street*, "Edward Northway Butt.
"*Mayfair, May* 3, 1880."

Sir,—Surely chemists are not blind to their future. The time for election of the new Council is near at hand. Let us unite and use our strength to send men who are worthy of such a position to represent us; men who will work and endeavour to suppress co-operative stores, which are becoming to many of us alarming. Support not those who are revengeful and daily damaging our trade by their $9\frac{1}{2}d.$ patent medicines and other ruinous charges on medicines dispensed, which at the present time does not allow barely an existence.

Hackney. W. M. Covell.

Sir,—The whole gist of the letters of a "Member" and "Pharmacist" is briefly stated thus: by the one "Mr. Shepperley has been the defendant in one of the most notorious and protracted counter practice cases, and is, therefore, not a suitable person to be a councillor," and by the other, "That the fact of Mr. Shepperley having been the victim of the Apothecaries' (?) persecution does not qualify him to represent us." With the first conclusion I entirely disagree, and as to the latter I suppose no one in his senses ever thought it did, but that his retirement from the contest by either is rendered necessary in consequence few, I think, will allow.

If I remember correctly, the Clerk to the Society of Apothecaries distinctly stated after the trial that had it been known that Mr. Jolly Death had been employed by the Nottingham Medical Defence Association to personate illness, with the view of getting a conviction against Mr. Shepperley, the Society's authority to prosecute would immediately have been refused. Now, in the face of an honourable statement as this, how can it be said that Mr. Shepperley's candidature will arouse the suspicion of this Society?

I repeat that because a man has unwillingly been mad the victim of local medical jealousy and persecution this ought not to be a sufficient reason for any member, however much he may love discretion, to ask Mr. Shepperley to reflect and retire from the contest.

I appeal to the sense of fairness of a "Member," who has doubtless in his time suggested something to a customer for the relief of a sore throat, in asking him, whether, had he unfortunately been placed in the same position, he would by such circumstance consider himself for ever afterwards ineligible to take any part in Pharmaceutical Government?

A "Member" has himself to thank for my having denounced his insinuations; if he did not intend his preamble about "conscience," "knowledge," "experience," "interests," "faithful performance," "onerous duties," etc., etc., to be read as parts of his attack, he should not have used such language. I am, however, extremely glad to see the *amende honorable* given in his last letter, more especially as he confesses to knowing nothing personally of Mr. Shepperley. In conclusion, in answer to "Pharmacist," who fails to see the reason why I should have taken up the cudgels in defence of Mr. Shepperley, I merely add, that I hope I have the courage of my opinions and having nominated, I defend him, and in writing a letter sign my name.

Geo. Jas. Gostling.

Alleged Presence of Arsenic in Glucose.

Sir,—In a paragraph in last week's Journal, headed "Poisonous Pigments," I find a statement of a foreign chemist, that glucose artificially prepared from amylaceous materials by means of sulphuric acid always contains arsenic derived from pyrites, etc.

During the last four years I have been engaged as analytical and consulting chemist to glucose manufacturers, and all chemicals, such as sulphuric acid, whiting, etc., were examined and arsenic has never been found to be present. There was a special agreement with the manufacturers of the acid that it should be made of sulphur only. In order to bleach the glucose I proposed the use of sulphuric acid gas, which was afterwards mostly removed by a special process, as its presence would have prohibited fermentation. Traces amounting to 0·015 per cent. could be recognized by the iodine test, starch being used as indicator.

As arsenious acid also discolours the iodine test, it may have been mistaken for sulphurous acid.

H. W. Langbeck.

Communications, Letters, etc., have been received from Messrs. Cox, Nichols, Haydon, Wood, Harrison, Horton, Tocher, Postans, Student, Apprentice, W. D., H. G.

CONTRIBUTION TO THE CHEMISTRY OF NIGELLA SATIVA.

BY HENRY G. GREENISH.

In the conclusion of a paper, published by Marquis, in the *Archiv für Experimentelle Pathologie*,* on the alkaloids of delphinium, attention is drawn by Professor Dragendorff to the suitability of the natural order Ranunculaceæ for the study of the relations existing between the chemical constituents of plants naturally closely allied to one another.

As a step towards extending our knowledge of the Ranunculaceæ, an analysis was made in 1878—79, by Dragendorff and Stahre, of the seeds of *Pæonia peregrina* (taken as a representative of Pæoniæ).†

The following examination of the seeds of *Nigella sativa* was undertaken with the object of ascertaining what relation, if any, the chemical constituents of the seeds bore to those of the other members of the subdivision Helleboræ on the one hand, and those of the Pæoniæ on the other.

The first examination of the seeds appears to have been that carried out in 1841, by Dr. Hugo Reinsch.‡ Among the substances found by this author, are, fatty oil (35·8 per cent.), ethereal oil (0·8 per cent.), two resins, bitter substance, nigellin, and a fluorescent body, together with albumen, gum, etc. The ill-defined characters of nigellin and the method of its preparation led to the conclusion that it could be no pure substance, and this opinion was confirmed by the examination of a sample in the museum of the Pharmaceutical Institute of this town. The latter, prepared exactly according to Reinsch's directions, formed a dark brown mass, of the consistence of a very soft extract, soluble in water, and did not, on the addition of an alkali (solution of potash), in any very perceptible degree show the fluorescence mentioned by Reinsch.

In 1871, Flückiger, in a communication published in this Journal,§ gives the history and botanical, pharmacognostic and microscopical characters of the seeds. As regards the constituents of the same, he confines his attention principally to the fixed and volatile oils. Of the former, he obtained 25·5 per cent., and is of opinion that in the solid fat deposited by standing myristic and palmitic acids are present. Of the volatile oil the yield was less than 0·8 per cent. It was levogyre, and possessed a strongly-marked blue fluorescence. The greater portion distilled at 256°, and its composition corresponded to the formula $C_{20}H_{34}O_2$ ($2\,C_{10}H_{16}+H_2O$).

The literature of the subject being so meagre, it was determined to make an independent analysis of the seeds. These were procured from a chemist in this town, and were obtained from plants cultivated in the neighbourhood of Moscow.

For the history, botanical, pharmacognostic and microscopical characters, I refer to the previously mentioned paper of Flückiger's. Be it permitted me here only to remark that the transverse section of the seed shows the volatile oil to be contained in cells in the outer seed coat, giving it a pitted appearance. The endosperm is loaded with oil globules, and after long keeping, groups of acicular crystals make their appearance, consisting probably of the crystalline solid fat contained in the fixed oil.

* *Archiv Exp. Path.*, B. 7, H. 1, p. 55. (1878.)
† *Archiv. d. Pharm.*, B. xi., H. 5. (1879.)
‡ *Jahrb. f. Pharm.*, iv., 384. (1841.)
§ *Pharm. Journ. and Trans.*, 3rd series, ii., 161. (1871.)

I. Extraction of Fixed and Volatile Oils.—To extract the fixed and volatile oils, 1100 grams of freshly crushed seeds were macerated two days with sufficient petroleum ether to cover them to a depth of half an inch, the solution thus obtained filtered off, the seeds washed with petroleum ether, strongly pressed, dried and weighed. The loss in weight by this extraction with petroleum ether amounted to 300 grams or 27·2 per cent.

This does not, however, represent the total amount of oil present, since absolute alcohol extracts a further quantity, as will be subsequently seen. Petroleum ether possesses no power of penetration, and the reduction of the seeds to a very fine powder is neither easy nor advisable. The petroleum ether filtrate and washings were mixed, the petroleum ether recovered by distillation on the water-bath, its complete removal, together with the ethereal oil, being effected in a porcelain dish on the water-bath. A quantity of dark yellowish-brown oil was thus obtained, which, on standing, slowly deposited a crystalline solid fat. This was reserved for subsequent examination.

To obtain the volatile oil, 2000 grams of freshly crushed seeds were submitted to distillation with water. The yield of ethereal oil was about 12·5 grams=0·62 per cent. It was a yellowish, mobile liquid, possessing in a high degree the peculiar odour of nigella seeds. After standing several months in the museum of the Pharmaceutical Institute, it was found to have deepened in colour. Like the petroleum ether solution from the seeds, it did not possess in any perceptible degree the beautiful blue fluorescence which Reinsch and Flückiger ascribed to it. If a drop of this oil be boiled with water, the filtered aqueous solution gradually assumes a reddish coloration; on the addition of a drop of caustic potash solution the colour deepens rapidly to an intense, very permanent, violet-red, fading only slowly on exposure to light and air.

II. Aqueous Infusion.—After maceration with petroleum ether, the seeds were treated with cold distilled water for twenty-four hours, at the ordinary temperature. The infusion was filtered off, the seeds, washed with water, and the extraction and washing repeated, the residue of the seeds being finally pressed and dried at 40° C. The first infusion only was examined.

This brown-coloured, somewhat cloudy liquid was tested for legumin or casein by the addition of a dilute acid to a small portion. No precipitate being obtained, the absence of legumin and casein was inferred. The whole quantity was evaporated by distillation in a partial vacuum to about one-sixth of its original volume. During this operation, the separation was observed of dark coloured flocks, which proved to be albuminous matter, impure from the presence of colouring (and fatty) matter carried down out of the aqueous solution.

(*a*). *Precipitation of Mucilage.* — The filtrate from this albuminous matter was mixed with three volumes of alcohol (85·5 per cent.) A precipitate was produced in the form of voluminous light-coloured flocks which was filtered off, washed with alcohol, dissolved in water with the addition of hydrochloric acid (without this addition it was not completely soluble), and subjected to dialysis during six days, the water being frequently changed. At the end of that time hydrochloric acid ceased to make its appearance in the dialysate and a grey-coloured substance was deposited in the liquid in the dialyser. The contents of the latter were diluted with a moderate quantity of water and again precipitated with alcohol. The precipitated gummy matter was collected on a filter, washed, drained and finally dried over sulphuric acid. It formed a greyish mass not very easily soluble in hot water, the solution so prepared being slightly acid in reaction. It gave a cloudiness with solutions of acetate and of subacetate of lead, and traces with lime water. It burnt easily, leaving a small quantity of a white light ash.

(*b*). *Treatment of Residue with Absolute Alcohol.*—The filtrate, after precipitation of the mucilaginous matter by alcohol, was freed from the latter by distillation in a partial vacuum, the residue evaporated in a porcelain dish on the water-bath to a small bulk, and mixed with several volumes of absolute alcohol which caused the separation of a brownish, glutinous mass (β). The supernatant clear liquid was poured off, the residue washed with alcohol, the wash alcohol, being added to the clear alcoholic liquid, from which the alcohol was recovered by distillation. The aqueous residue so obtained yielded, on dilution with water, a brownish flocculent precipitate, which was collected on a filter, washed with water, and dried over sulphuric acid. It was found to be insoluble in water, soluble in alcohol, easily soluble in alkalies, being reprecipitated from the alkaline solution by the addition of an acid. These characters tend to refer the substance in question to the class of phlobaphens, it probably being a decomposition product of tannic matter. The aqueous filtrate from this phlobaphene (?) possessed an acid reaction, and was shaken successively with petroleum ether, benzin, chloroform and ether.

(i). The petroleum ether solution left on evaporation a scarcely visible residue.

(ii). Benzin removed from the aqueous liquid a yellowish-brown substance. The shaking was repeated several times till only small quantities of the substance were removed, and the united benzin solutions evaporated to dryness.

(iii and iv). Chloroform and ether removed further quantities of the same yellowish-brown substance.

The liquid was then rendered alkaline with solution of soda, and subjected to a repetition of the above treatment but without result.

By the treatment with the above liquids it is seen that the only substance removed is the yellowish-brown body dissolved out of the acid solution by benzin, chloroform and ether. The residues from all three solvents were united, and formed a clear, dark brown amorphous mass, from which crystals could not be obtained. It was easily soluble in alcohol, sparingly so in water, or in acidulated water; with readiness, however, in alkaline solutions. The aqueous solution reddened blue litmus paper. On boiling with dilute hydrochloric acid it evolved a somewhat penetrating odour, resembling the ericinol produced by the decomposition of glucoside ericolin of *Ledum palustre*. From this ericolin it may be distinguished by the fact that it cannot be regarded as a glucoside. The presence of sugar before or after boiling with dilute acids could not be recognized. The very small quantity of this substance at my disposal precluded the possibility of a closer investigation of its properties and relations.

The clear liquid after shaking with ether was reed from the latter by warming on the water-bath. It was then acidified with dilute sulphuric acid, and was found to give a precipitate with potassiomercuric iodide, and with the majority of the group reagents for alkaloids.

The substance giving these reactions was subsequently isolated from a fresh portion of seeds, the quantity present in this solution being too slight to admit of its separation.

(*c*). *Examination for Sugar.*—The glutinous mass (β), produced by the addition of absolute alcohol to the concentrated aqueous infusion, dissolved in water to a clear deep yellowish-brown solution, which reduced Fehling's solution, although to no very great extent. It was mixed with excess of solution of basic acetate of lead, the voluminous yellowish-grey precipitate filtered off, washed (by suspension in water), filtrate and washings freed from lead by sulphuretted hydrogen, filtrate and washings from the sulphide of lead evaporated to a small bulk on the water-bath, and finally dried over sulphuric acid. It formed a clear amorphous yellowish-brown mass, and deposited, after long standing, a small quantity of crystals. It reduced Fehling's solution as before, but only to a small extent. The examination of this substance was not carried further. It probably contained sugar, although the majority consisted of a substance not capable of reducing alkaline copper solution.

(*d*). *Examination for Acids.*—The lead precipitate which contained the lead salts of the acid present in the seeds, was suspended in water, and decomposed by a current of sulphuretted hydrogen, the sulphide of lead removed by filtration, and the aqueous solution of the acids evaporated on the water-bath to a small bulk, and dried over sulphuric acid. It formed a clear yellowish-brown amorphous mass, soluble in water, with strongly acid reaction. It was treated with absolute alcohol, which left a portion undissolved. The alcoholic solution, after removal of the alcohol and dilution with water, was treated with animal charcoal, by which means part of the colouring matter was removed. The acid liquid contained a relatively large quantity of phosphoric acid, traces of hydrochloric and sulphuric acid.

The substance which alcohol failed to dissolve was easily soluble in water, with a strong acid reaction, and such a solution gave precipitates with potassiomercuric and potassio-bismuthic iodides, with iodine and iodide of potassium, picric and tannic acids, and is the same substance as obtained in the attempt to isolate the alkaloid, the presence of which was anticipated from the above reaction. This, body, however, seems to belong to the class of albumens. With Millon's reagent, with sulphate of copper and solution of potash, it yields the appropriate reactions, and resembles the albumens in containing abundance of nitrogen; but differs somewhat from that class of substances in its strongly acid properties, it forming a compound with barium, which carbonic acid gas fails to decompose.

III. Extraction with Alcohol.—The residue of the seeds after extraction with water was treated with sufficient absolute alcohol to cover them to a depth of half an inch, and allowed to stand several days at a temperature of about 35° C. The tincture was then filtered off, the residue of the seeds strongly pressed, and the alcohol recovered from the tincture by distillation. The residue of the seeds was then subjected to a repetition of this treatment, the concentrated alcoholic tinctures so obtained being mixed and evaporated in the water-bath till all spirit was removed. Separation was then found to have taken place into an upper oily and a lower semi-solid tenacious resinous mass. The oily liquid, which proved to be fluid oil which had escaped extraction with petroleum ether, was poured off, the residue washed with petroleum ether, and dissolved in 50 c.c. warm absolute alcohol. This alcoholic solution on cooling deposited a very small quantity of a white substance, which collected, washed and dried, formed a white amorphous resin, burning with a luminous flame, and leaving no ash. The quantity (about a centigram) was so minute that further examination of this substance could not be made.

The alcoholic solution of the resin was subjected to a fractional precipitation with water. On reaching a dilution corresponding to an alcohol of 71 per cent., a quantity of a dark greenish coloured substance separated out, which was collected, washed with 70 per cent. alcohol, and partially dried by exposure to the air. It was then treated with petroleum ether and ether, the former of which solvents was coloured bright dark green, and removed a green fluid oil (oil with traces of chlorophyll). The ethereal solution left on evaporation a slight quantity of a whitish resinous (?) substance, not identical with the resin, insoluble in 40 per cent. alcohol. A small whitish residue was left undissolved, which proved to be identical with the following resinous substance.

The filtrate, on dilution to a strength corresponding to 40 per cent. alcohol, yielded a tolerably copious light coloured precipitate, which was collected, thoroughly washed, and dried by exposure to the air. The filtrate was evaporated to dryness on the water-bath, and proved to be almost entirely soluble in boiling water, and to contain traces of the resin insoluble in 40 per cent. alcohol. It was not further examined.

The precipitate insoluble in 40 per cent. alcohol was found to contain traces of the fluid oil, from which it was completely freed by treatment with ether. After this purification it formed a whitish amorphous powder, the dust from which caused an unpleasant prickling in the back of the throat, and a sensation of dryness in the nostrils, with a tendency to sneeze, which latter, however, was not very marked. No particular taste could be observed; but the alcoholic solution possessed a slight bitterness, which was quickly followed by a prickling and sensation of dryness in the throat.

In water, benzin, ether, petroleum ether and bisulphide of carbon it is almost insoluble; in chloroform slightly soluble; in alcohol, especially when warm, with ease, the solution being neutral to test-paper. If ether be added to the alcoholic solution no precipitation takes place, and if to the mixture water be added till the ether separates, the substance will be found to have been partially taken up by the ether which now is contaminated with alcohol. The residue left by the ethereal solution on evaporation is identical with the original substance and of the same greyish-white colour. The attempt was made by treating the dilute alcoholic solution with freshly ignited animal charcoal to decolorize it, but the resulting resin still possessed the same greyish tint.

By the slow evaporation of the alcoholic solution the substance was deposited in tufts of long thin greyish coloured microscopic prisms. Aqueous solutions of the alkalies dissolved it, but the addition of an acid to these solutions caused its separation.

A few drops of a weak alcoholic solution imparted to a relatively large quantity (several ounces) of water the property of frothing like soap solution, the froth remaining permanent for hours.

By destructive distillation no umbelliferone could be detected.

A dilute alcoholic solution gave with solutions of reagents in alcohol of about 50 per cent. the following reactions:—

Ferric chloride, a clear yellowish-green solution.

Acetate of lead, a cloudiness.

Basic acetate of lead a whitish precipitate, almost completely soluble in excess.

Mercuric chloride, opalescence.

Barium chloride, clear solution.

The hot aqueous solution failed to reduce alkaline copper solution even after several minutes' boiling.

With pure concentrated sulphuric acid it assumed a reddish then yellowish colour, the whole becoming in fifteen to twenty minutes beautiful rose-red, in the course of as many hours violet-red.

Commercial concentrated sulphuric acid (containing traces of nitric acid) produced a yellowish colour, the whole on warming speedily assuming a dark violet-red tint. Solution of stannous chloride caused almost complete decolorization of the solution with separation of violet coloured flocks. Pure sulphuric acid and sugar resulted in the slow production of a fine violet-blue colour disappearing in the course of a couple of days.

Sulphuric and nitric acids produced an orange-red, turning to yellow.

Boiled with concentrated acid it swelled, without going into solution. No separation of a crystalline substance could be observed.

On heating with a mixture of equal volumes pure sulphuric acid and water, the substance was carbonized.

On heating on platinum foil it first melted, and then burnt with a luminous flame, leaving but a trifling amount of ash. In a quantitative determination 0·2530 gram left 0·0005 gram ash, equivalent to 0·19 per cent.

The melting point was found to be about 205° C.

Dried over sulphuric acid the substance suffered but a very trifling further loss in weight at 110° C.

On burning with oxide of copper in a stream of oxygen, the following results were obtained:—

0·2232 dry substance yielded CO 0·5085, H_2O, 0·1805
0·1818 „ „ „ „ 0·4163, H_2O, 0·1495

equivalent to (calculated on substance free from ash)

	I.	II.	Mean.
C=	62·27	62·58	62·43
H=	9·00	9·15	9·07

This corresponds closely to the formula $C_{20}H_{33}O_7$ which requires—

C = 62·33
H = 8·57

On boiling with dilute hydrochloric acid the substance is decomposed into sugar and a greyish-white substance difficultly soluble in water. This decomposition-product was found to consist principally of microscopic acicular crystals.

Two hours' boiling with dilute hydrochloric acid (1 per cent.) was found sufficient to produce entire decomposition. Accordingly 0·913 gram of the dry substance was so treated with 50 c.c. 1 per cent. solution of hydrochloric acid in a flask provided with a long glass tube to admit of the condensation and return to the flask of the steam evolved so as to avoid concentration of the acid. After cooling the precipitate was filtered off, and washed with water till the washings and filtrate amounted to 100 c.c. As a mean of several estimations 12·05 c.c. of this solution were found necessary to reduce 10 c.c. Fehling's solution. This corresponds to a yield of sugar $=0·4149=45·4$ per cent.

The decomposition-product was dried and weighed. It weighed $0·5045=54·9$ per cent.

In a second experiment, in which 0·929 gram of the dry substance was boiled with alcohol containing 1 per cent. hydrochloric acid, the decomposition product, precipitated by the addition of water, after washing and drying, weighed 0·5323 or 56·3 per cent.

This substance yielded on burning with oxide of copper the following results:—

0·2670 dry substance yielded CO_2 0·739 gram; H_2O, 0·2492.

0·2152 dry substance yielded CO_2 0·5808 gram; H_2O, 0·2030.

equivalent to—

	I.	II.
	C=75·48	73·50
	H=10·31	10·47

In the second of these estimations a minute quantity of carbon escaped combustion, being deposited as such in the chloride of calcium tube, which, therefore rendered the percentage of hydrogen found somewhat too high, the carbon on the other hand decidedly too low. I have accordingly taken the first combustion only into consideration. This corresponds to the formula $C_{14}H_{23}O_2$, which requires—

Calculated.	Found.
C=75·33	75·48
H=10·31	10·38

Supported by these figures I have constructed the following equation for the decomposition which ensues when the substance in question is boiled with dilute hydrochloric acid:—

$$C_{20}H_{33}O_7+H_2O=C_{14}H_{23}O_2+C_6H_{12}O_6$$

According to this equation, 100 parts of the substance should yield 57·7 parts decomposition product and 46·6 parts sugar. I have found instead of 57·7, 54·9 and 56·3, and instead of 46·6, 45·4. These figures show a tolerably satisfactory agreement.

The decomposition product gave colour reactions similar to those of the mother-substance, but the tints were not so striking. It possessed also the peculiarity of imparting to water the property of frothing, and I do not think myself unjustified in assuming the same complex of atoms to occur in both substances.

The name I have adopted for this substance, which appears to be peculiar to nigella seeds, is that proposed by Professor Dragendorff, viz. melanthin; for the decomposition product melanthigenin. The word is derived from the Greek μέλας black, in reference to the colour of seeds which have themselves borne the name of melanthium (Guibourt).

The question now presents itself: With what substances already isolated and examined does melanthin show a similarity, and what are the chief points of distinction?

The property melanthin possesses of frothing in aqueous solution indicates a relationship with saponin and digitonin. From saponin it may be distinguished by its being very difficultly soluble in water, easily soluble in strong alcohol, and by its containing a larger percentage of carbon (saponin contains 54·26 per cent., melanthin 62·43 per cent.*). The digitonin of foxglove-leaves resembles saponin in its solubility in water, difficult solubility in strong alcohol and in the percentage of carbon it contains, and in addition to these characteristics the aqueous solution when heated with dilute acid assumes a red colour.

A greater similarity to melanthin is borne by the parillin of sarsaparilla, which Flückiger† has fully investigated and described. That body he succeeded in obtaining in pure white crystals, the composition of which on analysis proved to be—

C=60·4
H= 9·0

or very nearly identical with melanthin.

Heated during a whole day on the water-bath with dilute sulphuric acid, parillin was completely decomposed into parigenin and sugar.

Parigenin possessed the composition—

C=75·5
H=10·9

or very closely approaching that of melanthigenin.

As is seen, parillin and parigenin show somewhat close agreement with melanthin and melanthigenin. Among others, the following differences serve to distinguish them:—

(i). Melanthin is much more difficultly soluble in water.

(ii). The property of frothing, as also the reaction with sulphuric acid, is possessed by melanthigenin, but not by parigenin.

(iii). The decomposition of melanthin on boiling with dilute acid is rapid and complete.

(iv). On boiling with concentrated hydrochloric acid melanthin yields no scaly crystals.

The glucosides of hellebore, helleborein and helleborin, seem to be somewhat farther removed from melanthin, but still closely related to it.

Helleborein is distinguished from melanthin by its solubility in water, by the rapid appearance of a red coloration when dissolved in concentrated sulphuric acid, by its containing less carbon (52·3 per cent.), and by its marked property of exciting violent sneezing. Its decomposition product, helleboretin, dissolves in spirit with red colour, and assumes with concentrated sulphuric acid a brown-red tint.

Helleborin resembles melanthin in its slight solubility in water and ether, but may be distinguished by its solubility in chloroform and by the slowness and difficulty with which it is decomposed under the influence of dilute acid. It contains more carbon than melanthin. Its decomposition product, helleboresin, contains likewise more carbon than melanthigenin.

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* With regard to the composition of saponin, it seems that the work accomplished in this direction by Herr Christophsohn ('Vergleichende Untersuchungen über das Saponin,' Dissert, Dorpat 1874) has been overlooked by Mr. Collier ("Saponin from the bark of *Quillaia saponaria*," *Pharmaceutical Journal*, [3], No. 482, p. 234). The former investigator obtained from the bark *Quillaia saponaria*, a saponin which, purified by repeated boiling with 95 per cent. alcohol, contained 2·61 per cent. ash. From Levant soapwort a saponin with only 0.87 per cent. ash. The composition of these saponins agreed closely with one another and with that of the saponines from *Rad. saponariæ rub.* and *Sem. A. grostemma githag.* The mean of eleven analyses was C=54·269 per cent., H=8·283 per cent., O=37·447 and differs widely from Mr. Collier's analysis, viz., C=44·53, H=9·09, O=46·38.

† *Archiv. d. Pharm.*, 3te R., x., 532.

Of the two glucosides, convallarin and convallamarin, contained in the lily of the valley (*Convallaria majalis*), the latter approaches saponin more closely than melanthin; it is easily soluble in water and contains about 53 per cent. carbon. Convallarin, on the other hand, is almost insoluble in water, easily in spirit, but may be distinguished from melanthin by the difficulty incurred in its decomposition with a dilute acid, by its giving a brown colour with sulphuric acid, and by its spirituous solution being precipitated on the addition of ether (melanthin being soluble in ether-alcohol). Its decomposition product, convallaretin, is easily soluble in ether and dissolves in concentrated sulphuric acid, turning slightly brown. Melanthigenin is difficultly soluble in ether and yields with concentrated sulphuric acid a red colour.

The arthanitin of Saladin (cyclamin) from *Cyclamen europæum*, also found in the roots of *Primula veris* (whence sometimes called primulin), is, like saponin, easily soluble in water, and contains only 55 per cent. carbon.

The yield of melanthin from Russian seeds was about 1 per cent. From German seeds which I subsequently worked up for this substance I obtained less than 0·1 per cent., and that impure.

The residue from the evaporation of the filtrate from melanthin formed a greenish mass, which still contained a small quantity of that principle associated with substances almost completely soluble in water (which had escaped extraction with that menstruum). It was not further examined.

(*To be continued.*)

NOTES ON CHIAN TURPENTINE.

BY R. MODLEN.

A recent paper in the *Lancet* (March 27th) having strongly recommended the use of Chian turpentine in cases of uterine cancer, I am induced to offer a few notes on the history of the drug. There is nothing original in them; they are merely extracts from works not generally accessible, but may prove of some interest.

Terebinthina chia (French, térébinthine de chio; Italian, trementina di cipro; German, cyprischen terpentin) is a liquid resinous exudation from *Pistacia Terebinthus*, nat. order, Terebinthaceæ, Juss., a handsome tree growing in most parts of the south of Europe, but especially in the Greek Archipelago. As *P. cabulica* it extends also to Beluchistan and Afghanistan, and as *P. Atlantica* it is found in North Africa. These different species are, however, considered by Hanbury and Flückiger as being merely slight variations of *P. Terebinthus*. In Languedoc and Provence it is a straggling bush, but in Palestine it is a handsome umbrageous tree.

Its Hebrew name is alah, variously rendered as oak, terebinth, tiel (linden), elm and even plane. The primary import of the word alah is strength, power, whence some hold that it signifies any mighty tree, especially the oak and terebinth. But as the oak has its proper name, allon, and is *not* a mighty tree in Palestine, one can have little hesitation in restricting the term alah to the terebinth. Dr. Robinson gives the best account of the tree as it is now found in Palestine. At the point where the roads from Gaza to Jerusalem and from Hebron to Ramleh cross each other, and about midway between the two last named towns, this traveller observed an immense terebinth tree, the largest he saw anywhere in Palestine. "This species is without doubt, the terebinth of the old Testament, and under the shade of such a tree Abraham may well have pitched his tent at Mamre. The terebinth (Arabic *but'm*) is not an evergreen, as is often represented; but its small feathered lancet-shaped leaves fall in the autumn. The flowers are small, and followed by small oval berries, hanging in clusters from 2 to 5 inches in length, resembling much the clusters of the vine when the grapes are just set. From incisions in the trunk there is said to flow a sort of transparent balsam, constituting a very fine and pure species of turpentine, with an agreeable odour, like citron or jessamine, and a mild taste, and hardening gradually into a transparent gum. In Palestine nothing seems to be now known of this product of the but'm."

In Palestine and the neighbouring countries the terebinth seems to be regarded with the same distinction as the oak is in our northern latitudes, and is very long lived. It attains the height of 30 to 35 feet.

The resinous juice is secreted in the bark, in special cells, precisely as mastic is formed in *P. Lentiscus*. To some extent it exudes spontaneously, but in greater abundance after incisions are made in the stem and branches. A large tree will yield from 6 to 11 ounces in a year. The harvest is from the end of July to October. In 1701, Tournefort visited Scio, when that island was said to produce scarcely 300 okes (oke = 2·82 lb. avoir.). A century later, Olivier stated that 200 okes was about the average yield. The trade is almost entirely in the hands of the Jews, who usually dispose of the gum in the Turkish Empire. In Greece it is sometimes used to flavour cordials, or mixed with wine in the same manner as mastic.

The gum as usually found in commerce, is a soft solid, becoming brittle by exposure to air. It is of a yellowish-green colour, and is composed of a resin and a volatile oil. All accounts agree in stating that it is extremely scarce in western commerce, coniferous turpentine being usually substituted for it. Dr. Pereira says it has an odour somewhat resembling fennel. By keeping, it acquires a somewhat less agreeable odour. It is soluble in rectified spirit, amylic alcohol, glacial acetic acid, benzol or acetone, and pure ether, B.P., the solution in each case being slightly fluorescent. An alcoholic solution reddens litmus and is neither bitter nor acrid.

Chian turpentine was well known to the ancients. It was the Τέρμινθος of Theophrastus.

Dioscorides, of Anazarba, in Cilicia, who wrote his great work on materia medica, A.D. 77 or 78, describes it as a finer sort of mastich. He says:—"There is also a resin in the lentisk (*Pistacia Lentiscus*), called lentiscine, by many, mastich. It is added to dentifrices, and to face liniments. The best resin and largest quantity comes from the island of Chio. The best is shining, like Tyrrhene wax in colour, large, easily crumbled, and fragrant. There is a green sort, but not so useful." Even in the time of Dioscorides there seems to have been need of an Adulteration Act, for he says, "It is mixed with frankincense and fir turpentines." (*δολοῦται δὲ λιβάνου κάι ῥητίνης υτροβιλίνης μιγνυμένων αἰτῃ.*)

In chapter 91 of book 1, he says, speaking of another substance which Sir R. Christison says is that known at present as Chian turpentine, "that the kernels of the fruit are edible, but disagreeable to the stomach. It acts as a diuretic, and is used in wine for diseases of the finger joints. The resin is imported from Arabia Petræa; it also grows in Judæa, Syria, Cyprus, Libya, and the Cyclades. This resin is by far the finest of any; then comes mastic, then pine and larch resins (turpentines). After these may be reckoned fir resins. It is very fit to give in cough and wasting away. It is given either given by itself or mixed with honey." He also gives a list of other diseases in which it was given at that time.

After being almost unknown in England, except as a botanical curiosity, the attention of the medical professsion has been drawn to the substance by Professor Clay, of the Queen's Hospital, Birmingham, as a cure for uterine cancer For most interesting particulars concerning the more purely medical part, I beg to refer to the *Lancet* of March 27.

The notes have been taken from Sir R. Christison's 'Dispensatory,' Edinburgh, 1842; Dr. Pereira's 'Materia Medica,' London, 1857; Dr. Kitto's 'Biblical Cyclopædia' (the botanical articles in which were written by Dr. Royle), London, 1856; C. G. Kühn's edition of Dioscorides, Leipsic, 1827; and Hanbury and Flückiger's 'Pharmacographia,' London, 1879.

THE DIGESTIVE FERMENTS, AND THE PREPARATION AND USE OF ARTIFICIALLY DIGESTED FOOD.*

BY WILLIAM ROBERTS, M.D., F.R.C.P., F.R.S.

Lecture I.

(*Concluded from page 894.*)

Diastatic Ferments: Digestion of Starch.

The importance of starch as an article of human food has, perhaps, scarcely been duly recognized. If we regard the enormous proportion in which the seeds of cereals and leguminous plants, and the tuber of the potato, enter into our dietary, and the immense percentage of starch in these articles, it is probably not too much to say that fully two-thirds of the food of mankind consists of starch. In the raw state, starch is to man an almost indigestible substance; but, when previously subjected to the operation of cooking, it is digested with great facility.

Diastase has only a feeble action on the unbroken starch-granule, even at the temperature of the body. In the lower animals, and in germinating seeds, the starch-granule is probably attacked in the first instance by some other solvent, which penetrates its outer membrane, and thus enables the diastase to reach and act on the starchy matter contained within. By the aid of heat and moisture in the process of cooking, the starch-granule is much more effectively broken up. Its contents swell out enormously by imbibition of water, and the whole is converted, more or less completely, into a paste or jelly or mucilaginous gruel. It is in this gelatinous form exclusively, or almost exclusively, that starch is presented for digestion to man. The digestion of starch is accomplished by the saliva and pancreatic juice, both of which are rich in diastase. Diastase also exists abundantly in the liver, and in smaller quantities in the intestinal juice, in the blood, the urine, and apparently in all the interstitial juices. Diastase from all these diverse sources appears to act substantially in the same manner as starch, changing it by a progressive hydrolysis into sugar and dextrine.

If the action of a fluid containing diastase—say saliva or extract of pancreas—on starch paste be watched, the first effect observed is the liquefaction of the paste and the production of a diffluent solution. This change is effected with great celerity; in two or three minutes, the stiff paste becomes a watery liquid. This is evidently a distinct act, and antecedent to the saccharifying process which follows. By operating with small proportions of diastase and large proportions of pure starch paste, it is possible to hit on a moment when liquefaction is complete and saccharification is not yet begun. At this moment, the solution yields a pure starch reaction, and no reaction of dextrine nor of sugar. The process of saccharification follows immediately on the heels of liquefaction; and, in ordinary manipulations, the one process runs into the other.

The speed of the action depends primarily on the proportion of the diastase. By adjusting the proportions of diastase and starch in such degrees that saccharification will be completed in about a couple of hours, the successive steps of the process can be leisurely followed by applying from time to time the appropriate tests.

If you test as soon as liquefaction is complete, you get a pure blue with iodine and a slight reaction of sugar with Fehling's solution. In a few minutes, the sugar reaction becomes more decided; and, although you still get a pure blue with iodine in the ordinary way of testing, you will get, by greatly diluting the blue solution and then adding more iodine, a deep violet tint—showing the presence of erythro-dextrine mixed with starch. The next step is the total disappearance of the blue reaction with iodine, and the substitution for it of an intense reddish-brown coloration of erythro-dextrine. By-and-by, the reddish-brown colour is replaced by a yellowish-brown, indicating the preponderating presence of a different kind of erythro-dextrine. Meanwhile, the sugar reaction goes on increasing. The next step is the entire disappearance of any kind of coloration with iodine. But the action is still very far from complete; the proportion of sugar goes on increasing for a considerable time after iodine has ceased to tint the solution. At length, however, matters come to a standstill, and the proportion of sugar ceases to increase.

The explanation of this series of reactions is impossible on the old view of the constitution of starch. Until recently, it was supposed that the starch-molecule was represented by the comparatively simple formula $C_{12}H_{20}O_{10}$; and that, under the influence of diastase, this molecule was resolved by hydration into two molecules—one of dextrine and one of grape sugar.

The researches of Musculus and O'Sullivan* have shown that this is not a correct account of the transformation. In the first place, it was found that the sugar produced was not grape sugar (dextrose), but another kind of sugar called maltose. It was also found that the dextrines first produced, and which were coloured red or brown by iodine, were progessively changed, with simultaneous production of sugar, into a series of dextrines of a lower type, which did not yield any coloration with iodine. To these latter kinds of dextrine the term achroo-dextrines has been applied.

As maltose is now ascertained to be the kind of sugar which is mainly produced in the digestion of starch by diastase, this body assumes a new and considerable importance in physiological chemistry; and it will not be out of place here to give some description of its properties. Maltose is a fermentescible crystalline sugar of the saccharose (cane sugar) class, having very little sweetening power, and possessing one atom less water than grape sugar. Its formula is $C_{12}H_{22}O_{11}$. It possesses more rotatory power on polarized light than grape sugar, but considerably less power of reducing cupric oxide. The rotatory power of maltose is +150, that of grape sugar +58. The reducing power of maltose is 61, compared to that of grape sugar as 100. Maltose can be hydro-

* The Lumleian Lectures, delivered before the Royal College of Physicians.

* O'Sullivan's papers are published in the *Journal of the Chemical Society* from 1872 to 1876. A full account of these researches is given in a paper in the same journal for September 1879, by T. H. Brown and J. Heron.

lysed into grape sugar by prolonged boiling with dilute acids. Malt diastase does not possess this power; but we shall presently see that the diastatic ferments of the small intestine are able slowly to effect the same change.

The researches of Musculus and O'Sullivan have rendered it necessary to assume that the molecule of soluble or liquefied starch is a composite molecule, containing several members of the group $C_{12}H_{20}O_{10}$, which is to be regarded as the constituent radical of the composite starch-molecule. The starch molecule must in the future be represented by the formula $n\ (C_{12}H_{20}O_{10})$—the value of n not being yet definitely agreed upon.

Two able chemists of Burton-on-Trent, H. T. Brown and J. Heron, have extended these researches, and fully confirmed the main conclusions of Musculus and O'Sullivan. In a recent publication (*Journal of the Chemical Society*, September 1879), they have for the first time presented a fairly complete scheme of the succession of changes undergone by starch under the action of diastase. These chemists assume that the molecule of soluble starch consists of ten members of the group $C_{12}H_{20}O_{10}$, and that its formula should be written $10(C_{12}H_{20}O_{10})$. This view greatly facilitates the comprehension of the progressive hydrolysis of starch by diastase.

We have seen that starch in the condition of paste or jelly is distinguished sharply by its physical properties from liquefied or soluble starch. There must, therefore, in all probability, be some difference of molecular aggregation between starch in these two states; and it will not be a very bold assumption to suppose that starch in the gelatinous state consists of still more complex molecules than soluble starch, and that several molecules of soluble starch are grouped together to form the molecule of starch in the gelatinous state.

On the ground of these assumptions, we may represent the successive steps of the digestion of gelatinous starch by the following series of equations.

The molecule of gelatinous starch $= n(C_{12}H_{20}O_{10})$ is first resolved into n molecules of soluble starch. The molecule of soluble starch is then resolved by progressive deduplication and hydration into dextrine and maltose by the following succession of steps.

One molecule of soluble starch $= 10(C_{12}H_{20}O_{10}) + 8(H_2O) =$

1. Erythro-dextrine α $9(C_{12}H_{20}O_{10}) + (C_{12}H_{22}O_{11})$ maltose.
2. Erythro-dextrine β $8(C_{12}H_{20}O_{10}) + 2(C_{12}H_{22}O_{11})$ „
3. Achroo-dextrine α $7(C_{12}H_{20}O_{10}) + 3(C_{12}H_{22}O_{11})$ „
4. Achroo-dextrine β $6(C_{12}H_{20}O_{10}) + 4(C_{12}H_{22}O_{11})$ „
5. Achroo-dextrine γ $5(C_{12}H_{20}O_{10}) + 5(C_{12}H_{22}O_{11})$ „
6. Achroo-dextrine δ $4(C_{12}H_{20}O_{10}) + 6(C_{12}H_{22}O_{11})$ „
7. Achroo-dextrine ϵ $3(C_{12}H_{20}O_{10}) + 7(C_{12}H_{22}O_{11})$ „
8. Achroo-dextrine θ $2(C_{12}H_{20}O_{10}) + 8(C_{12}H_{22}O_{11})$ „

The final result of the transformation is represented by the equation

$$\underset{\text{Soluble Starch}}{10(C_{12}H_{20}O_{10})} + \underset{\text{Water}}{8H_2O} = \underset{\text{Maltose}}{8(C_{12}H_{22}O_{11})} + \underset{\text{Achroo-dextrine}}{2(C_{12}H_{22}O_{10})}$$

We must conceive that the energy of the ferment is exercised in gradually pulling asunder the component groups or radicals of the unstable molecule of soluble starch, detaching one after another from the parent molecule; each radical, as soon as detached, assuming an atom of water and becoming an atom of maltose. At each detachment, the parent molecule draws its remaining groups together to form a new kind of dextrine. As the process goes on, the dextrine molecule becomes smaller and smaller—that is, contains fewer and fewer component radicals; the higher dextrines giving a red or brown coloration with iodine, but the lower dextrines giving no reaction with iodine. It is to be noted that, after the transformation has reached its final term, there still remains a portion of achroo-dextrine unconverted into maltose. Upon this remnant, diastase has only a very slow action. The percentage result, when the reaction is completed, gives, in round numbers, eighty parts of maltose and twenty parts of achroo-dextrine. The eight varieties of dextrine indicated in the above table of equations have not all been obtained in the separate state; but there is strong evidence of the existence of at least several of them as distinct bodies.

The account just given of the transformation of starch has been deduced from a study of the action of diastase derived from malt. The question arises—physiologically an important question—whether the action of salivary and pancreatic diastase is identical with that of malt diastase. The researches of Musculus and von Mering* give an affirmative answer to this question. These observers found that saliva and pancreatic extract act on starch paste in the same way as malt diastase; the final products in all cases being achroo-dextrine and maltose, and not dextrose (grape sugar). At my suggestion, Mr. H. T. Brown was good enough to submit the question to a fresh examination in regard to pancreatic extact. His results fully confirm the conclusions of Musculus and von Meering. He found, however, that there was a slight difference in the results when the action of pancreatic extract and malt diastase on starch was continued a long time. The pancreatic ferment, in addition to the power, which it shares with malt diastase, of slowly converting the lowest achroo-dextrine into maltose, exhibited a power of slowly changing maltose into dextrose (grape sugar) which is not possessed in any degree by malt diastase. Mr. Brown also informs me that there is in the small intestine a ferment which possesses similar properties.

The respective Shares of Saliva and Pancreatic Juice in the Digestion of Starch.—The respective shares of saliva and of pancreatic juice in the digestion of our farinaceous food are probably variable, and perhaps not quite identical.

As all our farinaceous food is eaten after being cooked, the starch in it is more or less completely gelatinized; it is, therefore, probable that one of the chief uses of salivary diastase in man is to liquefy starch jelly. A very brief contact suffices for this; and it is manifest that the accomplishment of this change is an important advantage in the subsequent operations in the stomach. Our gruels, blancmanges, puddings, and similar farinaceous dishes, owe their thick pasty condition to starch in the gelatinous state; and nothing can be imagined more resistent to the rapid permeation of the meal by the gastric juice, and to the pulping of it into a uniform chyme, than the presence of coherent masses of starch-paste. If the saliva performed no other service than this, it would furnish an important aid to the digestion of a meal. There has been considerable dispute as to whether, and how far, the saccharification of starch goes on in the stomach. My observations lead to the conclusion that this depends on the degree of acidity of the contents of the stomach; and it is known that this varies within very wide limits. When a meal is swallowed, it takes some time for the gastric juice to permeate the mass, and the acidity of the gastric contents is for some time very feeble. As digestion proceeds, the contents of the stomach tend to become more and more acid. This is a point which each one can observe for himself. The stomach is by no means reticent of its doings. The posseting which we see in infants goes on in a less degree in the adult; and we are perforce made aware, sometimes inconveniently so, by our palates, of the ascending scale of acidity in the stomach. Saliva acts energetically in neutral and in slightly acid media; but its activity is checked and finally arrested when the acidity becomes pronounced. When digestion is proceeding comfortably and normally, a certain interval elapses before the acidity of the stomach becomes considerable; and during this interval the salivary diastase continues active, and has time to accomplish a good deal of work. But we must remember that our farinaceous food is, for the most part, not in the most favourable condition for rapid digestion. It is not generally in a state of mucilage but in the form of a solid paste, as in bread, puddings, and pastry. A good deal of it, too, is imperfectly cooked.

* Maly's *Jahresbericht für Thier-Chemie* for 1878, p. 40.

Consequently, the larger part of our starchy food reaches the duodenum still unchanged, or only partly changed; and this larger part of the work is consummated by the pancreatic juice in the alkaline medium of the small intestine. I shall have to return to this point in speaking of gastric digestion.

It has been noted as curious, that the saliva of man possesses more diastatic power than that of almost any other animal. Among the herbivora, which are large consumers of starch, the saliva has comparatively little diastatic power; and in some, as in the horse, it is almost or altogether wanting. I apprehend that this is due to the fact that man alone has learnt to cook his starchy food, and that the diastatic power of his saliva has become developed with the opportunity for its exercise. Diastatic power would be thrown away in the saliva of the horse, because he eats his food in the raw or uncooked state, and saliva is without action on raw starch.

When can Starch be said to be fully Digested?—Seeing that in the digestion of starch a number of intermediate products are evolved, the question arises, when can the digestion of starch be said to be accomplished? Is maltose the only product absorbed? are not the dextrines, especially the achroo-dextrines, also absorbed? The dextrines, even those coloured by iodine, are highly diffusible, and pass freely through parchment-paper in dialysis. In this respect, they contrast strongly with starch-jelly, and even with liquefied (or soluble) starch, both of which are undialysable. It seems not improbable that the lower dextrines are largely absorbed. Because, if we follow the history of starch after it has been transformed by digestion and absorbed, we are confronted with the remarkable fact that, after absorption, the products of starch digestion or at least a large portion of them, undergo a reconversion in the liver into a substance closely resembling undigested starch. Glycogen, in its essential features, is an exact counterpart of soluble starch. It forms an opalescent solution in water; it is undialysable; and it is transformed by diastase into dextrine and sugar.

It appears reasonable to suppose that it would be an advantage to the economy, if that portion of our starchy food which is destined to be stocked in the liver as glycogen should be absorbed at an early period of digestion, because, the less removed the digested product is from starch at the moment of absorption, the fewer steps it will have to retrace in recovering the amylaceous state after absorption.

It is not necessary to suppose that the ascending steps of the reconversion are identical with the descending steps of digestion; but it is probable that they are fundamentally alike, seeing the close similarity of the products at the two ends of the journey. At any rate, there is no warrant in the present state of knowledge for the opinion that sugar is the only absorbable product of starch digestion.

Absolute Energy of Diastase.—The notion that the energy of diastase is not consumed in action seems, on *à priori* grounds, to be quite untenable; such a notion contravenes a general principle in physics, that energy in performing work is expended and finally exhausted. It is easy to show experimentally that diastase is no exception to this rule. Payen and Persoz estimated that malt disatase was able to convert two thousand times its weight of starch into sugar. My own experiments with extract of pancreas indicate a much higher power than this. The following experiment illustrates at the same time the enormous diastatic power of pancreatic diastase, and the fact that this power is strictly limited.

A quantity of starch mucilage was prepared, containing one per cent. of pure potato starch; one hundred cubic centimetres of this mucilage contained exactly one gram of dry starch. The pancreatic extract employed was prepared in the following manner. Fresh pig's pancreas, freed from fat, was rubbed up with an equal weight of fine sand until it became a smooth uniform pulp. This pulp was spread out very thinly on sheets of glass, and allowed to dry in the open air for a fortnight. It was then scraped off with a knife, and formed a rough shreddy sort of powder. One hundred and twenty-five grams of this mixture of pancreas and sand were infused, at the temperature of the room, in one thousand cubic centimetres of saturated chloroform-water, with a little more chloroform added to insure against decomposition. The mixture was allowed to stand for four days with occasional agitation, and the product was then filtered clear through paper. The extract of pancreas thus prepared proved a very serviceable preparation, and most of my observations on pancreatic digestion were made with it.

This extract was found to be so extremely active, that it was necessary to dilute it largely in order to bring the quantities of starch operated on within due compass. Accordingly, a dilution was made of one cubic centimetre of the extract in one thousand cubic centimetres of water. Five numbered phials were then severally charged with one hundred cubic centimetres of the prepared starch mucilage, so that each phial contained exactly one gram of dry starch. One cubic centimetre of the diluted pancreatic extract was added to phial No. 1; two cubic centimetres to No. 2; four cubic centimetres to No. 3; six cubic centimetres to No. 4; and eight cubic centimetres of the same diluted extract to phial No. 5. The phials were then corked and placed in a warm chamber, where the temperature was steadily maintained by a Page's regulator at 100° F. (38° C.)

At the end of twenty hours, the contents of the phials were examined. All of them were perfectly transparent, and had entirely lost the opalescent appearance of the original starch mucilage, and not a vestige of sediment existed in any of them. The following reactions indicated the progress of the transformation.

No. 1 gave an intense blue coloration with iodine, and, when the blue solution was largely diluted and more iodine added, it developed a violet tint which showed the presence of erythro-dextrine; it also reduced the cupro-potassic solution freely.

No. 2 gave a strong blue reaction with iodine, and, by diluting and adding more iodine, the colour changed to a deep claret-red, indicative of abundance of erythro-dextrine. This and all the rest gave a strong sugar reaction with Fehling's solution.

No. 3 yielded no blue reaction with iodine, but an intense port-wine coloration of erythro-dextrine.

No. 4 gave no blue reaction with iodine, and only the faintest possible brown coloration with that reagent, showing only trace of erythro-dextrine.

No. 5 exhibited not a vestige of reaction with iodine. It contained neither starch nor erythro-dextrine, but it yielded a strong sugar reaction,

The transformation of No. 5 might be regarded as complete, but the rest still contained starch or erythro-dextrine, or both, Nos. 1, 2, 3 and 4 were restored to the warm chamber and re-examined at the expiration of seven hours. No. 4 no longer gave the slightest reaction with iodine; but Nos. 1, 2, and 3 showed only slight signs of further alteration, and were returned to the warm chamber.

At the end of forty-eight hours from the commencemeent of the experiment, Nos. 1, 2, and 3 were examined again.

No. 1 showed a strong blue coloration with iodine, and also a strong reaction of erythro-dextrine,

No. 2 no longer gave any blue tint with iodine, but it exhibited an intense erythro-dextrine reaction.

No. 3 only gave a yellowish-brown reaction with iodine of moderate intensity.

After a further sojourn of seventy hours in the warm chamber, the contents of the three phials were not found to be sensibly altered; they gave exactly the same reactions as before. It was evident that in these phials the diastatic action had run its course to an end within the period of forty-eight hours, and that the solutions had then come to a state of rest, the ferment had liberated all its energy, the limits of its power had been reached, and the task allotted to it was left unfinished. Nevertheless, it had accomplished an amount of work which, considering its infinitesimally minute mass, appears marvellous. We shall now endeavour to measure approximately the amount of this work as indicated by the above experiments.

The original pancreatic extract, when evaporated to dryness in a water-bath, was found to leave a residue of 1·5 per cent. of organic matter. This organic matter included, besides diastase, a quantity of proteolytic ferment (trypsin) and a certain quantity of the milk-curdling ferment. It also included a certain quantity of digested proteid matter; for, in making an extract of the pancreas, there is always accomplished some self-digestion of the glandular tissue. Taking into account these various admixtures, it would appear a very liberal allowance to estimate the diastatic ferment as amounting to one-fourth of the total organic matter. This would give us for the original extract a proportion of diastase, in round numbers, of 0·4 per cent., and for the diluted extract, of 0·0004 per cent.

The proportion of diastase added to phial No. 4 seems to have hit off with precision the limit of quantity required to transform one gram (15·5 grains) of starch in forty-eight hours at a temperature of 100° F. (38° C.). The amount of diluted extract added to this phial was six cubic centimetres; and, on the basis of the above estimate, this represents a quantity of net diastase amounting to 0·000024 gram. This yields us, by an easy calculation, the astounding result that pancreatic diastase is able to transform into sugar and dextrine no less than forty thousand times its own weight of starch.

The speed at which a given quantity of starch is transformed by diastase depends essentially on the proportion of ferment brought to act upon it. In the above experiments, the proportion of diastase was very minute in comparison with the amount of starch, and the action went on slowly for forty-eight hours. But if we reverse these proportions, and mix a small amount of starch with a large amount of diastase, the transformation is instantaneously accomplished.

If a test-tube be half filled with an active extract of pancreas, and a few drops of starch mucilage be quickly shaken therewith, you cannot detect the reaction of starch or dextrine in the mixture, however prompt you may be with the testing; the transformation has followed on the admixture as instaneously as the explosion of the charge follows the fall of the trigger. Between these extremes there are all gradations. This mode of action differs entirely from what is seen in the operation of ordinary chemical affinity. If you add a drop of acid to an excess of alkali, the acid is instantly neutralized and the action comes to an end; and conversely, if you add a drop of alkali to an excess of acid, the action is equally instantaneous; the affinity of the two bodies for each other is a mutual affinity. But this is not the case with the action of diastase on starch. The starch appears entirely passive in the process; all the energy is on the side of the diastase, and this energy can only be liberated gradually. There is something in this strikingly suggestive or reminiscent of the action of living organisms. To illustrate my meaning, let us compare the particles of the ferment to a band of living workmen, whose function is to scatter little heaps of stones. If the heaps be few and the workmen many, all the heaps will be scattered at once, and the energy of the workmen will still remain sensibly unimpaired. But if the heaps be millions and the workmen hundreds, and if the workmen be doomed to labour on until they fall exhausted at their task, the scattering of the heaps will go on for a comparatively long time, and the process of exhaustion will be a gradual one.

I may here mention that the diastatic ferment does not exist in the saliva and pancreatic juice of young suckling animals, except in minute proportions. Its quantity increases when the teeth are cut. In the human infant, diastase does not appear to exist in sufficient abundance to digest starchy matters effectively until about the sixth or seventh month. Until this period, it is, therefore, not advisable to administer farinaceous food to infants.

DIGESTION OF CANE SUGAR: INVERSIVE FERMENT.

Bernard* first called attention to the fact, already mentioned, that cane sugar (saccharose) required digestion both in animals and plants before it could be utilized in nutrition. The cane sugar stored up in beet-root and in the sugar cane is changed by ferment action into invert sugar before it is permitted to circulate in the sap, and take part in the nutritive operations of the plant. He also found that an analogous transformation was requisite before cane sugar could be assimilated by animals. He states that, when cane sugar is injected into the blood, it circulates therein as an inert body, and is in no degree used as nutriment by the tissues, but is eventually entirely removed unchanged with the urine. Cane sugar is, however, an important article of food, and is consumed by us in large quantities every day; and we know that, when thus consumed, it does not behave like an inert matter, circulating awhile in the blood, and then being eliminated by the kidneys as a waste product. It is evidently absorbed and assimilated, and must, therefore, somewhere or other, be transformed or digested in animals as it is in plants. Reasoning this way, Bernard sought for an inversive ferment for cane sugar in the alimentary tract; and after searching in the saliva, in the stomach, and in the pancreas in vain, he at length discovered it in the small intestine. In the small intestine, he found that cane sugar was transformed into invert sugar, and by a similar ferment with that destined for analogous purposes in yeast, in beet-root, and in the sugar cane.

The transformation of cane sugar into invert sugar is represented by a very simple equation:—

$$\underset{\text{Saccharose.}}{2C_{12}H_{22}O_{11}} + \underset{\text{Water.}}{2H_2O} = \underset{\text{Dextrose.}}{C_{12}H_{24}O_{12}} + \underset{\text{Lævulose.}}{C_{12}H_{24}O_{12}}$$

The inversive ferment was detected by Bernard in the small intestine of dogs, rabbits, birds and frogs. Balbiani found it in the intestine of the silkworm. It was recognized by myself in the small intestine of the pig, the fowl, and the hare. It does not exist in the large intestine.

But although my observations on this subject coincided in the main with those of Bernard, I noted two points which I think merit further attention. The first was that while a piece of small intestine infused in water yielded a mixture which was capable of inverting cane sugar, the same infusion when filtered through paper until it was perfectly clear had no such power. It seemed as if the inversive ferment did not pass freely, if at all, into true solution, but remained attached to some of the formed elements contained in the intestine. The second point which I noted was the extreme slowness of the action. When cane sugar was added to the unfiltered infusion of intestine, and the mixture maintained at blood-heat, it generally took a couple of hours before a reducing effect with the copper test could be obtained. Both these circumstances reminded one of the action of formed ferments, and I could not help thinking that there was here something which required clearing up at some future time.

THE PRODUCTION OF INDIGO IN BENGAL.†

Indigo is almost entirely obtained from leguminous plants of the genus *Indigofera*, that cultivated in India being the *Indigofera tinctoria*, and that in America the *Indigofera anil*. The plant is grown in India, China,

* Claude Bernard—'Leçons sur les Phénomènes de la Vie,' tome ii., p. 36. Paris: 1879.

† From the *Journal of the Society of Arts*, April 30, 1880.

Java, the Antilles, and Central America. It is planted either in the spring or the autumn, and generally in clayey soil. In India it has pinnate leaves and a slender ligneous stem, and, when successfully cultivated, rises to the height of 3, 5 and 6 feet. It is cut with pruning knives at the end of May, and as its growth is exceedingly rapid, two, and sometimes three crops are obtained, but the last crop, in its production of colouring matter, is not equal to the first. Mr. Kœchlin-Schwartz, in an article in the *Bulletin de la Société Industrielle de Mulhouse*, gives some interesting particulars of the preparation of indigo in Bengal.

In this province of India, the indigo factories—in addition to filters, presses, a boiler, drying grounds, and reservoirs—are provided with two rows, each consisting of 15 to 20 vats. These vats are constructed of brickwork, and covered over with a strong coating of stucco; they are generally from 18 to 20 feet square, and about 3 feet deep; the back row is nearly three feet higher than the front, and it is in the higher row of vats that the fermentation takes place. When the fermentation is completed, the liquid is turned off, and flows into the lower vats. The water of the Ganges, which is comparatively pure, and therefore well adapted for the purpose, is utilized in this process.

In the morning the plant is cut, taken to the factory, and loaded in the vats in the evening, one vat containing 100 packages or bundles, arranged in layers, on the top of which are placed transverse pieces of wood tightly wedged down, it being necessary that the plants should be well pressed, or the fermentation would not otherwise thoroughly take place. Water is then allowed to flow into the vats until the plants are submerged. The process of fermentation lasts from nine to fourteen hours, but depends entirely upon the temperature. To test the progress of the operation, a little of the liquid is drawn off into the lower range of vats; if it is of a pale straw colour, the quantity produced will not be so abundant, but it will be of a superior quality than when the colour is of a deeper yellow tinge. The colour of the liquid after fermentation, and when it is drawn off, is always more or less of a deep yellow. It is allowed to remain some little time, then the water, while still warm, is beaten by twelve naked men armed with long bamboos. While this is going on, the higher range of vats is being emptied and cleared for another supply of the plants, seventeen workmen being employed in cleaning one vat. The liquid is beaten for two or three hours, and gradually becomes a pale green colour, and the indigo forms into small flakes; it is allowed to remain half an hour, and the water is then turned off gently, corks placed at different levels in the vats being one by one withdrawn. The water returns to the river, and the deposit, which resembles a thin scum, is carried through a trough into a deep trench. By means of a hand-pump, it is then brought up and boiled for a short time in order to prevent a second fermentation—which would cause it to turn black and be spoiled. It is allowed to remain about twenty hours, and then the boiling process is again resorted to, which continues for three or four hours, when the boiling mass is poured off and strained through a filter. This filter is composed of a brick vat covered with stucco, 18 to 20 feet long, 6 feet wide, and about 3 feet deep; it is covered with bamboos, on which are spread rush mats, and over these a strong, well stretched linen cloth. On this cloth, after the liquid has been strained through, there remains a thick, deep blue paste, almost black.

The water which was in the vat, in flowing through the filter, leaves this deposit of indigo. The paste is then placed in small, solidly constructed wooden cases, perforated with small holes, and with a very strong linen cloth at the bottom; the cases are then covered with cloth, and a wooden lid perforated also with small holes; they are then pressed in a vice to extract every particle of moisture. When this operation is completed, the indigo is found in a large thick block, the cutting of which demands careful attention, and must be done very slowly. The blocks are then submitted to the action of the drying-ground, which consists of a large brick building of a good height, with windows furnished with closed lattices to exclude the rays of the sun, even thick bushy trees being planted all round the buildings to assist in keeping out the light. The cakes occupy from three to five days in drying, and are then sent to Calcutta. It is in this state that indigo is delivered into the market; its quality may be tested by its lightness or small specific gravity, and its bright colour when rubbed with the nail.

THE GLUCOSIDE FROM WHITE MUSTARD SEED.*

BY H. WILL AND A. LAUBENHEIMER.

Sinalbin, $C_{30}H_{44}N_2S_2O_{16}$, is prepared by extracting with warm alcohol white mustard seed (*Sinapis alba*) from which the oil has been removed by pressure and by treatment with carbon bisulphide. The crystals which are deposited are washed with carbon bisulphide and dissolved in a small quantity of hot water; the solution is then boiled with animal charcoal, filtered and mixed with strong alcohol, and the precipitate which is formed is recrystallized from alcohol, when pale yellow needle-shaped crystals of sinalbin are obtained. The mother liquor from the crude sinalbin contains sinapin thiocyanate. Sinalbin is insoluble in ether and carbon bisulphide, sparingly soluble in cold absolute alcohol, but freely soluble in water. The aqueous solution has a neutral reaction; when brought in contact with a trace of an alkali it acquires an intense yellow colour, which is turned red by nitric acid. Silver nitrate throws down a white precipitate which consists of the silver compounds of sinapin and of sinalbin thiocarbimide; the filtrate, which has a strongly acid reaction, contains sinapin (which may be precipitated by mercuric chloride) and grape sugar. When the precipitate is decomposed by sulphuretted hydrogen, sinapin sulphate, $C_{16}H_{24}NO_5HSO_4$, and the cyanide, $C_6H_4(OH)CH_2CN$, pass into solution; the latter can be extracted with ether. After recrystallization, from benzene, the cyanide forms colourless plates (m. p. 69°), soluble in ether, alcohol, warm benzene and warm water. On boiling with potash, ammonia is evolved and orthohydroxyphenylacetic acid,

$$C_6H_4(OH)CH_2.COOH,$$

is produced. The acid crystallizes in colourless prisms (m. p. 144·5°), soluble in alcohol, ether and hot water, and bears some resemblance to Salkowski's parahydroxyphenylacetic acid (*Ber.*, 12, 1438). The calcium salt, $(C_8H_7O_3)_2Ca + 4\,H_2O$, forms glistening prisms, sparingly soluble in cold water; the barium salt, $(C_8H_7O_3)_2Ba + H_2O$, triclinic prisms, slightly soluble in cold water. The silver salt, $C_8H_7O_3Ag$, is almost insoluble in water and is decomposed by heat.

On the addition of mercuric chloride to a warm aqueous solution of sinalbin, a precipitate is produced which contains, in addition to compounds of mercury with sinapin sulphate and the cyanide, C_7H_7OCN, a double chloride, viz., $C_{16}H_{23}NO_5HCl.HgCl_2$.

If ground white mustard seed is treated with water and filtered an acid liquid is obtained which contains myrosin, sugar, sinapin thiocyanate and sulphate. The myrosin may be precipitated from this solution by alcohol. An aqueous solution of sinalbin is decomposed by myrosin, thus—

$$\underset{\text{Sinalbin.}}{C_{30}H_{44}N_2S_2O_{16}} = \underset{\text{Sinalbin thiocarbimide.}}{C_7H_7O.NCS} + \underset{\text{Sinapin sulphate.}}{C_{16}H_{23}NO_5.H_2SO_4} + \underset{\text{Sugar.}}{C_6H_{12}O_6}.$$

The pungent principle in the mustard seed is contained in the albuminous precipitate, which separates out on the addition of the myrosin; by extraction with alcohol and ether it can be obtained in the impure state as a yellow oil insoluble in water.

* *Annalen*, 199, 150—164. Reprinted from the *Journal of the Chemical Society* for April, 1880.

The Pharmaceutical Journal.

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Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

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THE EXHIBITION OF CHEMICAL AND PHARMACEUTICAL APPARATUS, ETC.

NEXT week is the time fixed for holding the usual "May Meetings" of Pharmacy, and before the issue of another Journal the Annual Meeting with its attendant Dinner and Conversazione will be things of the past. Full information as to where and when they are to be held will be found on the front page. Speculations as to their probable characteristics and how far they will vary from those of the meetings of former years would hardly be profitable on the present occasion and may be dispensed with in view of the full report of accomplished facts which we hope to present as usual in the course of a few days. But there is one thing in connection with the Annual Meeting this year concerning which a passing notice and some words of explanation will probably be useful, and that is the exhibition of objects more or less allied with pharmacy which is to be held in the Society's rooms, Bloomsbury Square, on the Tuesday, Wednesday and Thursday of the coming week.

It is satisfactory to find that notwithstanding some disquieting forebodings that were experienced at an early period after it had been decided to hold this exhibition, there is now every prospect that it will prove to be a decided success. A large number of manufacturers and others have responded to the invitation of the Council, and notwithstanding the exclusion—rendered necessary, by the limited space available—of many articles such as usually find their way into exhibitions, there will be ample food for thought and observation in those that will be shown.

The exhibits will be grouped as far as possible in six classes, each of which will occupy a separate room, and a catalogue which is being prepared will be a sufficient guide as to where the different objects are to be found. It may be stated here briefly that the first group, consisting of Gas-Heating Apparatus, including the apparatus used by MR. FLETCHER to illustrate his recent lecture before the Society of Arts, will be placed in the octagon room on the second floor, known as the Examiners' Laboratory. Pharmaceutical Apparatus will be arranged in the large front room on the first floor, which many visitors will recognize as one of the examination rooms. This group will include mixers, pill-coating, plaster and capsuling machines, tincture presses and other similar articles. In the examination room behind this there will be a display of Aerated Mineral Waters. In the Materia Medica Museum will be the Drugs, Chemicals and Pharmaceutical Preparations, a title that sufficiently discloses the nature of the exhibits included under it. The Chemical Museum, on the opposite side of the entrance hall, will be devoted to Scientific Apparatus, and here may be seen a capital collection of microscopes, spectroscopes, polarimeters, telephones, microphones, balances, thermometers, radiometers and various other apparatus. In the room behind will be shown, what will perhaps prove of most interest to many, shop fittings and bottles and different requisites for the shop and dispensing counter, besides a number of medical appliances such as frequently find their way into the chemist and druggist's stock.

It will be seen from the foregoing that the exhibits will be sufficient in importance and variety to well repay examination, and it is to be hoped that every chemist and druggist who possibly can will avail himself of the present opportunity of making himself acquainted with them. The present exhibition is an experiment, and it is evident that its repetition will be, to a great extent, dependent upon the amount of appreciation shown of this new effort of the Council to consult the convenience and promote the interests of the trade.

It only remains to add that the Exhibition will be open on Tuesday, Wednesday and Thursday, on the first two days from 9 a.m. till 5 p.m., and on the last day from 9 a.m. till 10 p.m. On Tuesday and Thursday the admission will be free to all registered Chemists and Druggists; but on Wednesday, the day on which the Annual Meeting is to be held, it will be limited to Members and Associates in Business of the Society.

THE SALE OF PATENT MEDICINES CONTAINING POISONS.

THE report on another page of a case of poisoning by chlorodyne affords a fresh illustration of the danger attending the pernicious habit, which has now been acquired by so large a number of persons, of taking or administering, without qualified medical advice, large doses of powerful and often poisonous preparations, concerning the nature of which they are almost entirely ignorant. An enormous development of this habit has been evident during recent years, and it has been doubtless due mainly to the freedom with which any toxic substance may be sold as a "patent medicine," the only restrictive condition being that a small tax shall be paid, whilst the possible—nay, probable—injury to the health of the community is ignored. By thousands of people pain and sleeplessness are looked upon less as symptoms of a disordered system than as inconveniences to be got rid of in the quickest possible way, and such persons are ready to grasp at anything that promises to assist them in attaining this end. In this mood some powerful anodyne or soporific, disguised under a fine sounding name and beslavered with testimonials as to its efficacy as a remedy against all the ills flesh is heir too, is brought under their notice. It may be had in unlimited quantities from any chemist, grocer, huckster or "stores," and when it is sold not a word of warning is given to the buyers as to the danger attending its use, for the simple reason that as a rule the sellers are themselves ignorant as to the nature of what is being sold. Temporary relief is perhaps attained by its use, but this is maintained after a time only by taking increasing doses, leading frequently to the contraction of a vicious habit and sometimes to an untimely death.

In the present case the cause of death was one of the preparations known as "chlorodyne," but it might just as well have been any of a thousand and one "patents" the names of which will occur to our readers. The deceased had for several years suffered from sleeplessness, for the relief of which he had been in the habit of taking chlorodyne. Being unwell he obtained, together with other medicine, half an ounce of his favourite soporific, the whole of which he took during one night in the hope of securing sleep. In the course of the next day he died, and in the opinion of the medical gentleman who made a *post mortem* examination his death was the result of poisoning by an overdose of chlorodyne.

It is not surprising to find that the case has been the subject of comment in the local press, or to find that some of the well-intentioned remarks assume a condition of things which does not exist. The *Leeds Mercury* considers that it is practically impossible to prevent the sale of these soothing drugs, for that if the law were to prohibit their sale in one disguise they would soon be offered in another. It admits, also, that no law would prevent a man from taking an excessive dose, if he were not deterred by his own judgment. As a remedy, it argues that all that can be done is to insist that the druggist, as far as possible, shall give his customer the means of guarding himself against danger. He is not to be left in doubt as to the risk he runs, and all those who use artificial aids to sleep are to be warned that at the best they are dangerous and at the worst are deadly poisons.

But this argument assumes that the sale of these "artificial aids to sleep" is entirely in the hands of chemists and druggists and that their composition is accurately and generally known. Neither of these assumptions is true. Unfortunately the sale is largely carried on by tradesmen who have no special qualification for advising as to the nature of such preparations, whilst, as was recently remarked in these columns, even the chemist and druggist would not under existing circumstances be justified in treating any such article or preparation as containing morphia or prussic acid, although he might have good reason for suspecting the presence of these or other poisons.

We are glad, however, to notice the increasing concurrence of opinion as to the necessity for legislation on this subject. Public opinion is undoubtedly ripening in favour of the abrogation of the exemption which relieves the sale of scheduled poisons under cover of the patent medicine stamp from the restrictions imposed upon the sale of the same poisons under their proper names. But there is still considerable haziness in the public mind as to the real state of the law, and we believe that the dispersion of this might be considerably promoted by the individual effort of chemists and druggists among their customers and acquaintances. When recently referring to this subject, in connection with the letter addressed to some of the London papers by Mr. Hubbard, we expressed an opinion that as a remedy for the various evils resulting from the sale of patent medicines containing poisons the only feasible course is to require the disclosure of the constituents that are of a poisonous nature, and to make the sale of preparations containing poisons subject to the limitations of the Pharmacy Act. To this opinion we adhere, and we believe that were the public mind made familar with the true state of affairs, legislation in this direction would not be refused.

THE ANNUAL DINNER.

It is hardly necessary to repeat here the announcement that the Annual Dinner of the Members of the Pharmaceutical Society and their friends will be held on Tuesday next at Willis's Rooms. But it may be useful to urge upon all who intend to be present that if they have not yet obtained their tickets they should do so at the earliest possible moment, in order to allow of those arrangements being made upon which the convenience and comfort of such companies so much depend. This year there are no stewards, and all applications for tickets should be made *at once* direct to the Honorary Secretary, Mr. Richard Bremridge, 17, Bloomsbury Square.

A CAUTION.

We are requested by a correspondent to caution the trade against the proceedings of a man, described as being about 5 ft. 5 in. in height, dark and slightly made. This person appears to pass himself off as the representative of a wholesale firm, for whom he solicits orders. Should he be successful, he pretends that he has come out without his pocket-book, and asks that the order may be written on a piece of paper for a memorandum. If, as is usually the case, this is done upon paper stamped with the chemist's name, his end is attained, and he uses the memorandum as an order to obtain the goods mentioned from the wholesale house, directing them to be charged to the chemist's account. This swindler's operations are said to be facilitated by the evident acquaintance with technical details which he possesses.

WOMEN PHARMACISTS.

It appears that attention has been recently directed in the New York press to the favourable field which pharmacy is supposed to offer for the employment of women. *New Remedies* remarks that "it is known "by those who are familiar with the subject that in "Great Britain the registration of women as pharmacists has only been accomplished through persistent efforts," whilst in the United States, on the contrary, no impediments have been offered. Of course this statement is a mistake. No difficulty has existed in this country as to the registration of women as chemists and druggists, by which they are qualified to carry on pharmacy to the fullest extent. The objection, which during the last year has been overcome, has been to their election as members of the Pharmaceutical Society.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, May 6, Professor Roscoe, President, in the chair. After the minutes of the previous meeting had been read and confirmed, the following certificates were read for the first time:—H. Brown, G. H. Hughes, H. Awbrey Lawrance, R. S. Marsden, E. A. Reilly, Brenton Symons, H. Kneebone Tompkins, A. Wingham.

The President then called on Dr. Hodgkinson to read a paper on—

The Action of Sodium on Phenylic Acetate. By W. H. Perkin, jun., and W. Hodgkinson.—One of the authors has already published some results as to the action of sodium on ethereal salts containing mixed fatty-aromatic groups. In the present paper they first give an account of the action of sodium on phenylic acetate prepared by heating dry phenol with acetylic chloride; the acetate boiled at 193° C. A most violent action took place with considerable rise of temperature. Hydrogen and much acetic ether were evolved, the silver salt from the latter being analysed. After the sodium had disappeared a solid body remained in the flask, which, when treated with water, formed a dark coloured solution and a small quantity of a thick oil. The aqueous solution yielded acetic acid, phenol and salicylic acid. The thick oil gave on distillation some undecomposed phenylic acetate and a crystalline mass, which was pressed between filter paper and crystallized from petroleum. Two forms of crystals were observed, and were separated by crystallization from alcohol. The substance most soluble in alcohol forms glistening white needles, melting at 48°, giving a red coloration with potash and having the composition

$$C_{15}H_{12}O_3.$$

The other substance crystallizes in yellow needles, melting at 138°, giving a yellow crystalline compound with alcoholic potash, and having the composition $C_{18}H_{14}O_4$. Experiments were now made by heating cresylic acetate with sodium. Acetic ether and salicylic acid were obtained, as in the previous reaction. Probably, therefore, these two substances are constant products of the action of sodium on acetyl phenols.

Dr. Hodgkinson then read a paper entitled—

Preliminary Notice on the Action of Sodium on some Ethereal Salts of Phenylacetic Acid.—In a contribution to *Liebig's Annalen*, by Max Conrad and the author of the present paper, it has been shown that the influence of the presence of a phenyl group in ethers of fatty acids results in the substitution of one or more of the hydrogen atoms in combination with the carbon immediately joined to the carbonyl group by the group containing the phenyl, giving a synthesis of so-called aromatic-fatty acids. From phenylic acetate the benzylic ether of β phenyl propionic acid was obtained as a primary product, and secondarily by the action of sodium on this substance dibenzyl acetic and β phenyl acrylic acids. Benzylic propionate, butyrate, etc., gave analogous results. The author of the present paper has experimented as to the effect of a phenyl group in the acid or negative portion of the ethereal salt. For this purpose α toluic acid seemed likely to give results, as from its ethyl ether might be formed ethylic phenyl acetoacetate.

$$\begin{array}{ll} C_6H_5 & CH_2 \\ & CO \\ & CH_2 \\ & COOC_2H_5. \end{array}$$

2·5 grams of sodium were warmed with 50 grams of the ether, a condenser was fitted to the retort, so that the liquid produced was removed, as fast as it was formed, from contact with the sodium. In one experiment 10 grams of a liquid distilled over which, after redistillation, boiled between 75° and 78°. On analysis it proved to be ethylic acetate. The residue in the retort, forming a thick mass, was treated with water and gave a solution in which sulphuric acid caused the formation of a white precipitate and an oily body. The latter was separated and distilled. On shaking the acidified aqueous solution with ether, phenylacetic acid was obtained, crystallizing from water in long needles melting at 76°. A small quantity of acetic acid was also obtained. The oily product on distillation separated into some unaltered ethylic phenacetate and an oil which, after purification, boiled at 250° at 60 mm., having the composition

$$C_{18}H_{20}O_2.$$

A residual oil gave on analysis numbers indicating

$$C_{18}H_{16}O.$$

The decomposition may thus be represented—

$$6(C_6H_5CH_2COOC_2H_5) + Na_2 = 2(C_6H_5CH_2COONa) + 2CH_3COOC_2H_5 + H_2 + 2(C_{18}H_{20}O_2).$$

The action of sodium on other ethers of similar constitution seems to be quite analogous, but more secondary products are formed. Experiments were carried out with propylic phenylacetate. Propylic acetate was formed. From the residue in the retort were obtained phenylacetic acid, a substance crystallizing from petroleum in white needles, having a composition indicated by the formula $C_{24}H_{20}O_3$, insoluble in acids and alkalies, and a yellow oil boiling at 335° at a pressure of 50 mm., giving on analysis $C_{22}H_{20}O_2$. The reaction has also been extended to primary isobutylic phenylacetate. It appears, therefore, that the first products of the action of sodium on the ethers of phenylacetic acid containing ethyl and its homologues are the corresponding ethylic, etc., ethers of acetic acid. The phenyl group of the phenylacetic acid being replaced by hydrogen it further reacts with sodium on another portion of the original ethereal salt, forming the above liquid and solid bodies, whose constitution is as yet undetermined, hydrogen being at the same time evolved. With benzylic phenylacetate the action of sodium appears to be analogous with that on the benzylic ethers of the normal fatty acids.

After a few remarks from Dr. Frankland, as to the importance of the results, the President proposed a vote of thanks to the authors, and expressed his gratification that a son of the Secretary had already commenced to contribute papers to the Society.

The next paper was on—

The Determination of Nitrogen in Carbon Compounds. By C. E. Groves.—The author described and exhibited an apparatus for facilitating the collection and measurement of nitrogen, evolved during the combustion of a substance according to Dumas's method. It consists of two vertical glass tubes, in size and shape somewhat resembling burettes. One, "a," is graduated, and is closed at its upper end by a glass stopcock; into its lower end is fixed a T tube, one leg of which is attached to the combustion tube (a bulb U tube containing a globule of mercury being interposed); to the other leg of the T tube is attached a long indiarubber tube, the other end of which is connected with the bottom of the second vertical glass tube "e." The combustion tube is charged in the ordinary way. The tube "a" is filled with potash solution, sp. gr. 1·25, and "e" is lowered until the opening of the T tube, which leads to the combustion tube, is free. Carbonic acid is then evolved and the air in the combustion tube swept out as usual. The graduated tube "a" is then filled with potash, and the stopcock closed as soon as the bubbles of gas are completely absorbed; the tube "e" is lowered until the level of the potash in it is a little below the T tube. The combustion is conducted in the ordinary manner. The advantages claimed for the apparatus are, its simplicity and the fact that as the combustion is carried out under diminished pressure, there is no tendency for the tube to blow out. The author also gives details of a method for using the same tube for six to twelve combustions. The mixture of CO and CO_2, obtained by the action of strong sulphuric acid on oxalic acid is recommended as preferable to hydrogen for reducing the oxidized copper gauze. The author also exhibited a simple arrangement for collecting or delivering small quanties of gas.

Mr. Perkin remarked that he had never yet been able to get all the air out of a tube by CO_2, he always had to use a Sprengel pump.

Mr. Kingzett had experienced the same difficulty as the previous speaker, and had obviated it in the same way.

Dr. Frankland strongly recommended the use of the Sprengel pump, and suggested the application of a water jacket round the measuring tube.

Mr. Groves, in reply, said that he had used a water jacket round the tube, and that by passing the CO_2 for the same time at the beginning as at the end of the combustion, the error due to the minute bubble of air could be almost completely corrected.

Mr. M. M. P. Muir then read a paper on—

Essential Oil of Sage.—The results of the author may be summarized as follows:—The composition of essential oil of sage varies with the age of the oil; when freshly distilled it contains comparatively small quantities of salviol, camphor, and cedrene; as the oil ages the quantities of these substances, especially of the first two, increase. The oil distilled from English sage contains much cedrene, boiling at 260°, with small quantities of $C_{10}H_{16}$, hydrocarbons and traces of oxidized compounds. The terpene of sage oil is identical with that from French turpentine, probably an isomeride of terpene boiling at 171° is also present. Salviol has the formula $C_{10}H_{18}O$, not $C_{10}H_{16}O$; when oxidized with chromic or dilute nitric acid it yields camphor melting at 174°, with oxalic and acetic acids. Salviol on distillation is slightly decomposed, water and a $C_{10}H_{16}$ compound being produced. Sunlight in the presence of air and in the course of time forms from the $C_{10}H_{16}$ compounds of sage oil salviol and small quantities of camphor. The latter substance is also formed by the action of sunlight on salviol. The action of phosphoric anhydride on salviol is very complex, there being formed polymerides of $C_{10}H_{16}$, one boiling at 171°, a hydrocarbon of the bezene series boiling below 130°, and a paraffin boiling between 170° and 180°; no cymene is found if the action be continued for some time. Phosphorus pentachloride acts upon salviol at high temperatures, producing a chlorinated derivative, which is decomposed on distillation, forming a $C_{10}H_{16}$ hydrocarbon boiling at 157° and probably the paraffin-like body mentioned above. Bromine acts energetically on salviol, hydrogen and carbon being liberated; a brominated oil may be separated and under certain conditions small quantities of camphor melting at 184°. Camphor separates chiefly from the portions of sage oil distilling between 205° and 208°; it is partially soluble in salviol, but separates out on cooling the solution to —15°. Sage camphor melts at 174°, boils at 205°; chemically it appears to be identical with laurel camphor; it is, however, optically inactive. The compounds present in sage oil are stable when pure, but when mixed with small quantities of other bodies they decompose. Processes of oxidation, deoxidation and polymerization probably occur simultaneously during the ageing and fractionation of sage oil. In discussing his results the author expresses an opinion that the camphor group may be regarded as a link between the "closed chain" and the $C_{10}H_{16}$ series, just as the $C_{10}H_{16}$ group forms a link between the fatty and the closed chain compounds.

Dr. Wright complimented the author on the completeness of his paper; though some of the reactions had been already worked out, additional and more complete evidence was always very valuable. He thought the author's views as to the relation between the closed chain compounds and the camphors were open to discussion.

Mr. Kingzett had been much interested in the paper, as it seemed that in many points the oxidation of sage oil was analogous to that of the terpenes. In one experiment he had obtained from turpentine colourless crystals closely resembling camphor; he should like to ask if Mr. Muir had observed during the oxidation of sage oil in the air any production of hydroxyl.

Mr. Muir had not specially looked for hydroxyl during the present investigation, but had noticed its formation in a previous research. He also replied to the criticisms of Dr Wright on the theoretical portion of the paper.

Mr. A. H. Allen then read a paper—

On the Presence of Nitrogen in Iron and Steel.—Numerous chemists have investigated this question, but as their results are not concordant, the question cannot be said to have received a definite solution. The principle upon which the author worked was to present to the nitrogen, if it existed in the iron, hydrogen in the nascent state, in a neutral atmosphere, which should rapidly remove the products from the sphere of action, and thus prevent any possible dissociation of ammonia at a high temperature. The reaction would probably be—

$$3Fe_4N_2 + 16H_2O = 4Fe_3O_4 + 6NH_3 + 7H_2.$$

A piece of hard glass tube was therefore connected at one end with a large retort containing water, and at the other with a Liebig's condenser. Fifty to two hundred grams of iron borings were placed, after heating to dull redness in a muffle, in the hard glass tube. The water was boiled until the condensed liquid was found by the Nessler test to be free from ammonia. The tube, with the iron borings (or steel filings), was then heated to redness in a Hofmann's combustion furnace; an evolution of ammonia at once commenced and continued for some hours. The presence of ammonia was proved by the alkalinity and odour of the distillate, the brown colour with the Nessler test, and the yellow precipitate with platinic chloride. (A tube was handed round containing 0·1185 gram of the double salt thus obtained.) Pure iron prepared by reducing pure hæmatite in a current of hydrogen, and then passing a current of steam as above, gave no trace of ammonia. That heated nitride of iron does evolve ammonia in a current of steam was proved by experiment. Ammonia is also formed by dissolving iron or steel in hydrochloric acid, either in the air or in a vacuum. In this way, by Nesslerizing the distillate, the author has succeeded in estimating with precision the nitrogen present in 1 gram of iron or steel. A series of determinations has thus been made of the nitrogen present in various brands of iron and steel; the quantity varied from 0·0041 per cent. in Spiegeleisen to 0·0172 per cent. in steel from Dannemora iron. No nitrogen was found in commercial aluminium or zinc, but traces were found in magnesium and sodium. No connection could be traced between the proportion of nitrogen and that of carbon or other foreign element present in iron or steel. Titanic plate iron contains only 0·0049 per cent. nitrogen. There is no positive evidence as to its condition; but the probability is in favour of the presence of nitride of iron.

The President said that the author had attacked successfully a difficult problem.

Dr. Wright thought the nitrogen might perhaps exist as a cyanide.

Mr. Allen, in reply, stated that he had no proof as to the condition of the nitrogen; he was only sure of its presence.

The following papers were taken as as read:—

On the Mode of Application of Pettenkofer's Process for the Determination of Carbonic Acid in Expired Air. By W. Marcet.—The author describes the apparatus which he has used in upwards of three hundred and fifty determinations, during a series of experiments on the influence of altitude on the phenomena of respiration ('Roy. Soc. Proc.,' 1878 and 1879). The air from the lungs is collected into a large indiarubber bag, whose capacity under a certain pressure is known, two bags are used, one holding 39·3, the other 68·4 litres. For the analysis of the air the following apparatus is used:—a thick glass tube or cylinder about two litres capacity is supported on a light tripod stand. Both ends are ground and are closed with thick ground glass discs, which, by means of grease and two screwed brass caps, close the cylinder airtight. In the upper glass disc three holes are made in which fit airtight, a thermometer, and two brass stopcocks. The lower disc has attached to its inner surface a thick vulcanite disc whose upper face is slightly funnel-shaped, so as to drain off completely any liquid from the cylinder. Perforations are made in the lower disc for attaching a tube from an air pump and for drawing off liquid. The cylinder is first dried and exhausted and the air from the large bag allowed to enter; the cylinder is again exhausted and filled a second time, the pressure being noted by a manometer and the temperature observed; a measured quantity of standard baryta solution is now introduced, the increase of volume is diverted into a small empty indiarubber bag connected with the cylinder so that the pipette can be emptied by closing its top and warming the bulb with the hand. All the stopcocks are now closed, the cylinder gently shaken, and the milky liquid is run into a bottle, which is corked and paraffined. Some of the clear liquor is decanted into a burette and titrated against a measured quantity of standard oxalic acid, turmeric being used as an indicator. The whole apparatus is portable and the results are perfectly reliable. The details of an experiment with the calculations are given.

Note on an Improved Form of Oven for Heating Sealed Tubes and Avoiding Risks of Explosions. By WATSON SMITH.—The author has constructed such an oven, having the following advantages:—A temperature of 420°–440° can be obtained in a few minutes with one moderately large Bunsen. It insures the safety (in case of explosion) of the experimenter and of the thermometer, has a simple construction and can be cooled down rapidly. It consists of a horse-shoe shaped inner tube of stout sheet iron, which contains thick iron tubes, surrounded by an outer D shaped cover of sheet iron. A figure accompanies the paper.

Note on a Convenient Form of Lead Bath for Victor Meyer's Apparatus for Determining the Vapour Densities of High Boiling Substances, together with a few slight modifications. By WATSON SMITH.—The author advises the cutting off the capillary delivery tube about half an inch from the main stem, and connecting the cut off delivery tube to the main stem with a piece of caoutchouc tubing only when everything is adjusted for a determination. Detailed drawings with measurements accompany the paper. A piece of iron gas tube 9 to 10″ long and 2″ internal diameter forms the lead-bath; two screens of sheet iron are used, one to steady the gas flame, the other to protect the upper part of the apparatus from draughts. The glass bulb is well smoked in a luminous gas flame and introduced into the lead very gradually.

After the thanks of the meeting had been given to the authors for their respective papers, the Society adjourned to May 20, when a paper will be read "On the Oxidation of Peaty Matter," by Miss Lucy Holcrow and Dr. E. Frankland, and the discussion on Dr. Tidy's paper (which will be printed this week) "On River Water" will take place.

SOCIETY OF ARTS.

THE CHEMISTRY OF BREAD-MAKING.*

BY PROFESSOR GRAHAM, D.SC.

Lecture I.

(*Continued from page 882.*)

Basic acetate of lead, added to a solution of dextrin, throws down a precipitate, and this is sometimes a convenient reagent to employ when you wish to remove dextrin from the infusions containing it. The action of yeast upon dextrin is very slow, but it does ultimately convert it into maltose sugar, and, of course, after that, into alcohol.

The next members of our carbo-hydrate series are cane sugar and maltose. Although probably of different molecular structure, they have the same centesimal composition. I have here a sample of the small crystals called Finzel's crystals, after the sugar manufacturer of Bristol, who unfortunately has been ruined by the export bounty system of the French Government, and who no longer now manufactures this product. On the whole, it is the purest sample of cane sugar that we can find in the market. Cane sugar is obtained not only from the cane plant, but also from the beet, the date, and the maple tree; it may also be obtained from many other plants, but these are the principal sources. The process of manufacture is not very intricate. It consists in the case of the cane of pressing the juice out, and then as rapidly as possible boiling it with a small quantity of lime, in order, first of all, to precipitate the albuminous matter, and so to neutralize the acid, because we shall see presently acids rapidly convert cane sugar, which is a crystallizable body, into the sugars which do not crystallize, which chemists call inverted sugars, or changed sugars, such as ordinary molasses consists of, and the solution of course is finally treated with animal charcoal in order to decolorize it. This latter part of the process is carried out in the refineries of England.

Cane sugar, when obtained in the pure state, you all know perfectly well, but there are some two or three reactions which I think may be of some interest to you. I said a little while ago that in these carbo-hydrates the hydrogen and oxygen are in the proportion to form water, and by the employment of a little oil of vitriol, which is a substance that has a great affinity for water, it actually breaks up the molecule of sugar, and in so doing unites the oxygens and hydrogen and forms water. That, of course, can only take place by the separation of charcoal. Mr. Lewis will add this material, which has such a power of absorbing water, to the solution of cane sugar, and you will soon see the separation of charcoal. It is already black. Presently it will intumesce, and, you now see, so rapid is the action, an abundant separation of charcoal, the hydrogen and oxygen having been converted into water and absorbed by the acid. This is the action of strong acid. If, instead of acting on the sugar by means of strong acid I had used strong potash, we should find very little change. Fehling's liquid, added to a solution of cane sugar, provided the solution has been recently made, has no action, or a very slight action. The action is only due to the effect of the alkali itself upon the cane sugar. While I am heating this, Mr. Lewis will take a solution of cane sugar, and add to it a very few drops of sulphuric acid. We are not now going to convert it into charcoal, but into other kinds of sugar. You will see that this cane sugar, which has not been treated by acid, has no action on Fehling's liquid. It does not reduce the protoxide of copper to the suboxide, yet boiling it with acid, even for a short time—and manifestly it would be much better to boil it for an hour—is quite sufficient to change the cane sugar to fruit sugar or inverted sugar. Having neutralized the acid by a little alkali and heated it again with Fehling's solution you see there is an abundant reduction from the protoxide of copper to the red suboxide.

This action is brought about not only by mineral acids, but by all kinds of albuminoid bodies. Mr. Lewis will take a solution of cane sugar and act upon it with a little malt infusion; this has the property of converting the cane sugar, to some extent, into the same products as result from the action of acids. That is the reason the West Indian planter is obliged, so soon as he has expressed the juice from the cane, to boil it as quickly as possible; were he not to do so, the acids of the juice and the albuminoid matters would rapidly convert the crystalline sugar into sugars that do not crystallize. These inverted sugars do not crystallize at all, and the origin of molasses in the manufacture of sugar is because in spite of all his care—formerly, indeed, in the West Indies, very

* Cantor Lectures: Delivered November and December, 1879. Reprinted from the *Journal of the Society of Arts.*

little care was taken—but in spite of even the care now taken there is always some crystallizable cane sugar converted into non-crystallizable sugars, and they come into the market in the form of molasses. Of course the larger portion of the molasses is converted into rum by fermentation and distillation. We are performing the same operation here, not by the use of the natural albuminoid bodies that exist in the plant, but by the aid of malt solution, and we have, even in so short a time, a partial conversion of the sugar solution.

The next matter to which I desire to draw your attention is that alcohol does not precipitate cane sugar; in other words, cane sugar is soluble in alcohol. Maltose sugar is precipitated by alcohol, which is able to dissolve a very small quantity of maltose, and one is obliged to take a very large quantity of alcohol in order to dissolve the crystalline substance called maltose.

The maltose sugar to which I now pass was first discovered by Dubrunfaut, but it was forgotten until O'Sullivan, of Burton-on-Trent, again studied the action of albuminoid ferments, such as we find in malt, upon starch. This table represents the action:—

Hydration Products of Starch. (*O'Sullivan.*)

$$\begin{array}{llll} & \text{Starch.} & \text{Maltose.} & \alpha\ \text{Dextrin.} \\ (1.) & C_{72}H_{120}O_{60} + H_2O = & C_{12}H_{22}O_{11} + & C_{60}H_{100}O_{50} \\ & & & \beta\ \text{Dextrin, i.} \\ (2.) & C_{72}H_{120}O_{60} + 2H_2O = & 2C_{12}H_{22}O_{11} + & C_{48}H_{80}O_{40} \\ & & & \beta\ \text{Dextrin, ii.} \\ (3.) & C_{72}H_{120}O_{60} + 3H_2O = & 3C_{12}H_{22}O_{11} + & C_{36}H_{60}O_{30} \\ & & & \beta\ \text{Dextrin, iii.} \\ (4.) & C_{72}H_{120}O_{60} + 4H_2O = & 4C_{12}H_{22}O_{11} + & C_{24}H_{40}O_{20} \end{array}$$

In other words, the first action is to add one molecule of water. That is brought about by the agency of albuminoid ferments. The same action is brought about also by the saliva of man, because that also contains an albuminoid ferment called *ptyaline*. In malt we have a similar albuminoid ferment, which has been called diastase. When one molecule of water is added it causes a lesion of the complex starch molecule into the distinct products, maltose sugar $C_{12}H_{22}O_{11}$ (the isomer of cane sugar and five molecules of dextrin $C_{12}H_{20}O_{10}$). The next stage is to add two molecules of water. Then a further lesion is brought about by the ferment. In the last stage we have four molecules added, and thus we obtain four molecules of maltose sugar and two of dextrin.

At our next meeting I shall point out that Brown and Heron, in some recent researches, and also Gruber and Musculus, give some other hydration products in addition to those that are represented by O'Sullivan. Maltose sugar differs from cane sugar in the following respects:—The formula is the same, that is, the composition of 100 parts is the same, and the molecular weight is, perhaps, the same, but the properties that distinguish maltose are the following. Cane sugar only rotates the plane of polarized light 73° to the right, whereas maltose rotates the ray 150° to the right. It is much more dextrorotary than cane sugar, although less so than starch. We saw that Fehling's liquid had no action on cane sugar, except, however, after a time, when the alkali began to break up the sugar. It has no immediate action, but we shall find on maltose sugar Fehling's liquid produces an abundant and immediate reaction on boiling, still the amount of reduction of the protoxide of copper to sub-oxide is not so great as in the case of the next sugars we shall have to speak of, namely, the dextrose and lævulose sugars. 100 parts of maltose sugar only produces as much action on Fehling's liquid as 61 parts of dextrose or lævulose sugars. Therefore, although maltose has the same formula as cane sugar there is a distinct difference, first in the action on polarized light, and secondly, in the action of Fehling's liquid. There is yet another difference; it is but slightly soluble in alcohol, therefore, the addition of alcohol to solutions of maltose will generally give a precipitate.

Maltose sugar is now being prepared somewhat largely in commerce, and here are some examples of it. One is the substance called O'Sullivan's dextrin maltose. It contains not merely maltose, but also dextrin. Here is another sample which is richer in maltose sugar and less rich in dextrin and has a lighter colour. The other important sugars, namely dextrose and lævulose, I propose to discuss at our next meeting, and will then call your attention to some later researches upon the hydration products of starch.

Lecture II.

To-night we pass on to the third sub-group, the glucoses, having the formula $C_{12}H_{24}O_{12}$. These are dextro-glucose and lævo-glucose. Sometimes they are called dextrose and lævulose. They occur in fruits, and probably are due to the action of acids, or soluble albuminoid ferments, or both together, on cane sugar which has been previously stored up in the vegetable organism.

Dextro-glucose, the first member on our list, has been very rarely found in fruits unassociated with lævo-glucose. A very well known example of this glucose is to be found in ordinary honey. Honey consists of dextro-glucose and lævo-glucose, and also cane sugar. Dubrunfaut, a good many years ago, pointed out that the ratio of the dextro-glucose and lævo-glucose in honey was not that which would have occurred had the product been formed only and solely from the inversion, or change, of cane sugar previously stored up. In other words, instead of being found there in equal quantities, as much of dextro-glucose as of lævo-glucose, he found there was always an excess of dextro-glucose, which would indicate that some of the dextrose was due to the action of some ferment, not upon cane sugar, but upon some such material as soluble starch.

As regards the preparation of dextro-glucose from honey, one of the simplest processes is to take granulated honey, and triturate it in a mortar with one-eighth of its own weight of alcohol. The alcohol will dissolve out the lævo-glucose because it is more soluble; and if this be repeated once or twice, that which is not dissolved in the alcohol will consist of the dextro-glucose and a small quantity of cane sugar, or sucrose.

Another simple plan is to take the crystalline honey, and submit it to severe pressure through a calico filter. If it be pressed with considerable force, the lævo-glucose is forced out in the liquid form, and you obtain the dextro-glucose, together with the cane sugar, in the solid condition.

A much cheaper way to obtain dextrose than from honey is to convert ordinary starch into dextrose. This is done by acting upon a solution of starch with dilute mineral acid. Dextrose was first prepared in this way by the celebrated chemist, Kirchhoff. He took a solution of starch, and acted upon it with acid to the extent of 2 per cent. of the water that he employed, and after keeping it at a temperature of from 80° to 90° C. for four or five hours, he obtained the formation of this dextrose. If this acid solution be neutralized with some powdered chalk, the sulphuric acid—for it is better to use sulphuric acid than hydrochloric—is converted into sulphate of lime, or gypsum, and on filtering you obtain a solution of the dextrose.

This dextrose is now made on a large scale. This bottle contains dextrose. This which you see here has also been made from starch, and is known commercially as glucose. I am indebted for these two specimens of dextro-glucose to the kindness of the managing director of the Manbré Saccharine Company. The way in which it is prepared generally—I do not know exactly how this sample was prepared—is to take Indian corn, which now is largely employed for that purpose by American manufacturers, or rice (which probably is the material that the Manbré Saccharine Company employ), or to take some other starch-yielding material. The rice or the Indian corn is first of all broken into a tolerably fine condition, and then is mashed with water, that is to say, it is digested or infused with water to which 1 per cent. of oil of vitriol has been added. This is heated up by means of steam, and, after some few hours, it is pumped into a boiler or digesting vessel, in which it is heated by means of steam coming direct from a boiler at 70 lbs. pressure. In a short time, the steam being injected from the boiler at that pressure into this other digesting vessel, the temperature rises, and ultimately the tension or pressure in the digester is the same as in the generating boiler, and a comparatively short time is sufficient to convert the starch into dextrose. Whereas, doing it as I am here, at the atmospheric pressure of 15 lbs. to the square inch, a much longer time is required for the purpose. So soon as the operation is complete, and the operators are able to tell that from an experiment I showed you at our last meeting—you remember that alcohol precipitates solutions containing dextrin; you also remember that alcohols precipitate solutions containing maltose sugar—then, at the particular moment when alcohol fails to precipitate either the dextrin or maltose sugar, they know that they have nothing left but dextrose, because in this process, which goes on with acids, as I shall presently show you, the bodies first formed are maltose and dextrin; but ultimately the maltose is hydrated to dextrin, and the whole of the dextrin is also hydrated to dextrose; so that, so soon as alcohol fails to give a precipitate, they know that the hydration process is complete. They then run it off into large tanks; powdered chalk is added to it, in order to neutralize the sulphuric acid; the whole is allowed to settle, and the clear liquid is drawn off, and passed two or three times through animal charcoal, in order to decolorize it. The amount of decolorization, to some extent, depends on the price that is to be charged for it, and the object for which it is to be employed. Ultimately, it is evaporated down in vacuum pans; that is to say, the evaporation takes place not at 15 lbs. pressure, but (by means of a steam-engine constantly pumping away the steam from the evaporating vessel), at a pressure of only some 2 or 3 lbs. It comes into the market in this solid form. The letter I received this morning from the manager of the Manbré Saccharine Company explained to me that it was quite easy for him to supply me with samples perfectly white. These are tinted. They have not been made at all for the purpose to which I propose to draw your attention in our next lecture. This sample was made to be used in the brewing of pale ale, but I wish to have some still whiter, because, as I shall have to point out, I propose that this dextrose shall be employed instead of potato, especially when inferior wheats are being used, in the manufacture of bread.

Now, as regards the properties of this dextrose. In the first place, as the name implies, it is dextro-rotary. It turns the plane of vibration of polarized light to the right hand 56°. It is less soluble in water, and also in alcohol, than cane sugar, and it is only half as sweet. If you try a portion from this bottle, you will find that it is not so sweet as cane sugar; indeed, it would take rather more than two parts of dextrose to produce the same sweetening effect as ordinary cane sugar. When oil of vitriol was added to a solution of cane sugar, you will remember that the cane sugar was broken up and charcoal was formed. You will find that the dextrose is more stable than the cane sugar, and that oil of vitriol does not break it up with the formation of charcoal. Mr. Lewis will kindly add some oil of vitriol to the solution of dextrose, and we shall find that there is no separation of charcoal.

While that is being done, I will pass on to the consideration of the other member of the series—lævo-glucose. This may be prepared from honey, either by the treatment of alcohol which I have explained, or else, and much more conveniently, by the simple method of pressure. It can be produced still more cheaply from what manufacturers call inverted or changed sugar, that is to say, ordinary cane sugar inverted or changed in its properties.

If you take 100 parts by weight of inverted sugar and rub it with 60 parts of hydrated lime—ordinary quick lime hydrated with water, so as to obtain a fine dry powder—and 1000 parts of water, at first you obtain a tolerably fluid mixture. Presently the lime reacts on the dextro-glucose and the lævo-glucose, which together constitute what is termed inverted sugar, and the whole mass solidifies. If, now, you take the solidified mass, and submit it to very great pressure, the dextrose combined with the lime—a dextro-glucosate of lime—is pressed out. It is fluid, whereas the lævo-glucosate of lime remains as a hard solid body. Now, if you take this lævo-glucosate of lime and digest it in water, and add oxalic acid to it, the oxalic acid throws down the lime, and you obtain the solution of the lævo-glucose. When prepared in this or any other way, it has the following properties. It is called lævo-glucose or lævulose, that is to say, it rotates the plane of polarized light to the left, 106°. When we want to indicate a right-handed rotation, we put a + before it, whereas — indicates a body which rotates the plane of polarized light to the left. This lævo-glucose is uncrystallizable; it is never solid; it will not solidify like the dextro-glucose, and it is as sweet as cane sugar. It is much more soluble, as I have already said, in alcohol, and also in water, than its congener, dextro-glucose.

So much for those two separately. I will now proceed to indicate the general chemical characteristics by which we can recognize glucose—not considering if it be dextro-glucose or lævo-glucose—but simply that it is a glucose.

In the first place, these glucoses reduce Fehling's solution. Mr. Lewis will take a small quantity of the dextro-glucose and add to it this Fehling's liquid, which, as I told you, consists of sulphate of copper mixed with the double tartrate of potash and soda, and rendered alkaline by caustic soda or caustic potash. When it is heated to a temperature of about 80° to 90° the protoxide of copper will be reduced, and you will see the red sub-oxide of copper. These glucoses, whether dextro- or lævo-glucose, have a peculiar action upon a solution of nitrate or chloride of cobalt. I ought to point out that cane sugar, when added to a solution of cobalt, has not the power of preventing the precipitation of the hydrated oxide upon the addition of an alkali, whereas, if we have a glucose present, then the oxide of cobalt is not precipitated from its solution by the addition of a little alkali.

On the left, we have a solution of cane sugar. The liquid you see is coloured by cobalt, and Mr. Lewis has added a little potash to it. On the right is glucose—I do not know whether he has given me dextro-glucose, but it is of no consequence. He has now added cobalt to this on my left hand, containing a solution of cane sugar, and next potash will be added to them, and you see there is a thick precipitate formed. If this solution of cobalt is added to the solution on the right, and then potash added, we shall not obtain any precipitate. That is one means of recognizing whether cane sugar contains some glucose, but as a reaction it is by no means so delicate as that resulting from the use of Fehling's solution.

The glucoses have a very marked and powerful reducing action, and by reducing action we mean that they are able to take away oxygen from other bodies; for instance, if you take an ordinary salt that you know very well, lunar caustic, or silver nitrate, if a glucose be added to that, together with a little ammonia—or, perhaps, a more convenient and better way of performing the experiment is to add a little ammonia to the glucose solution, so as to obtain an ammoniacal solution of glucose—then add silver nitrate to that, and gently warm it, the silver will be precipitated in the metallic state. When I say that, I do not mean that you will see the silver having the same appearance as in a shilling, for it will be a black powder. Occasionally it happens that it is precipitated on the sides of the glass, so as to give a mirror-like appearance to it. If that black powder were put under a powerful hammer, you could force the particles together, and then they would have all the appearance of ordinary metallic silver as known to you.

Glucose has the power of changing blue indigo into white indigo, and we call that a reducing action. It is not properly a reducing action, but the expression is due to the amount of knowledge we had many years ago, when we thought that white indigo contained less oxygen than blue. We now have another theory to explain it, but all I wish you to understand is, that this powerful reducing agent can change blue indigo into white indigo on being warmed with a little alkali. You see, on warming the tube, how rapid the action is.

If I take this reduced indigo—highly coloured at present, because potash acts on the glucose at a high temperature and converts it into various coloured products—and put it into water containing a little acid to neutralize the alkali, you see I obtain the blue indigo again. Glucose in an alkaline solution has the power of converting a liquid that is much employed by chemists for the detection of iron in solution. It is called the red prussiate of potash, and it converts this salt into red prussiate of potash. The red prussiate of potash is reduced to the yellow prussiate of potash, or the ferricyanide into the ferrocyanide. Ferricyanide was poured into this tube, together with ferric chloride, or tincture of steel, and there was no reaction. Now, upon the addition of glucose to the ferricyanide of potassium, it is converted into ferrocyanide. Now, ferrocyanide gives with tincture of steel a Prussian blue, whereas ferricyanide gives with tincture of steel no such Prussian blue. You see, from the foregoing experiments, then, that glucose is a powerful reducing agent.

Another experiment, which it is hardly necessary to show you, is that caustic potash or soda has no action, or very little, on cane sugar, whereas it rapidly converts the glucoses into coloured products. The yeast organism has a powerful action on solution of dextrose. It converts dextrose very rapidly into carbonic acid gas and alcohol. The same action takes place with lævo-glucose; but if you take a mixture of dextro-glucose and lævo-glucose, such as is made from inverted sugar, then you would find that the yeast organism uses much more dextro-glucose per unit of time than it does of the lævo-glucose. After some time you would, perhaps, find no dextro-glucose left, but there would still be some lævo-glucose left, which would give a certain fulness on the palate when you were drinking the ales for which it is employed.

This leads me to give you a short description of the method employed for the making of this inverted sugar. I have a sample of it here which has been made in that way. The cane sugar is dissolved in water and a small quantity of sulphuric acid is added to it, about 1 per cent. It is then heated, and in the course of an hour, or an hour and a half, the whole of the cane sugar has been converted into a mixture of equal parts of dextro- and lævo-glucose. This is evaporated down, and is employed very largely in the manufacture of beer—not exclusively, the proportion, perhaps, being one-fourth, or, more usually, one-sixth, along with malt—and the chief reason why the brewers employ this inverted cane sugar is that it contains no albuminous matters. Now, in certain samples of barley, especially in some seasons, such as the one which we have unfortunately passed through, there is a large quantity of soluble albuminous matters formed, on account of the bad maturation period, just when these soluble albuminoids should be converted into insoluble. Under these circumstances, either a material such as this dextro-glucose, or a material such as you see here, which is a mixture of dextro- and lævo-glucose, is employed in order to give a certain stability to beer which otherwise it might not have.

Now, the cane sugar has a dextro-rotary power of $+73\cdot8°$, lævo-glucose has a lævo-rotary power of $-106°$, and dextro-glucose a right-handed rotary power of $+56°$. If you then add those together, and divide by two, you will find that the mixture has a lævo-rotary power of $\frac{-106°+56°}{2}$ which is equal to $-25°$, the optical activity of inverted cane sugar.

(To be continued.)

Parliamentary and Law Proceedings.

Poisoning by Chloral.

At the Manchester City Police Court, John Walter Lee, was brought up on a charge of having attempted to commit suicide. It appeared from the evidence, that a little before twelve o'clock on the previous day it was discovered that the door of the room which the prisoner occupied at the Queen's Hotel was fast, the prisoner up to this time not having left his room. A joiner on the premises burst the door open, and the prisoner was found lying on his face on the floor in an unconscious state, having apparently fallen off the bed. A bottle labelled "poison," was found in the room, and from the appearance of the prisoner it was thought advisable to secure the services of a surgeon, who used the stomach pump and a battery, and ultimately brought him round with great difficulty.

Evidence was given showing that the poison was chloral, which had been obtained from Messrs. Thompson and Capper, homœopathic chemists, the label on the bottle indicating that six drops were sufficient for a dose.

The surgeon who attended the prisoner said there was very little doubt that death would have ensued had the prisoner not been discovered at the time he was.

Mr. Headlam remanded the prisoner for a week in order that his friends might be communicated with in the meantime.—*Manchester Paper.*

Death from an Overdose of Chlorodyne.

At the Leeds Town Hall on Wednesday, May 5, the Borough Coroner (Mr. Malcolm) held an inquest on the body of John Rivers, aged 42.

The Rev. H. F. Rivers, of Offham Rectory, near Maidstone, said the deceased was his brother. He had suffered from sleeplessness, and for several years he had been in the habit of taking chlorodyne. Witness had no suspicion that the case was one of suicide. The last letter received from the deceased by his sister stated that he was very happy and comfortable.

Mrs. Chaplin said the deceased came to live at her house seven weeks ago. He had been away for more than a fortnight, and returned in a cab on Saturday morning. He appeared to be very ill, and she assisted him upstairs. He continued ill during the day, and on Sunday he said he thought he was a little better. She wished to call a doctor, but he would not allow her to do so, and said he would go to a doctor himself. On Sunday night he vomited a good deal, and on Monday forenoon she asked Mr. Pickles, surgeon, to see him.

Mr. Pickles said he found the deceased very ill. He told witness that on Sunday he had gone to a chemist, and got medicine and a bottle of chlorodyne. During the night, when he found he could not sleep, he had taken all the chlorodyne. Witness asked if he had been in the habit of taking chlorodyne, and he said he had. He prescribed the usual remedies, which the deceased took. In the afternoon he called again, but the deceased was then dead. He had made a *post-mortem* examination of the body, and was of opinion that deceased had been poisoned by an overdose of chlorodyne. From 20 to 30 drops was a very large dose. He had seen the bottle, which was a ½-ounce one, and would contain 240 drops.

The jury gave a verdict in accordance with the medical evidence.—*Leeds Mercury.*

Poisoning by a Liniment.

The Leeds Borough Coroner held an inquiry at the Town Hall, on Wednesday May 5, with regard to the death of Septimus Oates, aged 28. The deceased had been in a depressed state for some months. Being left in the kitchen by himself for five minutes he got a bottle containing a mixture of opium and belladonna, which his sister used as an outward application for rheumatism, and went to the closet and drank a portion of the contents. His sister passed the door a few minutes afterwards, and he shouted out, "Good bye." She went to him, and found the bottle, which was marked "poison," on the floor. Dr. Jessop was sent for; and he ordered his removal to the Infirmary, but he died shortly after his arrival there. The jury returned a verdict to the effect that the deceased died from the effects of the opium and belladonna taken by him whilst suffering from temporary insanity.—*Leeds Mercury.*

Review.

Elements of Modern Chemistry. By Adolphe Wurtz, Member of the Institute, etc. Translated and edited, with the approbation of the Author, from the Fourth French Edition, by Wm. H. Greene, M.D., etc. London and Philadelphia: J. B. Lippincott and Co. 1879.

The author in his preface states that "the French editions succeed each other rapidly, showing that this little book responds to an educational need." This may be the case in France, yet when we consider the numerous excellent text-books on chemistry now existing in the English language, it is difficult indeed to believe that we require still another to introduce us to the general truths of the science.

It is needless to state that any work by such a distinguished author as M. Wurtz is entitled to receive the most profound respect, and we opened the book before us with the expectation of finding the subject treated in such a manner as to give this volume a pre-eminent position amidst the existing English manuals of chemistry. In this hope we are not entirely disappointed, for though we fail to see that this book responds to any educational need which is not already provided for by existing English works, it must be admitted that the translator in his preface is correct in stating that "this book is therefore a brief but accurate embodiment of modern chemical ideas, arranged in such a form that the most difficult principles are acquired gradually in the course of the descriptions."

First of all an introduction is devoted to the consideration of the peculiarities of chemical force or affinity, and some experiments are described by which the results of chemical action are shown to be widely different from those produced by mere admixture. It is, however, unfortunate that in this introduction a molecule of sulphide of iron is represented by a circle marked S, and another marked Fe connected by one line only. Though we quite recognize the fact that the author does not intend this single line to stand as a so-called bond representing the atomicity of iron and sulphur we rather think that a beginner would be led into the error of supposing that such is the case.

Following this introduction is a brief exposition of the principles of chemical philosophy, and we consider this the least commendable portion of the book. It is of course undesirable that a book intended for beginners should be heavily weighted at the beginning with an elaborate treatment of this portion of the subject; in fact we are inclined to believe that in the matter of chemical philosophy a learner is helped most by a somewhat dogmatic style of teaching, and more particularly by brief and clear explanations of the meaning, we might almost say definitions, of the terms used.

From this point of view we hardly think that the inquiring mind of an ordinary student would be quite satisfied by the explanation given here of the meaning of the term atomic weight. He would meet with it pretty frequently, and would naturally desire to know what this term really represents. If he referred to the index he would not find the term mentioned, but by careful search he would find the following:—"The equivalents represented merely the ponderable proportions, according to which bodies combine; the atomic weights represent the relative weights of the volumes of gases which combine. The equivalent of hydrogen—unity—expressed merely that hydrogen was the unit to which were referred the weights of other bodies with which it entered into combination. The atomic weight of hydrogen is the weight of one volume of hydrogen, taken as unity, and to this unit are referred the atomic weights of other bodies." If this were considered hardly a satisfactory explanation of the meaning of the term in connection with those elements which cannot be converted into vapour, such as carbon, the student in continuing his search would learn that the law discovered by Dulong and Petit—*the atoms of the solid elements possess sensibly the same specific heats*—permits the deduction of the atomic weights from the specific heats, and that "it is evident that if the product of the specific heats by the atomic weights be a constant that may be called the *atomic heat*, dividing this product by the specific heat should give the atomic weight." Exactly, but we venture to think the beginner would still consider his question unanswered, viz., what is really meant when the term atomic weight of carbon is employed?

The notion of equivalents is treated at some length, and the author concludes by saying that "in order to determine the equivalent of an element it is sufficient to find the quantity of that element which combines either with one of hydrogen or with a quantity of another element which is equivalent to one of hydrogen, for instance eight of oxygen." If this were all, the equivalents of all elements of varying atomicities would be indeterminate. The author omits to say that the equivalent is really the *smallest* quantity of an element which will combine with one of hydrogen or with an equivalent quantity of another element. Following the introductory chapters the author gives an account of the non-metallic elements, their methods of preparation, their properties, and their chief compounds. This portion is worthy of all praise. The main facts concerning each are given with admirable clearness and accuracy, any commercial processes concerned being described with a fair amount of detail, without the descriptions being rendered tedious. It is noticeable that arsenic and antimony are included in the non-metallic elements, while bismuth is placed among the metals. After the consideration of the non-metallic elements, the theory of atomicity is discussed in a separate chapter. The author then proceeds to give a very useful account of the general characters of the metals, their classification, their alloys, and of salts generally. The iron in ferric salts is not described as being tetratomic, but the two atoms are together called a hexatomic couple, for which the name ferricum is suggested for convenience.

In his detailed treatment of the metals and their compounds the author devotes a large amount of attention to the means practically adopted for the reduction of the metals. Thus the metallurgy of iron occupies no less than seven pages, while five only are given to the consideration of the salts of the metal. These descriptions of practical processes, as well as the illustrations accompanying them, are remarkably good; in fact the illustrations throughout are excellent, excepting here and there one of minor importance.

Turning to the portion of the book devoted to organic chemistry, we find that it commences with a rather meagre account of elementary analysis. The author states in his preface that "immediately on entering the immense domain of organic chemistry, we find the facts overwhelmingly numerous and complicated. Among all these facts a severe and careful choice has been made, the historical importance and the theoretical and practical interest of the compounds being borne in mind." The author has been most judicious in his choice, and there are indeed few bodies of first-rate importance and interest which are not considered with some degree of detail.

The author does not divide the bulk of organic compounds into two great groups—fatty and aromatic; but after some introductory matter, in which explanations of the terms saturated hydrocarbons, alcohols, ethers, aldehyds, acids, acetones, amines, organo-metallic compounds, etc., are given, the author proceeds to describe the series of substances usually included in the term fatty group, under the heads of monatomic and polyatomic compounds.

In connection with aromatic compounds, considerable attention is given to Kekulé's theory of the closed benzol chain, and a series of well selected graphic formulæ are given to illustrate how Kekulé's lateral chains may be grafted at different points of the benzol nucleus by substitution for the different hydrogen atoms, and so produce ortho-, meta- and para- derivatives.

On the whole the book before us is perhaps as good as any other of its class in the English language. The intention of the author apparently is not so much to induce students to accompany their reading by practical experiment as to cause them to acquire a knowledge of modern chemical facts and principles from description. This is shown by the fact that after the treatment of the non-metallic elements, no experiments such as would recommend themselves to the learner are described in detail.

The work would be very materially improved by a more copious index, and by the addition of a table of contents.

BOOKS, PAMPHLETS, ETC., RECEIVED.

The Pharmacopœia of the British Hospital for Diseases of the Skin. Second Edition. Edited by Balmanno Squire, M.B. Lond. London: J. and A. Churchill. From the Author.

Manual for the Physiological Laboratory. By Vincent Harris, M.D. Lond., and D'Arcy Power, B.A. Oxon. London: Bailliere, Tindall and Cox. 1880. From the Author.

Obituary.

Notice has been received of the death of the following:—

On the 6th of January, 1880, Mr. Edwin Brunt, Chemist and Druggist, Hyde. Aged 23 years. Mr. Brunt was an Associate of the Pharmaceutical Society.

On the 16th of April, 1880, Mr. Henry Taylor, Chemist and Druggist, Newbury, Bucks. Aged 63 years.

On the 20th of April, 1880, Mr. William Thomas Williams, Pharmaceutical Chemist, Cardiff. Aged 26 years.

On the 25th of April, 1880, Mr. Thomas Henry Brunt, Chemist and Druggist, Hyde. Aged 48 years. Mr. Brunt had been a Member of the Pharmaceutical Society since 1876.

On the 26th of April, 1880, Mr. David Smart, Chemist and Druggist, Port Glasgow. Aged 36 years.

On the 30th of April, 1880, Mr. William Bellerby, Chemist and Druggist, Newcastle-on-Tyne. Aged 61 years.

On the 2nd of May, 1880, Mr. William George Harding, Chemist and Druggist, late of Sudbury. Aged 48 years.

On the 4th of May, 1880, Mr. Charles John Hayward, Pharmaceutical Chemist, Lincoln. Aged 44 years. Mr. Hayward had been a Member of the Society since 1859.

Dispensing Memoranda.

[401]. The mist. scillæ referred to in Scotch ℞ is, doubtless, that given, under article "Scillæ," in 'Christison,' very much used in Scotland, viz.:—

℞ Syr. Scillæ,
Aq. Menth. Pip. . . . . āā ℥ij.
Tinct. Opii Ammon.,
Tinct. Lavand. Co. . . . . āā ℥ss.
Syr. Simp. . . . . ℥j.
M.

Vide 'Christison,' 1842, page 839.

Geo. Wilson.

[407]. The following I take to be the meaning of directions, as required by R. A. Cripps.

Misce, fiat pilula, sufficit quantum (s. q.) mitte duodecim (pilulas.).

Mix, and let a pill be made (mix), a sufficient quantity to send twelve.

H. W. Nichol.

[407]. In the prescription which R. A. Cripps inserts, there is no doubt but that "quantum sufficiat" was intended; for by taking into consideration the doses of the ingredients ordered, and the number to be taken, it cannot leave any doubt but that the mass was to be formed sufficiently large to enable each pill to contain hyd. perch., $\frac{1}{20}$ gr.; pot. iod., $\frac{1}{2}$ gr.; ext. aloes Bbd., 1 gr.

C. T. M.

[407]. In answer to R. A. Cripps, instead of "*q*" it ought to be "*a*," *secund. artem.* The writer evidently bringing the stroke of the "*a*" too far down.

Apprentice.

[408]. In answer to this query, I beg to state that according to the copy of the prescription zinci phosphas would be meant, the dose of which is from 1 to 3 grains.

It could not be meant for zinci phosphid., as the dose is from $\frac{1}{12}$ to $\frac{1}{8}$ of a grain.

323, *Park Road, Liverpool.* E. Whiston.

Correspondence.

H. Y.—(1) Probably *Bunium flexuosum*. (2) Probably *Arctium majus*. (3) *Alyssum saxatile*, not British. We cannot undertake to name plants when only leaves are sent.

A. Skirving.—The specimen is *Luzula sylvatica*.

J. W. D. Hume.—We will try to answer your question next week.

"*Nemo*" is thanked for his communication, which, however, does not meet the requirement of "*Apprentice*," who asked for a recipe for making the preparation.

R. L. G.—The preparation is a proprietary one, and we are not aware that the formula has been published.

J. Barrett.—The oleate of lead used by Dr. Sawyer in the treatment of eczema has been described by him as being prepared by "heating a mixture of oleic acid and oxide of lead." (*Practitioner*, Nov. 1879, p. 348.)

F. G. Foster.—There is no exception in the Pharmacy Act which renders legal the sale of scheduled poisons as homœopathic medicines by unregistered persons.

T. Horton.—The formula given by Mr. Squire (*Pharm. Journ.* [3], viii., 603), is—"Thymol, in crystals, ℈j; lard, ℥j. Melt together at the temperature of a water-bath and allow to cool."

J. Harrison.—The point has not been overlooked, the names of persons sending plants being all known.

Communications, Letters, etc., have been received from Messrs. Chipperfield, Mee, Howden, Haydon, Statham, Lyle, Postans, Covell, Gravill, Brown, MacEwan, Snif, Beta, D.D.

THE ANNUAL DINNER.

The Annual Dinner of the members and friends of the Pharmaceutical Society took place on Tuesday last, at Willis's Rooms, Mr. G. W. Sandford, President, in the chair.

Grace having been sung—

The President proposed "The Health of the Queen," which was received in the usual loyal manner, as was the next toast of "The Prince and Princess of Wales and the rest of the Royal Family." In proposing this toast the President alluded to the interest taken by the Prince of Wales in all that affected the welfare of the nation, and also to the youthful princes who were to be seen every day amongst them.

"The Army, Navy and Reserve Forces," was the next toast, proposed by the President. After referring in appropriate terms to the army and navy, he reminded his audience that this year was to be celebrated the majority, or coming of age, of the volunteer force, and it was therefore particularly the occasion for wishing them prosperity. With the toast he begged to couple the name of Captain Richardson, Leicester.

Captain Richardson, in responding to the toast, said it was an additional honour to speak to it at a time when our forces had so recently been distinguishing themselves in Afghanistan and South Africa, and he was especially proud to think of the important part played by medical men in the campaign in South Africa. He could not forget either the important part played by chemistry in modern warfare. Not long ago he had the pleasure of spending a day at Woolwich, where Professor Abel gave every scientific man present one of the greatest intellectual treats he could receive. Chemistry had done more for modern warfare than any other science, and though it might make it dreadful, he hoped it would also make the horrors of war more brief than in old times.

The Vice-President, Mr. G. F. Schacht, being called upon to propose the next toast, said he thought the Committee had done well in placing the toast of "Science" high up on the list, and perhaps it was not unbecoming that he, as Vice-President of the Pharmaceutical Council, had been requested to propose it, for the Society was based fundamentally on the assumption that pharmacy rested for all that was good in its past history, for all that was good in its present condition, and for all its hopes in the future, on a fair, worthy cultivation of science. It might be true that the Executive had not been able to pursue quite uninterruptedly the highest ends, but in that they had only shared the common lot; broadly speaking, it had pursued a steady course, and endeavoured to cultivate scientific pharmacy. As a member for some years' standing of the Pharmaceutical Conference, it had been his lot to visit several centres of activity throughout the British Isles, and wherever he had gone he had found pharmacists genuine devotees of science. Such persons had often been unknown out of their immediate local surroundings, but nevertheless they had been men doing good work in their own localities, and finding in that work not only their greatest usefulness, but their greatest delight. So often had this occurred that he hoped that the time was not far distant when this would be the rule in pharmacy, and not the exception. Connected with the toast he begged to name Professor Roscoe, not only because he was a distinguished chemist and physicist, and a man of science generally, but from his high official position. Not one present but had heard of Owens College, Manchester, and they must all admit how much of its success was due to the labours of Professor Roscoe. These had made it one of the most successful scientific experiments in modern times, and he felt especially pleased to have the opportunity of testifying his admiration for one who was not only a man of science, but one of the most successful organizers of scientific instruction.

Dr. Roscoe, in responding, begged to thank the Vice-President for the kind words he had spoken of himself. Good wine needs no bush and science needs neither apologist nor patron. Those who could look back for twenty-five years might well be satisfied with the progress English science had made; progress not only in quality and in the quantity of the scientific work which had been done, but progress especially in the amount of general recognition which scientific investigation and men of science had won for themselves throughout the country. At the present moment the man of science occupies a distinct position in the community. He does work which is generally recognized, and his position is a highly appreciated one in the body politic. Nor is this opinion confined to the educated few; it is pretty generally held among the educated many, and the recognition which science in England now receives is greatly due to the importance and to the character and ability of our scientific literature; partly also to the effect of the science lectures which have been given throughout the country, and thus it came about that this general recognition of and interest in science was something which had gone down almost to the lowest stratum of society. Looking at the matter from the purely educational view the older universities were found vieing with the modern higher educational establishments of the country to place science teaching in its highest departments on a proper footing. With reference to the institution with which he had the honour to be connected it might perhaps be interesting to state that they had now in the North of England a new university—the Victoria University, the charter of which was received the other day, so that a new English University had now become a positive fact. It had been born, and only required careful feeding and nourishment to bring it up to be a stalwart and useful member of society. The teaching of science was now percolating through all classes. In London the adoption of scientific instruction in Board Schools was an accomplished fact, in great measure owing to the efforts of Dr. Gladstone. A short time ago the idea of a ploughboy or a son of a mechanic receiving instruction in chemistry would have seemed quite a chimera, and not less so for a Cambridge man taking a degree in physiology alone, but both these things had now become established facts. When one considered the interest taken in scientific subjects by the mass of the people, and especially the interest taken in the theory of evolution by the world at large, and recollecting that this was the work of an Englishmen, they must all agree that at no other time had the work done by English men of science been more important than it was at the present day, and that the interest shown by the public in the support and acknowledgment of it was never greater than at the present moment. Again, what changes had not the Pharmaceutical Society undergone and what important results had not it accomplished during the last twenty-five years. As representing the Chemical Society, the Fellows of which confined themselves especially to chemistry as a science, he might congratulate the President on the progress which his Society had made and express the conviction which the Fellows of the Chemical Society entertained of the high importance of its labours, and the value of its results. He hoped their Society would long continue to flourish and become more and more completely the great educational establishment of the pharmaceutical profession..

The President next proposed the toast of the "Medical Profession," coupling with it the name of the President of the Medical Society of London. To the medical profession be said the Pharmaceutical Society owed the greatest respect. It was their duty to aid that profession in alleviating human suffering, and on the other hand the medical profession had done a great deal to advance pharmacy. He was lately reading a paper on modern surgery, which set forth in glowing terms the advances which had been made in recent years, having especial reference to the use of anæsthetics, showing how the surgeon was now able deliberately to perform operations, which formerly must be hurried whilst the patient was writhing under the knife; it then went on to speak of the antiseptic treatment, and he could not help feeling proud that chemistry and pharmacy had aided the surgeon in both these respects.

Dr. GANT responded very briefly, as he was suffering from a laryngeal affection. He begged, however, to thank the President for the kind terms in which the medical profession had been spoken of, and remarked that the Society he represented was the oldest of the kind in London, being now in its second century. The medical profession was very large, numbering some 18,000, including all branches, not the least important of which were the medical officers of health. He wished he could say that their relations with the public were altogether satisfactory, but it must be acknowledged that public opinion differed much as to what should constitute the profession, and there were those who seemed to be desirous of introducing an imperfectly educated order of practitioners. Only last year a learned serjeant-at-law declared in the House of Commons that he would have herbalists incorporated with legally qualified practitioners—men who as he confessed had never seen the inside of a medical college. Then again there was a small section which would not merely restrict, but altogether prohibit vivisection, from which alone scientific physiology could be learnt; and on the vaccination question, again, there was a great deal of ignorance abroad. Indeed, in one sentence the public needed to be protected not from the profession, but from themselves. One result, however, they could not disturb, and that was the cordial and highly satisfactory relation which existed between the Medical Profession and the Pharmaceutical Society.

Dr. B. W. RICHARDSON: The peculiar honour is entrusted to me of proposing what is emphatically the toast of the evening, "Success to your Society." I might propose this toast right heartily on the ground of old acquaintanceship, dating almost from the birth of the Society, certainly from its earliest days. It was my fortune, my good fortune, to know your founder, Mr. Jacob Bell; I had the pleasure of being a co-worker with him—and although once in the management of a public institution with which we were connected, I and my medical colleagues thought that he let his feelings over-ride his judgment, whereby a coldness ensued, that coldness was but as a passing April shower, followed by a long and genial summer of friendship, which has left on my mind, but one impression, the recollection of his untiring devotion to this the grand work of his life, and the pleasure of watching its growth from his time to its present magnitude, influence, and place in the public estimation. I might, again, propose this toast right heartily on personal grounds, in remembrance of the many services the members of the Society have rendered to physiological physicians, who, like myself, have striven to advance the therapeutical art by the experimental method. When the late Sir James Simpson was about to introduce chloroform his first care was to seek from two members of your fraternity, Messrs. Duncan and Flockhart, the chemical he wanted, in all its purity. When the late Dr. Snow was conducting his inquiries, inquiries which were the very basis of modern therapeutical investigation by experiment, he was wont to seek the same assistance from another member of your fraternity, the able translator and annotator of Fresenius, our friend, Mr. Lloyd Bullock. In like manner in the twenty-five years during which I have traversed the same path, whenever I have wished to introduce some new medicament into practical medicine,—peroxide of hydrogen, nitrite of amyl, the hydrides, the colloids, methylene bichloride, sodium ethylate, methylal, or other substance,—I have sought the same able assistance, and with equal success. To one member of your Council, one too, sir, who will, I hope, in due time fill the chair you now so worthily occupy,—Mr. Robbins,—my obligations in this respect are specially and singularly due; and to your honoured President of last year, Mr. Williams, a chemist in the truest sense of the word, they should also be expressed. But, sir, I would like to place this toast on far higher grounds than these. I wish success to your Society because of the great assistance it daily renders to the science of medicine in all her departments. In medicine now-a-days old things are passing away, and everything is becoming new. Galen, who for so many centuries ruled the curative medicinal art, is Galen no longer as our forefathers knew him. *In Deorum numerum receptus est.* He is received into the number of the gods, and remains only as a name. The Galenicals, once so potent for good or for evil, are almost forgotten. Galen, in his day, taught that the practitioner of medicine should prepare his own medical armament, keep his own dispensatory, send out his own remedies. In this day, whether for better or worse, the physician, the surgeon, or the obstetrician, finds it as much as he can do to visit, prescribe, direct and lead. To you, therefore, is virtually left the whole of the work of preparation and dispensation of remedies for the sick, so that to the body medical you are what the press is to the body political. You are not the physician, not the surgeon, not the obstetrician, but you are *the fourth estate* of scientific medicine. The further scientific medicine advances the more she requires you to be near her as her basis of supply: the more refined she becomes the more important it is for you to be able to meet her new and increasing demands. I for one, indeed, am liberal enough to wish that you were no longer of her, but with her. I could hope that by a friendly amalgamation of your body with the last of her great and useful organizations which co-ordinates most nearly with yours, you could, before very long, enter our pale altogether, become, like us, professional in the strictest sense of the word, and obtain, each one of you, the direct opportunity of rising to the highest attainable position in a united and common profession. Gentlemen, I would propose this toast on still higher grounds, even than those I have just named. I wish your Society success because of the public benefit it confers as a scientific, conscientious and trusted public body. At a time when the race for wealth at any price is the overwhelming maddening ambition, at a time when the ignoble and suicidal craving after luxury and false repose is the besetting sin, it is past all expression essential that duties such as you perform should be supervised and directed by and through a body of men who are raised above the ignorance that prompts, and the low cupidity that sustains that most criminal and cowardly of all crimes, the art of trafficking in the ills that flesh is heir to, and of taking advantage of suffering humanity in its most hopeless, helpless and defenceless states of physical and mental misery.

Mr. President and gentlemen, in the days when the old Greeks literally revelled in the radiance of intellectual light, there lived amongst them, to almost a century of life, a man called Isocrates the rich, an anomalous philosopher, who from timidity could never speak a speech, and who nevertheless wrote such splendid orations and such a noble work on rhetoric that he became accounted one of the grand orators of his country. This master taught his pupils that when any one of them was called to perform a public task he must "First think, then speak, and last of all fulfil." In obedience to this direction, I have thought, I have spoken, and last of all I fulfil by inviting you, in all brotherly affection, sympathy and sincerity, to join me in proposing continued prosperity for and continued usefulness to the Pharmaceutical Society of Great Britain, coupling with the toast the name of your worthy and distinguished President.

The PRESIDENT said he could only wish it had fallen to more able hands to acknowledge the kind manner in which Dr. Richardson had proposed success to the Pharmaceutical Society. It had been his privilege to be connected with that Society for the last thirty years, and he felt the greatest pleasure in hearing Dr. Richardson speak of what they had done in that time; they had established the Society on such a basis that it was respected by the profession and referred to with advantage in matters concerning the public health. They had done all they could for the advancement of pharmacy, though there were many difficulties to overcome, which never could have been overcome but for the efforts of the able man who led them on in the first instance and to whom Dr. Richardson had so kindly referred. It was now thirty-nine years since the Society was founded; in those days there were few such men as Mr. Bell, but there were a few both in London and the country. Those men were not selfish men, who tried to keep all the advantage accruing from their position to themselves, but endeavoured as far as possible to advance every member of the trade to their own position. Dr. Richardson had alluded to the time when all dispensing would be passed over from what was called the medical profession into the hands of pharmacists, and he also referred to advancing pharmacists into a branch of the medical profession. As to the first of these things, at any rate, he believed he was perfectly right in hoping that such a thing would come about, and that it would be really as much to the advantage of the medical profession as to chemists that it should be so. They were going on steadily with their examinations, and that the high standard attained would not be allowed to drop they were assured by the constant presence of Dr. Greenhow, who came at every examination to see that, on the one hand, they were faithfully and properly conducted, and on the other, that the examiners were not unduly hard upon the candidates. There were also material interests of the Society to which they were bound to look, and for which it was necessary that care should be taken in the selection of the men who met month by month to perform the duties of the Council and of others who were officially employed at Bloomsbury Square. In some of those duties they were much aided by his friend, Mr. Flux, the solicitor of the Society, whom he saw near him, and whom he was somewhat disappointed at not seeing in Parliament, as he had hoped he would have been. In conclusion, he might say that some of the happiest days of his life had been passed in association with the members of that Society.

The President lastly proposed the health of "The Visitors," coupled with the name of Dr. Buchanan.

Dr. Buchanan having responded in brief but appropriate terms, the meeting broke up.

During the evening a choice selection of music was sung by Miss Agnes Larkcom, Miss Julia Elton, Mr. Montem Smith and Mr. Winn.

Mr. Harradine officiated as toast-master.

THE EXHIBITION.

On Tuesday morning the Society's Rooms were opened to visitors for the examination of the chemical and pharmaceutical apparatus, preparations, and other objects of interest enumerated below. Up to Thursday evening, when the exhibition closed, the attendance was numerous and in all respects it may be said that this portion of the week's work was highly successful.

ROOM No. 1.
GAS APPARATUS.

Townson and Mercer, 89, *Bishopsgate Street Within, London, E.C.*

Fletcher's Gas Apparatus, as exhibited at the Society of Arts, on April 28, by M. T. Fletcher, F.C.S.
Crucible Furnace, with side chimney.
Muffle Furnace.
Perfected Ladle Furnace.
Fletcher's Solid Flame Burner.
Wallace's ditto.
Ditto, with horizontal tube.
New Evaporating Burner.
Fletcher's Hot-Air Bath, for pharmaceutical purposes.
Simple Furnace.
Foot Blowers.
New Soldering and Brazing Blowpipe with Taps.
Blowpipe, for use in Hand Brazing.
New Adjustable Stand for ditto.
Original Hot Blast Blowpipe.
Special Chemical Blowpipe.
Jeweller's Soldering Coals.
Melting Arrangements, for obtaining ingots of gold, silver, etc,, without the use of a furnace.
Simple Injector Gas Furnace, in which a safe arrangement is made for burning the vapour of light petroleum or benzoline.

ROOM No. 2.
PHARMACEUTICAL APPARATUS.

Baker, J., and Son, 14, *Tabernacle Walk, Finsbury, London, E.C.*
Mixing Machine for powders.
Morton's Mixing Machine for liquids.

Bourne and Taylor, 35, *Castle Street, Holborn, London, E.C.*
Cartner's Pill Coating Machine; Gas Furnace; Suppository Pan; Stopper Loosener; Patent Funnel; Funnel Measures; Pill Scoop.

Bracher, P. H., 77, *High Street, Wincanton, Somerset.*
Patent Desideratum Mixer, for mixing all kinds of powders.

Burroughs, S. M., 8, *Snow Hill, London, E.C.*
Corking Machine; Drug Presser.

Burton, Geo., 221, *St. John Street, Clerkenwell, E.C.*
Drug Mill.

Christy, T., and Co., 155, *Fenchurch Street, London, E.C.*
Tanning Testing Aparatus, for estimating value of barks, woods, fruits, etc.

Cocking, T. S., 72 *and* 74, *High Street, Sittingbourne.*
Pill Machine; Pill Piper, turns one pound of pil mass into perfect pipes in three minutes.
Pill Burnisher, with Reversible Strap; finishes off at one operation two gross of pills.

Erhardt and Co., 9, *Bond Court, Walbrook, London, E.C.*
Capsuling Machine.

Gall, F., *Carshalton, Surrey.*
Improved Label Damper.

Glew, J. C., 10, *Museum Street Holborn.*
Pharmaceutical Drying Closet, designed by Mr. T. E. Greenish.

Goodall, T. S., 5, *St. Peter's Street, Derby.*
Model of Grinding and Levigating Machine.

Hayward, Tyler and Co., 84, *Upper Whitecross Street, E.C.*
Hydraulic Tincture Press.

Hottinott, F. F., *Boundary House, Hadley, Barnet.*
New Pill Coating Machine.

Ladd, J. H., and Co., 116, *Queen Victoria Street, London, E.C.*
The Boomer and Boschert Tincture Press, with hoop and plates tinned; capacity, 6 gallons; pressure, 10 tons, worked by hand.
Small Patent Tincture Press, with Enamelled Cylinder; capacity, 2 quarts.

LYNCH AND CO., 171*a*, 171*b*, *Aldersgate Street, London, E.C.*
Pill Coating Machine, Pill Counter, Tincture Press.

MAW, SON AND THOMPSON, 7, 12, *Aldersgate Street, E.C.*
Faija's Patent "Perfect" Mixer, consisting of one or more mixers or stirrers revolving round a pan in one direction, and on their own axis in another.

NUTTER, N., 71, *Cornhill, London, E.C.*
Johnson's Hydraulic Filter, especially suited for precipitates, glucose, colours, anthracene, etc.

OBERDORFFER, E., *Grimm* 12, *Hamburgh.*
New Pharmaceutical Press.
Plaster Spreading Machine.

OLIVER, J. G., 9, *Western Road, Hove, Brighton.*
Model of Exhaustive Percolator and Air Pump.

POUND AND SON, 60, *Leather Lane, Holborn, London, E.C.*
Two Antiquated Pill Machines.

SHILLCOCK, J. B., *Bromley, Kent.*
Patent Leech Vase.

SYMES AND CO., 14, *Hardman Street, Liverpool.*
Enterprise Manufacturing Co's Screw Press.
Prentiss's Pharmaceutical Still.
Gas Heater for Dispensing Counter.
Apparatus for Continous Extraction.

VIAL, E., 1, *Rue Bourdaloue, Paris.*
Machine for Stamping Names, etc., on Pills.
Pill Finisher, with Movable Ring.

WYLEYS, WALKER AND CO., *Coventry and London.*

ROOM No. 3.

AERATED MINERAL WATERS.

GODFREY AND COOKE, 30, *Conduit Street, London, W.*
Eau Restaurative, an effervescing solution of hypophosphites.

IDRIS, TREVENA AND CO., *Pine Grove, Hornsey Road, N.*
Phosphade, an effervescing, agreeably flavoured solution of hypophosphites.
Peptade, ditto of pepsine.
Tasting Samples of Phosphade, Peptade, etc.
Fluid Magnesia, B.P. strength, in syphons for dispensing purposes, remaining in solution until the bottle is emptied.

PALK AND SMITH, 8, *The Strand, Torquay.*
Sparkling Rozelle, a non-alcoholic tonic fruit beverage.

PRNETICE BROTHERS, *Stowmarket.*
Florvita, a chemical manure for flowers, with specimens of plants, illustrating its effect upon growth and flowering.

RILEY, C. R., *Elm Tree Lodge, South Lambeth.*
Ginger Ale, guaranteed to remain clear.

ROOM No. 4.

DRUGS, CHEMICALS, PHARMACEUTICAL PREPARATIONS.

BURROUGH, J., *Gale St. Distillery, Chelsea, London, S.W.*
Specially Pure Spirits of Wine.

BURROUGHS, S. M., AND CO., 8, *Snow Hill, London, E.C.*
Effervescing Citrate of Caffeine.
Extract of Nux Vomica.
Distilled Extract of Hamamelis.
Compressed Chlorate of Potash Tablets.
Compressed Chloride of Ammonium Tablets.

CHRISTY, T., AND CO., 155, *Fenchurch Street, London, E.C.*
Alkaloids:—Duboisine Sulphate; Eserine Sulphate; Pilocarpine Hydrochlorate and Nitrate; Pelletierine Tannate.
Crude Drugs:—Alstonia Bark, Dita Bark, Sassy Bark, Sweet Bark from Australia, Australian Pepper Stem, Japanese Gentian, Japanese Belladonna Root, Moutan Peony Root, Kusam Root, Coptis Root, Caroba Leaves, Papaw Leaves, Paraguay Tea, Curari, Goa Powder.
Preparations:—Alcoholic Extract of Fresh Coca Leaves, Fluid Extract of Fresh Coca Leaves, Extract of Pomegranate Root, Australian Pemmican for making Beef Tea.

EVANS, LESCHER AND WEBB, 60, *Bartholomew Close, London, E.C.*
Fossiline.

FLETCHER AND FLETCHER, *Holloway Road, London, N.*
Iodine in large crystals.
Metallic Bismuth, refined by a new process, by which all traces of copper, silver, arsenicum, tellurium, selenium, sulphur and phosphorus are eliminated.
Chemically Pure Bismuth Salts.
Scaled Preparations.
Iodide of Bismuth and Quinine.
Permanent Solutions of Iodide of Iron, Bromide of Iron, and combinations of the Hypophosphites, Lactophosphates, etc., in a concentrated form, for the preparation of chemical syrups.

HAMILTON, LONG AND CO., *Dublin. London Agents—Young and Postans*, 35, *Baker Street, W.*
Solution of Pepsine and Pancreatine.

HEARON, SQUIRE AND FRANCIS, 5, *Coleman Street, E.C.*
Curari in Gourds.
Ditto, opened to show contents.
Chian Turpentine.
Fine Cusparia Bark.

JOBST, F., *Stuttgart. London Agents—Burgoyne, Burbidges, Cyriax and Farries*, 16, *Coleman Street, E.C.*
Pure Quinine crystallized, and the following Salts, Acetate, Anetholate, Arseniate, Carbolate, Citrate, Eugenate, Hydrochlorate, Sulphates (neutral and acid), and Tannate.
Sulphate of Cinchonine.
Santonate of Sodium.
German Opium, and the following active principles, Pseudomorphin, pure Laudanine, Meconin, and Thebaine.

LORIMER AND CO., *Junction Road, Upper Holloway, N.*
Pepsine Sauce.

MACKAY, MACKAY AND CO., 1 *and* 2, *Bouverie Street, E.C.*
Ammonio-Citrate of Cerium.
Salicylate of Quinine.
Chian Turpentine.
"Sanatizer," a combination of Carbolic, Cresylic, and Cymylic Acids, for disinfecting purposes.
"Oxychlorogene," a non-poisonous disinfectant generating Oxygen and Chlorine, when brought contact with organic matter.

MORSON AND SON, *Southampton Row, London, W.C.*
Ethidene Dichloride, Isobutyl Chloride, Conia Hydrobromate, Eserine Sulphate and Salicylate.
Sublimed Chrysophanic Acid.
Sublimed Menthol.
Jaborandi Leaves.
Cotoin and Paracotoin.

PARKE, DAVIS AND CO., *Detroit. London Agents—Burgoyne, Burbidges, Cyriax and Farries*, 16, *Coleman Street, E.C.*
Resinoids:—Apocynin, Chilonin, Eupurpurin, Hamamelin, Stillingin, Xanthoxylin.
Solid Extracts:—Black Cohosh, Culvers Root, Damiana, American Mandrake, Rhus Aromatica, Yerba Santa.
Fluid Extracts:—Berberis Aquifolium. Rhamnus Purshiana, Cereus Bonplandii, Eucalyptus Globulus, Jacaranda Procera, Grindelia Robusta, Piper Methysticum.
Empty Capsules for liquids, etc.

POUND AND SON, 60, *Leather Lane, London, E.C.*
Indestructible "Cheque" Ink.

SYMES AND CO, 14, *Hardman Street, Liverpool.*
Chrysarobine and Pure Chrysophanic Acid; Microscopical Sections of Araroba, showing its deposition in the tissue of the wood.

WHIFFEN, THOS., *Lombard Road, Battersea, S.W.*
Salicylate of Quinine.
Valerianate of Quinine.

YOUNG AND POSTANS, 35, *Baker Street, London, W.*
Effervescent Salicylate of Quinine.
Glycerole of Pepsine.
Preserved Ripe Indian Bael Fruit.

ROOM No. 5.
SCIENTIFIC APPARATUS.

BAKER, C., AND CO., 244, 245, *High Holborn, London, W.C.*
The "Model" Microscope.
Simple and Binocular Dissecting Microscopes.
Botanical Lenses on Adjusting Stands.
Cameras for Drawing and Measuring.
Cases of Dissecting Instruments and Apparatus.
Collection of Botanical and Chemical Microscopic Objects.
Microtomes Specially Adapted for Cutting Vegetable Sections.
New Microscopic Lamps.

CETTI, E., AND CO., 11 and 31, *Brooke Street, Holborn, W.C.*
Drs. Russel and West's Urea Apparatus.
Dr. Blackley's Urea Apparatus.
Professor Frankland's Water Analysis Apparatus.
Sprengel Pump.
Petroleum Testing Apparatus.
Dr. Mills's Colorimeter.

COLLINS, C., 157, *Great Portland Street, London, W.*
Histological and Pharmaceutical Microscopes.
Cheap Botanical Dissecting Microscope.
Microscopical Mounting Apparatus, in case.
Microscope Lamp.
Harley Binocular Microscope, full size.
Micro-specimens, Botanical, Chemical, etc., in cabinet.

DOLLOND, J. AND C., 1, *Ludgate Hill, London, E.C.*
Clinical Thermometers, with improved flat bore, presenting a broad line of mercury to the naked eye, hence more easily seen; the index is indestructible, and the price reduced one-half.
Chemical Thermometers, reading to 150° and 180° C., and 600° F., respectively.
Chemical Thermometer, self-registering to 200° F.
Chemical Thermometer, with flat stem to prevent rolling, reading to 300° F.
Beale's Urinary Test Cabinet.
Lownes's Patent new Short Length Barometer and Thermometer Combined.
Spirometer.
Student's Microscope, complete, in cabinet.

FIELD, R., AND CO., 99, *Suffolk Street, Birmingham.*
Polarimeter, with Polariser and Analyser of Zellett's and Nicol's prism respectively, and tube of 100—200 millimetres for holding essential oils, etc., when under examination.
Achromatic Microscopes, suitable for Pharmacists' use, with A and B eye pieces, ¼ in. objective, dividing to ½ in., and ¾ in. dividing to 1½ in., plane and concave mirror, wheel of diaphragms, stand condenser, draw tube, and triangular rack bar, with accessories, in cabinet.

HILGER, A., 192, *Tottenham Court Road, London, W.*
Chemical Spectroscope, dividing sodium lines easily, with arrangement for micrometer measurements, on universal stand.
Direct Vision Chemical Spectroscope, with comparing prism.
Chemical Pocket Spectroscope, with micrometer scale.
Chemical Pocket Spectroscopes, 4½, 3½, and 1½ in. long, in case. The 3½ in. size is Professor Smythe's Rainband Spectroscope, indicating twenty-four hours beforehand the coming state of the weather.

MURRAY AND HEATH, 69, *Jermyn Street, London, S.W.*
Steinheil's "Aplanatische Loupen," or new combined achromatic triplet magnifying glasses.

ORME, J., AND CO. (*late M. Jackson and Co.*), 65, *Barbican, London, E.C.*
Bayley's Cuprimeter, for the colorimetric estimation of copper, as described before the Chemical Society, April 1, 1880.
Bayley's Washing Bottle, for use in washing precipitate with sulphuretted hydrogen water, etc.
Electric Lamps (Hickley's Patent), as now in use at the Polytechnic, etc.
Orme's Carbonic Acid Apparatus, for estimation of carbonic acid in carbonates.
Crookes's Radiometers.
Hughes's Microphones.
Electro-Moteurs.
Vacuum Tubes in action with Ruhmkorff's coil and battery.
Electric Bells, in action.
Mann's Gravimeter, a new apparatus for ascertaining the sp. gr. of cement and other solids in a very easy manner.
Graduated Volumetric Apparatus, a set of.
Bunsen's Pumps, various forms of.
Ink, for writing on glass.
Finest Bohemian Beakers, Flasks, Basins, etc.
Self-Acting Spirit Blowpipes.
Balmain's Luminous Paint.
Petroleum Test Apparatus, as supplied to Trinity House, etc., according to Act of Parliament.
Letcher's Blowpipe Cabinets (Society of Arts).
Telephones (Hickley's Patent), fitted up in different parts of the building.

SCHMIDT, F., AND HAENSCH, *Berlin.*
Improved Microscope, with rachet movement for showing every portion of a slide.
Polarimeter, low priced.

SWIFT, J., 43, *University Street, London, W.*
New Petrological Microscope, for viewing biaxial crystals of extreme wide angle, the two systems of rings being brought into the field of the microscope by Swift's special optical arrangement.

"Challenge" Microscope.
Medical and Botanical Student's Microscope.
Microscopical Slides, including salicine, quinine, and other chemicals for examination under polarized light.

TOWNSON AND MERCER, 89, *Bishopsgate Street Within, London, E.C.*
Copper Water-Oven, with condensing worm attached.
Gas Apparatus, for heating tube.
Zenetti's Chlorine Water Apparatus.
Rheocord.
Wheatstone's Bridge.
Geissler's Burette and Stand; new form of clamps for burettes.
Steel and other Forceps.
Solution for Writing on Glass.
Erdmann's Floats, coloured.
Student's Chemical Balance.
Sets of Weights Assorted.
Nickel-Plated Spatulas.
Royle's Carbon Filter.
Flat Gas-burner; ditto for tubes.
Drechsel's Wash Bottle.
Volkard's Nitrogen Tubes.

WHEELER, E., 48, *Tollington Road, Holloway, London, N.*
Microscopical Slides, illustrating the minute structure of plants as described in botanical text-books.
Two Microscopes.

WYLEYS AND CO., *Coventry*; *and*
WYLEYS, WALKER AND CO., 223, *Upper Thames Street, London, E.C.*
Pharmacist's Microscope.
Microscopical Slides.
Cabinets of Materia Medica Specimens.
Chemical Apparatus and Reagents.
Chemical Balance.
Pharmaceutical Preparations.

ROOM No. 6.

MEDICAL APPLIANCES, SHOP FITTINGS, ETC.

ALLEN, J., AND SON, 64 *and* 65, *Marylebone Lane, London, W.*
Hot Air and Vapour Bath, for application to beds, and ditto for use under a chair.
Bronchitis Kettle, with Stand and Lamp, and ditto for the fire.
Inhaler.
Infant's and Invalid's Food Warmer.
Ventilating Croup Kettle.

ARNOLD AND SONS, 35 *and* 36, *West Smithfield, London, E.C.*
Patent Clinical Thermometer, with Coloured Scale to render the reading more easy, and constriction to prevent the index from descending into the bulb.
Patent Vaporizer or Bronchitis Kettle, Inhaler and Vapour Bath Combined, in which possibility of burning or getting out of order is prevented.
Patent Hypodermic Syringe, having a small oil reservoir to keep the plunger moist and always ready for use, with coloured gradations and screwed mounts.
Patent Eye Syringe, by the use of which access of air is prevented, and a delicate jet or spray thrown with or without force, as required.
New Patent Constant Current Battery, requiring recharging only once in two years, and with high electro-motive force.
Arnold's Invalid Alarm Bell.
Patent Simplex Enemas.
Registered Portable Enema, which can be carried about full of fluid and ready for use.
Registered Universal Enema, a combination that answers for rectum, vagina, eye, ear, nose, or for cleaning wounds.
Improved Throat Spray Producer, with metallic tube, which can be bent to any angle.
Lister's Carbolic Spray Producer, with three metallic flexible tubes, adapted to diffuse or concentrate the spray as required.
Lister's Carbolic Steam Spray Producer.
Dr. Benton's Improved Universal Douche, available for the eye, ear, nose, or for cleansing wounds.
Alexander's Urinary Test Case.

AYRTON AND SAUNDERS, 149, *Duke Street, Liverpool.*
Canty's Poultice Bags.

BOURNE AND TAYLOR, 35, *Castle Street, Holborn, E.C.*
Clinical Thermometer.
Dropping Tubes.
Spray Producers. Inhalers. Eye Douche.
Absorbent Cotton Wool.
Abyssinian Soda Tap.

COWAN, W., 24, *Avenue Street, Springburn, Glasgow.*
Vaccination Shields.

ERHARDT AND CO., 9, *Bond Court, Walbrook, London, E.C.*
Vegetable Parchment for dialysis, etc.
Extremely Thin and Polished Tinfoil, 5000 sheets to an inch in thickness.

GABRIEL AND TROKE, 82, *City Road, London, E.C.*
Registered Capsuled Horse Balls.

GLASGOW APOTHECARIES' CO., 32 *and* 34, *Virginia Street, Glasgow.*
Patent Shop Bottles, with glass labels fitted into a recess in the bottle, rendering the labels indestructible by acids, spirit, etc.

HOWLETT, S., 4, *Lindley Street, Mile End, London, E.*
Improved Counter Show Case, with mirror-lined drawers, instead of the ordinary trays.

HUNT, W. T., 60, *Avenue du Prado, Marseilles.*
Machine Folded Paper Caps for capping dispensing bottles, etc.

KIDSTON, FILMER, *Duke Street, Brushfield Street, Bishopsgate Street, London, E.C.*
Prize Dispensing Counter.

LYNCH AND CO., 171*a*, 171*b*, *Aldersgate Street, London, E.C.*
New Truss.
New Spray Diffuser.
New Dispensing Bottle.
Brighton Sea Salt.

POTHS, H., AND CO., 4, *Sugarloaf Court, Leadenhall Street, E.C.*
Glass Shop Bottles with burnt-in labels.
Porcelain Grease-proof Jars with ditto.
Wood Blocks for sending bottles by post.
German Flat Boxes with overlapping rim, preventing damage from pressure.
Dry Ink in packets for producing coloured inks by immediate solution in water.

TOOGOOD, W., 37, *Mount Street, Grosvenor Square, W.*
Beaker-shaped and Pipette-shaped Standards, used for testing apothecaries' measures.
Glass Apothecaries' Measures as required by the Weights and Measures Act.

TOOMEY, M. F., 54, *Rathbone Place, London, W.*
Dental Tray, for taking impression of the gums and teeth.

The Pharmaceutical Journal.

SATURDAY, MAY 22, 1880.

THE ANNIVERSARY MEETINGS.

THE reports of the proceedings of the past week occupy so much of our available space that we have not much opportunity to refer, in detail, to what took place at the several meetings, and must therefore be content to mention, only briefly, some of the more noteworthy features of the last few days.

The opening of the Exhibition, of which a description will be found at page 931, commenced the proceedings, and we shall, on a future occasion, refer to some of the objects exhibited.

Taking, as next in order of time, the Annual Dinner, it may fairly be said to have been in every respect as succesful as on any former occasion. The number present at it was one hundred and twenty-six, including several distinguished guests, and the complimentary mention of the services rendered by the Pharmaceutical Society by those of them who responded to the toasts will certainly be read with satisfaction by all who take an interest in the Society, as showing that the work it is doing is well appreciated and esteemed by cultivators of science no less than by the medical profession.

The Annual Meeting this year was, as might be expected, a reflection of the tranquil current of events recorded in the Report of the Council. There were no burning questions to discuss and consequently the proceedings did not involve any such great demand upon the time of the members present as has been the case on former occasions. In the PRESIDENT's Address a passing reference was made to the desirability of pharmacists possessing more exclusive rights as to the dispensing of medicines than it was possible to secure in 1868, and to the circumstance that our colleagues in Ireland have been more fortunate in that respect; but notwithstanding the suggestion of regret implied by this comparison, it was pointed out that the general esteem in which the Pharmaceutical Society is held as the representative of British pharmacists is such as to give no reason for dissatisfaction on their part with the position they hold.

In the discussion that followed the reading of the Council's Report attention was directed to the growing importance of the examinations conducted by the Society and to the increased expenditure in connection with this part of the operations. The propriety of endeavouring to maintain the efficiency of these examinations by liberal remuneration of the examiners was urged by Mr. UMNEY, who, as having had experience of what was required for the proper performance of their duties, could speak with authority as well as impartiality on this subject. Much of the time occupied by the meeting was, however, taken up with a discussion of the mode in which the votes for Members of Council are given and the conduct of the scrutiny of voting papers.

The Conversazione at the South Kensington Museum, on Wednesday evening, presented the usual attractions and was well attended.

Last, but not least in importance, the election of Members of Council for the ensuing year, as announced by the report of the Scrutineers on Friday morning, showed that there is less reason than formerly was the case to regret the prevalence of a want of interest in this duty, and the result is calculated to show that, at least among those who voted, there is a sound appreciation of the qualifications desirable in a representative of the general body. We do not suppose that any of those who took part in this election are unmindful of the benefits to be derived from sound instruction in those sciences which it is necessary for every member of the trade to be conversant with, or that they are any the less sensible of the services rendered by those who devote themselves to the business of imparting such knowledge. It has, however, been shown that the great majority of the electors recognize the incompatibility of the positions occupied by the professed teacher and the representative member of the executive body. In an almost equally marked manner it has been shown that, though the prosecution of a lucrative business extraneous to pure pharmacy is a thing any man may engage in if he desires, it does not constitute a qualification to occupy the position of a member of the Council.

PROSECUTIONS UNDER THE WEIGHTS AND MEASURES ACT.

ON various occasions remarks have been made conveying a disparaging suggestion that in calling the attention of our readers to the provisions of the Weights and Measures Act superfluous zeal has been manifested, and too much importance given to the matter; but some cases have during this week come before the Southwark Police Court which are calculated to lead to different conclusions. Five chemists and druggists, carrying on business in the south of London, have been summoned for having in their possession apothecaries' weights that were not correct and in conformity with the legal standards. The presiding magistrate, taking into account that the Act had only recently come into operation, and that these were the first cases of prosecution, imposed only a nominal fine of one shilling for each incorrect weight.

It appears, therefore, that the mention we have on various occasions made of the necessity for seeing that the weights and measures used by chemists and druggists were made to conform with the existing law has, contrary to the criticism above referred to, been insufficient. One of the defendants, in fact, pleaded that he did not know the Act was in operation, and that he had been unable to get any information on the subject; while another stated that some of the weights complained of were quite new, and had been supplied by a first-class firm. We think it desirable to mention these facts for the purpose of emphasizing the recommendations we have frequently offered as to the expediency of having apothecaries' weights and the measures used by chemists and druggists made to conform, as far as possible, with the requirements of the Act.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, May 19, 1880.

MR. GEORGE WEBB SANDFORD, PRESIDENT.

MR. GEORGE FREDERICK SCHACHT, VICE-PRESIDENT.

Present—Messrs. Atkins, Bottle, Churchill, Frazer, Gostling, Greenish, Hampson, Hills, Mackay, Richardson, Robbins, Savage, Symes and Williams.

The PRESIDENT read a letter he had received from Mr. Rimmington, saying he regretted he should not be able to attend the Annual Meeting, and expressing his sense of the courtesy and kindness he had always received from his colleagues at the Council board of whom he had to take leave, pressure of other business compelling him to withdraw.

Mr. ATKINS said they must all regret the retirement of Mr. Rimmington, and he thought it would be only right to send Mr. Rimmington some acknowledgment of his letter.

The PRESIDENT said the Secretary would no doubt see that this was done.

RESTORATIONS TO MEMBERSHIP.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

THE LATE MR. CRACKNELL.

The PRESIDENT moved the following resolution:—

"That the Council, having heard of the death of Mr. Cracknell, desire to express to the family of the deceased gentleman their most sincere sympathy at the loss which they have sustained, and at the same time to convey the assurance of the high esteem in which the late Mr. Cracknell was held by the Council for the valuable services which he rendered to pharmacy."

The PRESIDENT said that Mr. Cracknell had been so long connected with the Society, having been one of the earliest examiners, that everyone must have held him in the highest esteem.

The VICE-PRESIDENT seconded the motion, which was at once carried unanimously.

THE SALE OF POISONS.

The PRESIDENT read a letter received from the Privy Council, enclosing one from a medical practitioner calling attention to a case in which a dipsomaniac patient of his had been supplied with narcotic drugs more freely than he considered right, and stating that he had applied in vain to the Pharmaceutical Society.

The PRESIDENT submitted a draft reply, which he had drawn up for the approval of the Council, which, after some conversation, was agreed to.

The order of business at the Annual Meeting having been settled, the Council adjourned.

THIRTY-NINTH ANNUAL GENERAL MEETING.

The Thirty-ninth Annual General Meeting of Members and Associates in Business was held on Wednesday, May 19, at 12 o'clock, Mr. G. W. Sandford, President, in the chair.

The SECRETARY having read the notice convening the meeting,

The PRESIDENT addressed the meeting as follows:—

THE PRESIDENT'S ADDRESS.

It has been, as you know, frequently my privilege to welcome the Members of our Society in this room in days gone by. When last I had that pleasure I certainly thought I should not again be inflicted on you in this position. That I should still be among you and with you was, I need scarcely say, in those days, as indeed it is now, my earnest wish. But certain work in which I had laboured being accomplished, I naturally desired to retire from the more active duties, leaving them in other and more able hands.

It was not, however, the will of the Council elected last year to leave me in my retirement. They chose once more to place me in the proud position of President, therefore, once more I must ask your indulgence, and I may add help, in the proceedings of this the 39th Annual Meeting of the Pharmaceutical Society. That "39th" carries one back a long way, but to those who, like me, have been connected with the Society during all that time it seems but short. I look back and think of chemists as they were prior to 1840, and as they might now have been but for the efforts made by Jacob Bell and a few others to assert for them a better position in the body politic, and not only that, but to fit them to occupy it.

We need not be dissatisfied with our position. This Society stands as an acknowledged institution in Great Britain, and has been taken as a model for the guidance of our friends in other countries, in America and Australia, to say nothing of our more immediate neighbours and brethren in Ireland, who, profiting by our example, have even improved on our legislation, and obtained more exclusive rights as to the dispensing of medicines than we were able to secure in 1868. Whether we shall ever be able to extend our privileges in that direction I dare not venture to predict; that we might have so extended them fifteen years ago, had the whole trade been united, I verily believe. There are now, it is true, certain questions agitating the public mind, at least in so far as it is expressed in the public press, which seem to point in that direction. We see that the exemption given in our Act of 1868 to the makers and vendors of proprietary medicines is being called in question, and the tide of public opinion seems to set towards restriction in that matter. From time to time there come to your Council appeals from public associations calling for more stringent regulations, some of them so stringent as to render them altogether impossible; some also originally sent to high officers of State, and by them referred here for information. I do not mention these things to mislead you with vain hopes; but rather to show in what estimation our Society is held, and consequently how necessary it is for us all as individual members to maintain the position we have attained.

We all know how much has been written of late on the indiscriminate sale of intoxicating drugs. There is no doubt much unmerited blame has been thrown on us in that matter; we have been blamed for permitting sales which in many cases we had no power to prevent; but still our responsibility in such cases must not be lightly regarded.

I think chemists, who alone are permitted to sell certain drugs, can never be unmindful of the reason which induced the Legislature to restrict the sale, and should therefore second heartily the effort made by the Pharmacy Act to prevent the improper use, or rather the abuse, of such dangerous articles.

But when we are asked, as we have been of late, to place in the proscribed list a number of articles, the use of which may be objectionable, but is not really dangerous, I think we are bound to consider well whether we should not by doing so to a great extent destroy the value of the schedule, besides unnecessarily hampering both ourselves and our customers.

I may be permitted to mention, as the Annual Report of the Council has not done so, that in the middle of last year, one or two prosecutions were instituted against chemists for selling what was termed "adulterated cream of tartar." It is a difficult matter at all times for this Society to stand forth in defence of anything tending in the smallest degree to lower the quality of drugs. But all the interests of druggists are under its guardianship; their best interest lies in maintaining an unsullied reputation, and when that reputation is endangered by an unjust accusation I think we should not hesitate to disprove it. At the instigation of the Council, in 1875, due allowance was made in the "Sale of Food and Drugs Act" for the unavoidable admixture of extraneous matter with any food or drug consequent on the process of collection or preparation. Every analyst knows that such an admixture is constant in cream of tartar and will, if he choose to be officious, or as he would term it, diligent, yield him a triumph before a bench of magistrates.

It was in two such cases that the Council, being first satisfied that the cream of tartar was really up to a good standard, authorized its Solicitor to appear and assist in rebutting the charge of adulteration. In both cases the summonses were dismissed, and in one the magistrates granted costs to the defendant.

The result shows the value of watching "Bills" in their progress through Parliament, and the necessity of maintaining for this Society such a character as will enable it to assert itself before the Legislature when occasion may require.

It has lately been my privilege to visit Edinburgh. I cannot forbear mentioning here, in our annual gathering, as I have already done in Council, how heartily our North British friends received me and my colleagues in that deputation, as the representatives of the parent stock of the Pharmaceutical Society.

I desire not to detain you longer, but I cannot sit down without expressing the great delight I felt in our meeting at Willis's Rooms last evening. I could not help feeling that it would have been utterly impossible before the establishment of this Society to have brought chemists together in so hearty a gathering.

At the conclusion of the Address, upon the President asking the Secretary to read the Annual Report,

Mr. Gostling (Diss) said as the report had been for some time in the hands of the members, he would move that it be taken as read.

Mr. Robbins (London) seconded the motion, and it was unanimously agreed to.

The following is the text of the Report:—

The Annual Report.

Shortly after the last Annual Meeting, the Council deemed it advisable to settle the vexed question of the admission of women to the Pharmaceutical Society. On the two occasions when this question was submitted to the General Meeting, the expression of opinion was so evenly balanced that it appeared likely to continue a source of contention. The election of Members undoubtedly rests with the Council, but in former years the opinion of the Council, like that of the Society, was so evenly divided that an appeal to the general body was deemed desirable. This change does not threaten any important result in the constitution of the Society; up to this time only four ladies have been admitted.

It is gratifying to observe in the Financial Report presented herewith that the increase in the revenue of the Society has continued. The increased revenue has been largely due to the greater number of candidates both for the Preliminary and Major examinations. An unusually large balance (£3405 15*s.* 5*d.*) was brought forward at the end of 1878, the Council were thus enabled in 1879 to purchase £3500 New 3 per Cent. Stock. In the last Report a regret was expressed that so many candidates for examination were satisfied to remain in the second grade of the Society. During the year 1879, *one hundred and thirty-four* candidates presented themselves for the Major examination, whereas in the previous year there were but *eighty-one.* In the Preliminary examination there was an increase of *three hundred and forty-four* candidates, of whom the great majority were not more than eighteen years of age. The Council infer from this that the importance of passing the Preliminary examination prior to connection with the trade, *the desirability of which has been so constantly urged*, is now more generally recognized.

With a view of ensuring the identity of the examinations in London and Edinburgh, the importance of which cannot be too strongly urged, the President and Vice-President, with three members of the Board of Examiners for England and Wales, were deputed to be present at the examinations held last month at the North British Branch, and will in due course report the impression made on them. Their report not having yet been formally presented, it is beyond the power of your Council to enter more fully on the subject in this summary of the proceedings of the past year. There is, however, no doubt that the two examinations are conducted with equal care.

The Library, now containing about seven thousand volumes, has constantly engaged the attention of the Council. From month to month, on the presentation of the Librarian's report, books which have been recommended by Members and others entitled to use the Library have, on the approval of the Committee, been purchased. A selection is also made from books submitted by publishers, and many others have been presented. A new Catalogue of the Library, including also that of the North British Branch, is in the press, and will be sent to all "Members" and "Associates in Business" of the Society. "Associates" and "Apprentices" of the Society will be supplied with copies on application.

An Index of the ten volumes of the *Pharmaceutical Journal*, from July, 1868, to June, 1878, has been compiled and printed; each "Member" and "Associate" of the Society is entitled to receive a copy thereof, free of charge, on application to the Secretary.

It will be remembered that the late Daniel Hanbury bequeathed a legacy to enrich the Library of the Pharmaceutical Society. The Council decided that this bequest should be applied to the purchase of *standard works of reference*, not to be circulated, but to remain permanently in the Library. The amount of the legacy has now been expended, and the following is the list of books purchased:—

Pfeiffer, Nomenclator Botanicus.
Pfeiffer, Synonymia Botanica.
Loureiro, Flora Cochinchinensis.

FINANCIAL STATEMENT FROM JANUARY 1ST TO DECEMBER 31ST, 1879.

Receipts.

	£ s. d.	£ s. d.	£ s. d.
Balance in Treasurer's hands, January 1st, 1879			1905 15 5
London and Westminster Bank—On Deposit			1500 0 0
Life Members' Fund—Interest		88 2 6	
Fee		21 0 0	
			109 2 6
Government Securities—Interest			543 8 10
Deposit Note—Interest			44 7 8
Subscriptions :—			
1741 Members, Pharmaceutical Chemists		1828 1 0	
812 ,, Chemists and Druggists.		852 12 0	
956 Associates in Business		1014 6 0	
827 Associates not in Business		434 3 6	
1071 Apprentices or Students		562 5 6	
19 Entrance Fees		39 18 0	
		4731 6 0	
Fines upon restoration to the Society		60 1 9	
			4791 7 9
Examination Fees :—			
1480 Preliminary Examination Fees		2658 14 0	
31 Modified ,,		32 11 0	
666 Minor ,,		1859 17 0	
135 Major ,,		623 14 0	
			5174 16 0
Registration Fees :—			
22 Registration Fees as Chemists and Druggists		115 10 0	
20 Fees for Restoration to the Register		21 0 0	
			136 10 0
Balance due to Secretary, December 31st, 1879			22 10 7
			£14,227 18 9

Expenditure.

	£ s. d.	£ s. d.	£ s. d.
Balance due Hon. Secretary, N.B. Branch, Jan. 1st, 1879			58 8 8
Balance due to Secretary, Jan. 1st, 1879			17 8 5
Annuity—Dr. Redwood			100 0 0
Carriage of Books to or from the Library, and other parcels			17 18 8
Certificates of Death			17 10 4
Conversazione		111 0 0	
Pharmaceutical Meetings		73 5 10	
			84 5 10

Examiners, Boards of—

	England and Wales. £ s. d.	Scotland. £ s. d.	£ s. d.
Fees to Examiners	1200 3 0	337 1 0	
Fees to Superintendents — Prelim. Examination	142 16 0	19 19 0	
Hire of rooms for conducting Prelim. Examination	44 1 6	3 12 0	
Travelling Expenses	133 17 0	14 19 10	
Refreshments for Examiners	81 7 3	7 1 2	
Apparatus, Drugs, Chemicals, for Examinations & sundry charges in connection therewith	86 5 7	26 8 11	
		409 1 11	
		1688 10 4	
			2097 12 3

	£ s. d.	£ s. d.	£ s. d.
Fees to the College of Preceptors		154 7 0	
			2251 19 3
Fixtures and Fittings			139 12 0
Furniture			11 15 0
House Expenses			281 6 9
Journal—Balance of Account, including £618 1*s.* 2*d.* Postage to Members and others			749 4 11
Laboratory :—			
Professor of Practical Chemistry—Endowment of Chair		100 0 0	
Prize Medals, etc.		5 12 6	
			105 12 6
Law Charges			273 19 7
Lectures :—			
Professor of Chemistry and Pharmacy—Endowment of Chair		100 0 0	
Professor of Botany and Materia Medica—Endowment of Chair		100 0 0	
Subscription to Royal Botanic Gardens		21 0 0	
Prize Medals, etc.		14 16 3	
			235 16 3
Library :—			
Librarian's Salary		200 0 0	
Purchase of Books, etc.		126 3 11	
			326 3 11
Purchase of Books, etc.—Hanbury Fund			40 13 0
Museum :—			
Curator's Salary		200 0 0	
Temporary Assistant's Salary		50 0 0	
Specimens, Bottles and Sundries		143 19 6	
			393 19 6
Branch of the Society in Scotland :—			
Assistant Secretary in Scotland—Salary		150 0 0	
Current Expenses		153 9 2	
			303 9 2
Postage			206 4 0
Provincial Education, Grant in aid of			35 0 0
Register			35 17 0
Repairs and Alterations			225 8 0
Rent, Taxes, and Insurance of Plate Glass			404 3 2
Returned Subscriptions to Associates			24 3 0
Stationery, Engraving, Printing, and Office Expenses			434 8 11
Salaries :—			
Secretary and Registrar :—			
Salary	450 0 0		
Rent	100 0 0		
		550 0 0	
Assistant Secretary		300 0 0	
Clerks and Servants		770 13 6	
			1620 13 6
Cost of Materials supplied to the Bell Scholars			10 0 0
Council Prizes and Herbaria Medals			9 17 6
Sundries			7 17 9
Travelling Expenses—Country Members of Council			343 13 3
Refreshments for Council			39 9 2
Purchase of £3500 New 3 per cents.			3388 15 0
Balance, December 31st, 1879 :—			
In Treasurer's hands		1390 4 5	
London & Westminster Bank. On deposit		500 0 0	
In Hon. Secretary's hands, N. B. Branch		43 0 4	
			1933 4 9
			£14,227 18 9

BENEVOLENT FUND, 1879.

Dr.

	£	s.	d.	£	s.	d.
Fifteen Annuitants, each receiving £35 . .	525	0	0			
Thirteen Annuitants each receiving £30 . .	390	0	0			
One quarter's payment to an Annuitant . .	7	10	0			
Three quarters' payment to ditto, at £8 15s.	26	5	0			
				948	15	0
Casual Grants.						
A former Member, Ipswich . . . age 65	20	0	0			
A Member, Gloucester . . . . . age 53	15	0	0			
A Member, Croydon . . . . . . age 69	10	0	0			
A Member, Bristol . . . . age 57	15	0	0			
A Member, London . . . . . . age 61	15	0	0			
A Member, London . . . . . . age 59	15	0	0			
A former Member, Parkgate, Neston age 62	10	0	0			
A former Member, Brighton . . . age 63	10	0	0			
A former Member, Holywell . . . age 47	10	0	0			
A former Member, Bristol . . . . age 36	5	0	0			
A former Member, Thornton-le-Beans age 62	10	0	0			
Widow of an Annuitant, London . . age 62	25	0	0			
Widow of an Annuitant, London . age 61	15	0	0			
Widow of a Member, Ossett . . . age 35	15	0	0			
Widow of a former Member, Northampton . . . . age 51	15	0	0			
Widow of a Life Member, Bristol . age 48	20	0	0			
Widow of a former Member, Brierley Hill age 43	5	0	0			
Widow of a Member, Devizes . . . age 49	10	0	0			
Widow of a former Member, London age 64	5	0	0			
Widow of a Member, Torquay . . age 58	10	0	0			
Daughter of a late Member, Southampton, age 47	10	0	0			
A former Associate, Bath . . . . age 31	10	0	0			
Wife of a former Associate, Norwich age 32	10	0	0			
Wife of a former Associate, London age 48	10	0	0			
A Registered Chemist and Druggist, Glasgow . . . . age 53	25	0	0			
Ditto, Birmingham . . . . . age 68	20	0	0			
Ditto, Sheffield . . . . . . age 65	15	0	0			
Ditto, Stone . . . . . age 39	5	0	0			
Ditto, Plymouth . . . . . . age 70	15	0	0			
Ditto, London . . . . . . age 67	10	0	0			
Ditto, London . . . . . . age 52	10	0	0			
Ditto, Bridgwater . . . . . age 58	10	0	0			
Ditto, Torquay . . . . . . age 61	5	0	0			
Ditto, Southgate . . . . age 73	15	0	0			
Widow of a Registered Chemist and Druggist, London . . . . age 57	10	0	0			
Ditto, Virginia, U.S.A. . . . age 39	15	0	0			
Ditto, Manchester . . . . . age 24	15	0	0			
Ditto, Maldon, Essex . . . . age 38	15	0	0			
Ditto, Richmond, Surrey . . . age 45	5	0	0			
Ditto, Huddersfield . . . . . age 56	5	0	0			
Ditto, Manchester . . . . . age 36	10	0	0			
Ditto, London . . . . . . age 39	15	0	0			
Ditto, London . . . . . . age 42	17	0	0			
Ditto, Acton . . . . age 55	10	0	0			
Ditto, Croydon . . . . . . age 60	15	0	0			
Ditto, Birmingham . . . . . age 38	10	0	0			
Ditto, Gosport . . . . . . age 48	10	0	0			
Ditto, Ashbourne . . . . . age 69	10	0	0			
Ditto, Birmingham . . . . age 37	10	0	0			
Ditto, London . . . . age 33	10	0	0			
Four Orphans of a Member, London, ages 9, 8, 4, and 3 years. Left without means. (See Journal, Feb. 8, 1879, pp. 659 and 662)	50	0	0			
Four Orphans of a Registered Chemist and Druggist, London. Two girls ages 10 and 12, and two boys ages 8 and 13 left unprovided for	10	0	0			
Orphan of a former Member, Lewisham, age 4 years. Grant made to assist in securing the election of the child to an orphan asylum (previous grants to widow amounting to £20, and a grant of £52 10s. to assist in securing the election of another child to an orphan asylum)	31	10	0			
				698	10	0
Printing and Stationery	26	6	5			
Postage	17	10	10			
				43	17	3
Balance in Treasurer's hands, December 31st, 1879 . . .				305	17	5
				£1996	19	8

Cr.

	£	s.	d.	£	s.	d.
Balance in Treasurer's hands, Jan. 1st 1879				193	1	4
Balance in Secretary's hands, Jan. 1st, 1879				2	10	0
Dividends on Invested Capital				543	15	0
Donations	55	5	0			
Subscriptions	1200	2	8			
				1255	7	8
Balance due to Secretary, Dec. 31, 1879				2	5	8
				£1996	19	8

We, the undersigned Auditors, have examined the accounts of the Pharmaceutical Society, as presented in the Financial Statement and Benevolent Fund Account, and find them correct; and that there was standing to the account of the Society at the Bank of England, on the 31st December, 1879:—

		£	s.	d.	£	s.	d.
General Fund	New 3 per Cents.	20,500	0	0			
Life Members' Fund. .	New 3 per Cents.	3,000	0	0			
					23,500	0	0
Benevolent Fund. . .	Consols	18,250	0	0			
Pereira Memorial Fund	Consols	100	0	0			
Bell Memorial Fund	Consols	2,050	0	0			
Hanbury Memorial Fund	Consols	400	0	0			
					20,800	0	0
Secretary's Casual Relief Fund . .	do.				105	0	0
Hills Prize Fund—Russian Bonds.					300	0	0

WILLIAM HODGKINSON,
S. LLOYD STACEY,
HENRY AYSCOUGH THOMPSON,
W. MANNING WATTS,
} *Auditors.*

February 26, 1880.

Descourtilz, Flore Médicale des Antilles.
Gaertner, De Fructibus et Seminibus.
Guibourt, Histoire des Drogues, 7me éd.
Le Maout and Decaisne, General System of Botany.
De Candolle, Géographie Botanique.
Flückiger and Hanbury, Histoire des Drogues.
Pritzel, Thesaurus Literaturæ Botanicæ.
Baker, Flora of the Mauritius and the Seychelles.
Bentham and Mueller, Flora Australiensis.
Miers, On the Apocynaceæ of South America.
Hooker, Niger Flora.
Kunth, Enumeratio Plantarum.
De Candolle, Monographiæ Phanerogamarum.
Roques, Phytographie Médicale.
Berg, Atlas zur pharmazeutischen Botanik.
Risso and Poiteau, Histoire des Orangers.
Miquél and Ver Huell, Illustrationes Piperacearum.
Horaninow, Prodromus Monographiæ Scitaminearum.
Seemann, Flora Vitiensis.
Baillon, Natural History of Plants.
Bentham, Flora Hongkongensis.
Grisebach, Flora of the British West India Islands.
Siebold and Zuccarini, Flora Japonica.
Wallich, Plantæ Asiaticæ Rariores.

The formal acceptance by the Council of the Hanbury Memorial Fund Trust has been completed; the amount invested is £400 Consols, and a die has been prepared for a medal which is to be offered for competition every two years "for high excellence in "the prosecution or promotion of original research "in the natural history and chemistry of drugs."

During the year many valuable additions have been made to the Museum. When it was determined by Government to break up the India Museum, this Council, feeling that many specimens of Materia Medica and matters allied thereto contained in that collection would be not only extremely valuable, but specially accessible to persons interested in them if placed in the Museum of this Society, so represented the matter to the Secretary of State for India, hoping that he would, if possible, secure the transfer of such articles to Bloomsbury Square. Ultimately it was decided that the whole vegetable collection should be sent to Kew to be under the sole control of the Director of the Museum there, and the applications which had been made to the India Office were transferred to the same authority for consideration. Through the kindness of Sir Joseph Hooker, the Director of the Royal Gardens, Kew, this Society has already received many interesting specimens, and there is reason to believe that more will follow.

The Evening Meetings, both in London and Edinburgh, in the papers read and the discussions which followed, have afforded opportunities for the consideration of various interesting matters. The Meeting held in London in December was specially devoted to discussion on the new regulations regarding apothecaries' weights and measures set forth in the Weights and Measures Act, 1878.

When the new Act was passed, the use of apothecaries' weights and measures in the sale of drugs was legalized, but no definition or schedule of them was appended to the Act. Under these circumstances, in January, 1879, the Board of Trade applied to this Society for general information as to apothecaries' weights and measures. A full description of them was thereupon forwarded to the Board of Trade by the President, and an "Order in Council" founded thereon has since been issued. Considerable delay has arisen in preparing the standards. They are, however, now ready and in the hands of many local inspectors. Every consideration has been shown by the authorities to chemists and druggists in this matter, and there is certainly no disposition to bring the provisions of the Act into operation hurriedly or harshly. Nevertheless it is of course desirable that chemists should put themselves in conformity with the law, and the difficulty of so doing has ceased, the makers of apothecaries' weights and graduated measures being now able to supply both with the Government mark of verification.

A large number of complaints of alleged infringements of the Pharmacy Act, 1868, were received by the Registrar in 1879. In all cases inquiries were made and communication with the offenders opened. The result generally was a discontinuance of the offence, but in twenty-one cases it was found necessary to have recourse to legal proceedings to enforce obedience to the law.

The question of the legality of the sale and dispensing of poisons by public companies (called in legal language "corporations") involved in the prosecution of the "London and Provincial Supply Association," which was in abeyance at the time of the last Annual Meeting, is still unsettled. The Bloomsbury County Court having decided that such a practice was legal, so long as a qualified man was employed to superintend the business, the Pharmaceutical Society appealed against that judgment to the Court of Queen's Bench, where the decision of the lower Court was reversed by no less authority than the Lord Chief Justice of England and Mr. Justice Mellor. On the appeal of the defendant, however, the case was carried to a higher Court, in which, as all must have observed from the reports in the Journal, a decision has been given adverse to this Society. The case is so important that the Council have felt it their duty to continue proceedings, and have instituted a final appeal to the House of Lords. The Council have been fortified in their resolution to take this course, not only by certain forcible remarks embodied in the report of the judgment of the Lord Chief Justice, who decided in favour of this Society, but also by doubts expressed in the separate judgments delivered by the Lords Justices Bramwell, Baggallay, and Thesiger in giving an adverse decision.

In 1879 the subscriptions and donations to the Benevolent Fund fell short of those received in the previous year by about £40. The Council are inclined to attribute this to the general depression of the year rather than to a decrease of interest in the prosperity of a Fund which is doing so much to relieve the necessities of unfortunate members of the trade. Year by year the permanent engagements of the Fund increase by the addition to the number of annuitants. In determining the number to be elected on the last occasion, it was painful to the Council to be obliged, from want of funds, to restrict it to three, there being several other approved candidates on the list. The amount granted in casual relief in 1879 was £698 10s. It may be added that in the present year the amount required for annuities is £1015, and presuming that the occasional grants will not be less than formerly, the expenditure will be upwards of £1700.

Mr. J. B. Mackey (London): I have much pleasure in moving

> "That the Report of the Council as now read be received, adopted and printed in the Society's Journal and Transactions."

It is not necessary for me to make any comments on this report, as everything is progressing so favourably. Many years have elapsed since I joined the Society, and having fulfilled the duties of Auditor for some years, I can bear testimony to the accuracy of financial matters, and the steady satisfactory progress of the Society.

Mr. Stacey (London): I beg to second the motion. It is hardly necessary to detain you long when things seem to flourish, as they evidently have done, to a great extent, under the guidance of the Council. I would refrain also from going into matters of a controversial character, because I take it that we ought to rely upon our Council, and when we look round upon the men that constitute the Council we must feel sure that they give their full attention to all the subjects interesting and affecting this Society. There are two subjects of the greatest importance which I am glad to see that the Council have dealt with, and dealt with with a firm hand; the first one being that alluded to at the commencement of the report; and although many might have a different view and may not feel well pleased personally at the action the Council have thought proper to take in that matter, still I believe as a body we ought to rest content and accept it as their best judgment. There is one remark in the report which does not convey to my mind any meaning—"This change does not threaten any important result in the constitution of the Society." I do not understand the meaning of those words exactly, but they perhaps are intended as a little *placebo* and we must receive them as such. If the Council do not anticipate any important result in the constitution of the Society arising from this change I would, as it were, throw out a word of warning, that a very important principle has been shifted and upset, and in years to come they may refer back and find that perhaps one principle would have worked better than another. I think it is a subject of great congratulation that the Society goes on progressing in the amount of funds that it receives and also that the funds of the Society are very carefully expended, and that our Council evidently has first in view the improvement of the education of all its members, and endeavours to interest them by improving the library as it has done to so great an extent, by improving the museum and in all other ways furthering the cause of education in connection with the Society. I think no one can read the report without feeling satisfied that it is the first duty of the Council to further the interests of this Society in that as well as in other directions. I am very glad indeed to see that they are ready at all times to take action to maintain the Pharmacy Act of 1868; that is most important. In connection with that, I am also glad to see that they are ready to take action in this matter of the dispute which is referred to in the last clause but one of the report, and I am willing to suppose that they have given that matter the most careful consideration, for it appears to me one of the most important matters that has ever come forward affecting the interests of the Society. I should call it almost a crisis in this Society. We must not be carried away by impulse in considering this matter. It is, I see, decided that the matter should go to the House of Lords, there to be decided. That is the first and natural impulse, to take it to the House of Lords; but there is a much larger consideration connected with that matter, though I hope, and I am willing to accept the decision of the Council that this is the wiser course, particularly seeing the knowledge that our President has upon all such matters. But when we remember the difference of opinion of the judges, and find that three of the first judges in the land in the Court of Appeal stated that the Act was a muddle—for those were almost their terms; they said certainly it was very imperfect—it becomes evident that there is one thing that this Society has to aim at, namely, the amendment of the Act of Parliament, so that, as our President has most clearly stated, we should maintain our position and that there should be no dispute as to the readings of that Act of Parliament which protects us and protects the public. I hope that it is the wiser course. But there is one consideration which I think is worth a good deal of thought: the more we stir in this matter in bringing it before the public the more difficulty shall we have in a certain sense. That is to say, as long as we are dealing with lawyers, with Parliament, and Acts of Parliament, we shall be all right. But the public at large have very little appreciation and never think whether they are going to be poisoned or not; they would not give it a thought hardly, or thank you for protecting them from being poisoned. I do not want to see this brought forward as a public matter throughout the country; if it is, I am quite convinced that it will become much more difficult for our Council to deal with, for although things are much tending to this, that some day we shall have to meet public opinion, yet public opinion outside understands nothing whatever of our business or trade, or of the use or danger of drugs and poisons. I have no doubt that we shall find that the Council in the coming year will use the greatest discretion, but I thought I might give expression to these few sentences, that we might not as a body be carried away with impulse and have the idea, if the House of Lords gives a judgment in our favour, that everything is done. I believe everything will not be done. We may close the co-operative stores or we may not, but I have yet to learn that even the decision of the House of Lords will make the Act of Parliament strong enough to enable us to close the co-operative stores. I think these are matters which we should all consider and be ready to meet when they do occur. Then with regard to the last clause I will just say a word. I hope that the reading of that clause will be sufficient to stimulate the members of the Society to supply the want that is shown to exist in the funds of the Benevolent Fund. I think little need be said on that point, because I think we, as a trade, are of a generous disposition and have good hearts, and that a perusal of the clause will be sufficient to bring forward the necessary funds. I have great pleasure in seconding the motion.

Mr. Urwick said he could not quite endorse all that had been said, although he might congratulate the Council upon some parts of the report. He congratulated the associates who had come forward for the Major examination; to him that appeared to be one of the most gratifying things in the report, and he hoped young men would press forward and not be content simply with the lower qualification of the trade or profession. He was sorry to see that the expenses were rather on the increase and that sufficient was not laid by, believing that there should be a greater margin between the income and expenses. It was true they were accumulating, but he noticed that the whole of the sum carried forward from last year had not been funded, only £3388 out of £3405 having been invested, the remainder being unaccounted for. He found that there was not so much at the end of the working this year as there was last, but this might be accounted for by the examiners having a larger allowance. He was told last year not to judge of it in a commercial way, but it appeared to him the examiners in past days had not had justice done to them, or else the present examiners had more than justice done to them. It seemed to him they were landed in that position, because the increase was so much greater. Last year attention was called to the large item of "postage, £443," and he was glad to see this had been reduced to £206. The report stated that a large number of complaints of alleged infringements of the Pharmacy Act were received by the Registrar, and he took it that the stereotyped letter was forwarded in each case by the Secretary, informing the persons they were doing wrong. That might be wise in a general way, but he did not think it was always to the interest of the Society that the Council should adopt that course; when good evidence was brought before them it would be to the advantage of the Society if a different course were taken, He had in his possession evidence of a case which had occurred quite recently, which he would bring before the attention of the Council. The Legislature and the public had called for education amongst chemists; they had insisted upon their being qualified, and he thought taking a stand upon that point, the Council should do a little more for the members when their interests were encroached upon. Catalogues had been sent to the Society calling attention to the fact that grocers were prepared to dispense medicine and to sell all kinds of drugs. This was the time, as he took it, for the Council to inform them they were doing wrong and that if they persisted in it they would be prosecuted; but the Council had been rather slow to act in the matter. The chemists in the neighbourhood of one of these grocers had taken upon themselves to test what was dispensed, and for this purpose drew up a prescription containing poison, which was duly made up and delivered at the expiration of twenty-four hours. Mr. Urwick having given the particulars of the case, as well as the name and address of the grocer and chemist concerned, said he hoped the case would be taken up by the Council. The report did not refer to one subject which he should like to have seen introduced, and pursued, viz., that of getting pharmaceutical chemists more embodied with medical men in the preparation of a new Pharmacopœia, because he thought if this were done it would result in a better work being produced.

Mr. Howard Hall, referring to the case just mentioned by Mr. Urwick, said it might turn out that the grocer was simply agent for the chemist. With regard to the first paragraph of the report, relating to the admission of women, he thought the mistake, if there was any mistake, in admitting women to the privileges of the Society, had been in allowing them to come as students, or to attend the Professors' classes. The Society, having been ready to take their money for instruction, ought not to debar them from the privileges of membership, and if women were willing to undergo the test of examination they ought to be allowed to become members. He was glad Mr. Stacey had alluded to the ungracious remark "This change does not threaten any important result in the constitution of the Society." If it did not why was anything said about it? It seemed to him very much like a wasp, the sting of the paragraph was in its tail, "up to this time only four ladies have been admitted." He should like to ask the members whether they had considered the case of a chemist being left with a family of daughters. He might have a good business, but yet by a sort of *esprit de corps* they might be debarred from the privilege of membership. It was absurd. Mr. Urwick had referred to the fees paid to the examiners, and having compared the accounts of 1879 with those of 1878, he found that the excess in fees to examiners last year amounted to £580 18*s*., though the Council might no doubt be able to explain that. One item of expenditure had not been included in the accounts, viz., the expenses of the deputation to Scotland, but he supposed this would appear in the next account. The report was not altogether *couleur de rose*, because the actual increase of income in 1879 over 1878 was only £870, and the increase of expenditure in the item of Examiners alone was £580. The increase of members was not so great as the report led one to imagine; for as he worked the figures out there were actually 18 less members as pharmaceutical chemists, 13 less chemists and druggists, 67 more associates in business, 20 more associates not in business, 31 more apprentices, and 7 less entrance fees than in 1878. When the accounts came to be analysed they did not look so favourable as at first sight, because an enormous balance had been brought forward from the previous year. He was glad to see that the item of postage, to which Mr. Urwick had referred, had been reduced from £443 to £206, and that there had also been a reduction in the expenses of the Library, House and Secretary's Department. As a great deal of correspondence had taken place lately in the Journal with regard to the members of Council, he might mention that, being one of the scrutineers appointed to examine the votes on the last occasion, he found that most of the Liverpool members had plumped for one candidate, and, as he pointed out in a letter to the Editor, the business of the Society could not be performed by country members only, there ought to be more London men on the Council. At the present moment there were only a few London men on the Council, though there were plenty of gentlemen in London quite able to conduct the business of the Society, and he hoped therefore that the general body of members would recollect that the great part of the Society's business must be done by London members.

Mr. Mackenzie (Edinburgh) hoped that the financial statement would be drawn up in a manner more uniform with the views of the members rather than that the members should run in conformity with the rules adopted. In the receipts and expenditure, allusion was made last year to several points, such as the Journal, and in the present report he noticed that nothing was put to the good of the Journal, although there was a considerable sum expended upon it. Surely there must be some income derived from the Journal, and if so, it ought to be shown. Allusion was also made to the North British Branch, and he should like to have the percentages of candidates examined at that Branch as compared with the London Branch. The examiners' fees were all under one head, but if they had the amount paid for examiners' fees in Scotland, and those in England, and the number of candidates passing in England as contrasted with Scotland, they would have some idea how things were done, and would see whether one compared favourably or unfavourably with the other. There was one thing which pained him very much, and therefore he would refer to it, and it was not in this case the amount of expenditure, but the smallness of expenditure in the shape of grants towards provincial education. Last year nothing was done in that direction, but this year the Council had made a small effort and had expended £35. In his opinion the provinces demanded more than that. He could look back to the time when the Society was beating up the country for members, and one of the things put forward to induce persons to become members was that something would be done for the education of young men in the trade. So far as his memory carried him there was no such clause as that those in office would make it their constant care to increase their store and keep the money all at home. They had a great deal of money locked up in the Three per Cents., which, if laid out upon education, might yield 100 instead of 3 per cent. If spared another year he should insist upon full particulars being given of the item under the head of "Clerks and Servants, £770." That was a large item to spend, and the members ought to be told something more about it, there having been an increase of something like £50. Other items had also increased, and he hoped that next year there would be no necessity for putting any questions upon the subject. As to the report, there were several matters for which the Council deserved credit, though he did not think that the increase of revenue was a thing to be boasted of. He noticed some reference to a deputation having visited Scotland, but unfortunately he overlooked the date of their coming, or otherwise he would have attended. Last year the report stated they were also in Scotland, and great things were expected from the visit; but he supposed that such an expenditure would not be required in future, as the report stated that both examinations were conducted with equal care. At page 5 of the report he noticed that a large number of complaints of alleged infringements of the Pharmacy Act had been received by the Registrar during the past year. He was one of those who believed that the Society had not yet thoroughly realized its position through its officials; they had not become, as they ought to, a terror to evil doers. For thirty-nine years the Society had been gaining prestige which other persons sought to get the benefit of, and when infringements occurred the usual letter was sent out by the Secretary; but he thought the time had now come when that printed letter should be put in the waste paper basket. As they paid about £200 or £300 a year for law expenses, they ought to get a little more for it, and he believed that if a letter were written by the Solicitor it would carry more weight than one from the Secretary. In the next report he hoped to see a clause to this effect, that the Council had proceeded vigilantly against every case of infringement and investigated them to the utmost. Certain persons had advocated a wider system of reporting the proceedings of the Council, which had been done, and he congratulated the Council upon it, but he was surprised to see no mention of it in the report. He hoped next year to see a statement in the report that the Council had thought fit to give candidates, who came up for examination and passed two-thirds of the requisite subjects successfully, information upon the remaining third. This was done by the College of Surgeons and Physicians, and he hoped it would be done by the Pharmaceutical Society. With regard to the first part of the report, which dealt with the question of the admission of women to the Society, the subject having been brought up at the annual meeting on two successive occasions, and lost, it was certainly a bold thing for certain members of the Council to again take up the question. He did not wish to go into the merits of the case, but he thought a majority ought to be respected, when it had been legitimately obtained, and he certainly never dreamt that the matter would be again taken up after the decision of the meeting. He thought the Council should either have abided by that decision or obtain a *plebiscite* from the whole of the members. He could not help expressing his surprise at the action of some from whom he expected better things, and who, after advocating things remaining as they were, had suddenly turned right-about-face, without showing any necessity for so doing. He admired the consistency of the President in adhering to his views; but he did not like the expression in the report about the election of members resting with the Council. It was also as well to remember that the election of the Council rested with the members.

Mr. Umney (London) desired to say one or two words on the subject of the examiners' fees. Having had the honour of a seat on the Board of Examiners for five years, though he had not now that privilege, he felt he had some right to speak on the matter. He imagined that the Council had simply acted in common justice. As far as he knew the history of the Society, for about fifteen or twenty years the Board of Examiners consisted of gentlemen (Hanbury, Deane, Cracknell, etc.) who came forward voluntarily to conduct the examinations when the Society at that time was not in a position to pay for their services. Then there was another stage, which lasted probably about ten years, when the Society remunerated the examiners to the extent of about two guineas a day. They had now come to the third stage, with a Society in a flourishing condition, and he felt they had not meted out more than justice, and indeed he questioned whether the fees were as high as they should be. The examiners did not simply come down at eleven o'clock, go through the routine and leave at four, but they had to give a deal of attention and thought to the subjects they had to examine upon, for if not the examinations would soon become a mere farce. There were at least half a dozen establishments in London which in three months would perfectly gauge each and every one of the examiners and know every question they would ask, unless they really took a great deal of pains with the matter. Speaking for himself, he could say that when he was an examiner he had frequently to give very special thought to certain subjects and to avoid asking over and over again the same questions. Examiners were not infallible and were liable to slip into grooves. He hoped, rather than see the fees decrease, that if the funds of the Society allowed they might be further increased.

Mr. Andrews (London) asked if members present were entitled to place in the ballot box the voting papers of country members.

The President said that according to the rules they could only receive the voting papers of those present.

Mr. Andrews did not think that was clearly expressed on the paper.

Mr. Postans (London) said a gentleman came to him the other day, who had signed his name outside the envelope, and, leaving it open, told him he could mark it as he pleased and deliver it. Of course he told him that such a proceeding would be entirely irregular; but that only showed what vague notions some people had about the matter. While on his legs he wished he could say a word to induce a large number of gentlemen to join the Society, for it was much to be regretted that a larger percentage who passed the examinations did not become members. It was very important that they should be a large and united body, for they had much to accomplish, and whether they could accomplish the ends they desired would depend very much on the way in which they went about it. One or two things in connection with the Birmingham Association, though no doubt done with the best possible motives, he thought might be left to the Pharmaceutical Society, and he referred more particularly to the preparation of the Pharmacopœia, on which he noticed a discussion had taken place in that body.

Mr. Hampson (London) said that the Council felt that the Board of Examiners were underpaid, and it was necessary in the interests of the Society that they should get the best men obtainable. In reply to Mr. Mackenzie's observations with regard to the admission of women to the membership of the Society, he might say that the matter was not brought forward by any member of the Council, but those ladies applied, as they had a right to apply, for admission in the ordinary course; in fact the good sense of the Council was manifested on that occasion.

Mr. Whittle (London) wished to say a word or two on this question. He had always felt that it was a serious one, and the Council appeared to have thought so too, as they had taken the opinion of the meeting on two occasions, on each of which it was decidedly against the ladies. There was no specific reason for saying it was expedient to go out of their way to elect those ladies, and he considered it a most revolutionary proceeding. They could not stop there, but they would have to admit them to the Council, and if so, why not to the Board of Examiners? He maintained that from its foundation, the Pharmaceutical Society was intended to be a society of men, and that it ought to remain so. He agreed with a previous speaker that to work the Society efficiently there should be a larger number of members of Council resident in London, because matters might crop up which required immediate attention, and it was also a considerable burden on the funds to have a large number of gentlemen who had to travel long distances. Some short time ago they were told they wanted new blood, and last year they had some new blood, and he was quite satisfied with what they had at present, and hoped that the retiring members this year would be re-elected. It was also a pity they did not know more of the persons who were put forward. He did not know anything at all about half of the names which were published, and they might be good men, or they might be bad. There ought to be some guarantee that they transacted their own business well before they were put on the Council to transact the business of the Society. He begged to thank the President for his consistency, for ever since he had known him the President has always stuck to what he thought, and did not mind what other people said.

Mr. Barclay (Birmingham) said as Mr. Postans had alluded to the association to which he had the honour to belong, it was only fair that he should put him right publicly, as he had done privately, and to state that that association never contemplated taking any direct part in any way with regard to the Pharmacopœia; it was a purely trade organization, but it was quite within its limits to urge on the Pharmaceutical Society that it should take part in the compilation of a new Pharmacopœia. He was glad to find by the report that the Pharmaceutical Society had been moving in the direction of protecting trade interests, and in the steps they had taken during the past year they deserved the hearty support of the whole trade. The Society, he thought, had done the right thing in going to the House of Lords, and he had no doubt if unsuccessful there it would be on the whole the best thing that could happen, because it would bring about the amendment of the Pharmacy Act. He was not afraid of public opinion, which he believed would support pharmacists and those who were at the head of affairs in protecting the public against unregistered men. He was glad the meeting had so heartily supported the report, notwithstanding the criticisms passed upon it, which were very wholesome, and he only wished that in another quarter there was more of the same sort of thing. There was nothing like a little discussion to let daylight into affairs, and when conducted good naturedly, as it always was there, it might be the means of conveying information to the Council which might guide them in coming years.

Mr. Romans (Wrotham) said he had not received a voting paper, and on application to the office could not get one.

The Secretary said the whole of the voting papers were carefully checked over by two persons as usual. He could not say why Mr. Romans had not received his.

The President said the rule was that a second voting paper could not be issued.

Mr. Mackenzie said if that were the case they ought to be registered.

Mr. Whittle said that the proof of postage was always considered sufficient.

Mr. Brown (Greenwich) asked if it had come to the knowledge of the Council that some of the judges who gave the decision in the late co-operative case were members or shareholders of the co-operative stores.

The President said he thought it would not be wise, and it was certainly no part of the business of the Society, to impeach the position of English judges.

Mr. Smith also thought it would be very unwise to do anything of the kind.

The President, in reply to the observations which had been made, said Mr. Umney had very well explained why the fees to the examiners had been increased. Reduction in postage had been occasioned to a certain extent by an alteration in the registration, which led to a diminution in the cost of certain formal letters which were sent by the Secretary. He then gave particulars of the case alluded to by Mr. Urwick, stating that action had been taken by the Council in the matter, and he read a letter that had been received from the grocer, in which that person said that he had no desire to break the law, but acted simply as an agent for a chemist and druggist, which he had been informed he could do. Mr. Mackenzie asked why they did not give the income of the Journal, but the fact was that they showed the balance after having given away, as they did, about 6000 copies weekly; after doing that, and providing for the postage of those copies, the whole expense did not exceed £700. With regard to the proportion of candidates in England and Scotland, the President read the statistics on the subject given in the Registrar's report, and commented on in this Journal (before pp. 623 and 628). With regard to the law expenses, he should say that the Society had really more work going on than many members imagined; the Council always considered questions of that kind privately, and did not publish all the prosecutions which were instituted, though in many cases they did so, and the report referred to this matter. He could also inform Mr. Mackenzie that it was often his unpleasant duty, being President of the Board of Examiners, when a young man failed in a particular subject, say chemistry or botany, to inform him of the fact. He was not told at the end of the examination what points he had been good in, and what not; but if he failed signally in one particular thing it was announced to him. As to the delivering of voting papers, an envelope had been enclosed to each member, on which was stated that it must be returned to the Secretary on or before May 17, or be delivered personally at the time of election, so that he thought there could be no question in the mind of any reasonable man.

The motion was then put and carried unanimously.

Mr. Mackenzie said he was pleased to hear what the President said about the examinations, but he thought it would be well if the Council instructed the Secretary to be a little more courteous in the replies he gave to country members seeking information. He had received one letter from him which seemed a sort of formal thing, and gave him no information one way or the other, and if he had only stated half what the President had done it would have given him more satisfaction.

The Secretary said it had always been his endeavour to carry out the business of the Society in as courteous a manner as possible, and it was very gratifying to him to know that although he had held the office for nearly twenty-five years this was the first time that it had been alleged that he had failed in this respect.

The President said the next business was to appoint scrutineers. Twenty gentlemen had signified their willingness to undertake the duty, and he would move that they be appointed accordingly.

The names having been read, the motion was agreed to unanimously.

Mr. Bottle said it had been remarked that certain plumper votes had been given by members residing in Liverpool, and he should like that explained, because he could not think it should be generally divulged or even known as to where plumpers came from. There either did exist, or ought to exist, an arrangement that when the envelopes were opened the voting papers were all mixed up together before they were recorded.

The President said he was present the other day when a great number of the voting papers were received, and could bear witness that as they came in they were locked carefully away in a drawer by the Secretary. Whether he afterwards opened the drawer and opened the envelopes and looked into them, he could not tell, but he did not think that it was probable.

Mr. Bottle said that hardly met the point he referred to.

The Secretary said all the voting papers received would be brought before the scrutineers on the following day in bulk; they were never examined separately.

Mr. Richardson thought the method of voting papers was not quite satisfactory, and he hoped that in an amended Pharmacy Act a different mode would be adopted. They could not be too jealous about this matter, and he would suggest that every voting paper should be sent by post, and none delivered personally.

Mr. Barclay was glad this question had been opened. For the sake of all persons concerned it was of the utmost importance that there should not be a shadow of suspicion outside that there was anything like partiality, and he would advise that they should have official auditors, that all the votes should be sent in, not to the office, but to some official accountants in time to be examined, and the result made known at the meeting. In that way there could not be any chance of dissatisfaction.

The Solicitor said this was not a matter of statute at all, but was provided for by the bye-laws, and if desired it was competent to a meeting properly called to modify the bye-law. But concerning the suggestion just made he must confess he had never heard a word of suspicion thrown on the conduct of these elections, and that the present mode by which it was conducted answered some ends, which in all elections were regarded as essential. For instance, the election took place at that meeting, and it was adjourned for the purpose of receiving the report of the scrutineers, when the report was brought up and dealt with as a part of the meeting. If the idea were carried out of having the results of the scrutiny known before the meeting it would be impossible that any suggestions then made concerning the fitness of any of the gentlemen proposed could be taken into consideration, or that those suggestions should have any influence on the members who performed their duty by attending personally. By the existing mechanism a means was provided by which those who did not attend personally could, through the medium of the post, cause their votes to be recorded. This practice, as far as he could ascertain, had been in existence from the commencement, and the box being placed on the table every vote recorded was recorded in the face of the meeting, and it would be hardly practicable for the gentlemen who voted early to vote often, as possibly otherwise might be the case.

Mr. Mackay (Edinburgh) said it might be interesting to know how Mr. Hall came to the conclusion that there were certain plumper voting papers received from Liverpool. If he understood anything at all about present machinery, the voting papers being returned were put into safe custody, and when the scrutineers met were scattered over a certain number of tables, and it occurred to him that no scrutineer could possibly know how any particular members voted unless he took the trouble to put the envelope and voting paper apart for the purpose of comparison. If that had been done by the scrutineers he thought the sooner they appointed some one else to scrutinize the conduct of the scrutineers the better.

Mr. Hall said the matter was perfectly simple. There were say four thousand of these papers issued, of which the Secretary received about two thousand by post. Last year he happened to be at the table where all the Liverpool voting papers were placed and every one of them contained simply one name. Seeing that they were asked to return fourteen members it seemed a waste of power to concentrate all their votes on one candidate in that manner.

The President: Mr. Hall has shown that being appointed a scrutineer he obtained possession of certain information, and he had now been violating the confidence which was placed in him by making it public. He was very sorry he had brought the matter forward. To alter the bye-laws and to appoint official auditors would, in his opinion, be a very bad thing. If there were any suspicion of foul play public auditors would be as liable to that as others. But there was another point to be considered. In the early days of the Society it was only those who lived beyond a certain distance from Bloomsbury Square who were allowed to send their voting papers through the post, because it was considered necessary to keep personal voting in force in order to secure a good attendance at the annual meeting. If everyone chose to send by post there might be no meeting at all. They need not come with their voting papers filled up, but might hear what was said with regard to the fitness of this candidate or that, and fill the paper up accordingly. As far as personal delivery was concerned he imagined that every man who wrote his name in the book at the entrance was considered to be present at the meeting, and his voting paper might be put in the box, but if his friend gave him his paper yesterday to be put in the box to-day he should not feel justified in doing so.

The Secretary explained how it happened that the Liverpool voting papers all came together last year. For the convenience of sending to country members with regard to the appointment of local secretaries, the names were arranged in lists of towns, and the voting papers had been arranged in the same way, but he had now discontinued that, so that if Mr. Hall were present on the following day he would find the papers all mixed up, and it would be impossible to know where they came from.

Mr. Urwick thought they ought to be obliged to Mr. Hall for the information he had given them, and that the President's remarks were rather stronger than necessary.

Mr. Symes said it was not his intention to have spoken on the present occasion, but he was somewhat called upon to defend his friends in Liverpool. It struck him, notwithstanding what Mr. Urwick had said, that a scrutineer should not possess the information which Mr. Hall appeared to have, and although he did not in general approve of anonymous letters, he thought under the circumstances it would have been better if he had called attention to the matter in a different way. He must also be allowed to say that he did not come there as the representative of Liverpool. He found that he had received 1270 votes, of which at the outside not more than 100 could have come from Liverpool. He was elected by the whole country, and came there to do his duty to the utmost, as all other members of the Council had done. He had had much pleasure since he had been there in seeing the efforts of his colleagues, and he was quite sure that if some gentlemen who had passed their criticisms to-day were members of the Council and behind the scenes, they would see a great deal to modify their views. He hoped the result would be to prevent in future anyone, scrutineer or otherwise, obtaining information which he should not possess.

Mr. Brown (Greenwich) asked what check there was on putting the voting papers into the box, and suggested that some one should be appointed to take the name of every gentleman who voted, and see that he was a member.

The Secretary said no one was admitted into the room unless he was entitled to vote.

Mr. Long thought the suggestion of sending all the papers by post was a very good one. He should like to know how many more annual meetings they were to have. There seemed to be a general impression that Othello's occupation had gone and it would be a question what they should do with the funds of the Society if co-operative stores succeeded in their present contention. It would be useless to go on with the business of a chemist and druggist when all the valuable part of it was taken away from them, and the only business they could do would be after the stores were shut up, on bank holidays and Sundays. The judgment of the justices who tried the case he must term nonsense. He thought the appeal must be right, both from the misdirection of the judge, and because the verdict was against the evidence. It was quite incorrect to say that a corporation could not be examined. The Pharmaceutical Society was a corporation and all the members were examined. The real secret of the case was their bondage, and the hard work and the unpleasantness in the drug trade which caused men to get out of it if they could. If they raised their position and made themselves and their assistants more happy and comfortable, there would be no traitors in the camp, and if the stores had no qualified assistants they would not be able to do business.

Mr. Mee then moved—

"That the cordial thanks of the meeting are due and are hereby tendered to the Council for the valuable service they had rendered the Society and to chemists and druggists generally during the past year."

Mr. Smith had great pleasure in seconding the motion and congratulating the Council and President on the ordeal they had just passed through. Most of the objections raised had been answered fairly, and for himself, as an old member of the Society, he had the greatest confidence in the Council and hoped that a large number, if not the whole of them, should be retained in their seats for the present year.

Mr. Barclay felt great pleasure in supporting the motion. He had been much pleased with the action of the Council in this important crisis, and he thought when the members were satisfied they ought to express themselves as readily as they would when they had to find fault. He knew from his own experience in a more humble capacity the responsibility which rested on the Executive in prosecuting such a case as the Council had in hand, when a false step might lead to very serious results, and, therefore, the hands of the Council ought to be strengthened by the whole of the members when they were taking the right course. He took it that the motion would also include a vote of thanks to Mr. Sandford for presiding on that day. Birmingham, for some reason or other, was credited with knowing something about electioneering, and he must say they were rather proud of their knowledge and of the results. With regard to the question which had been raised of the voting, he hoped the Council would look a little more carefully into it. They were now in quiet times, when an alteration might be made without any kind of feeling. But if anything went wrong or strong feeling were aroused it would be more difficult to make any change. It was too late for members to make up their minds as to the candidates when they came to that meeting, and he therefore begged to repeat the suggestion he made before. He also desired to thank the Council for the exhibition they had instituted, and he thought that if they kept abreast of the times in that manner there would be no fear of not obtaining a good attendance at the annual meetings.

Mr. Andrews also supported the motion, and agreed that official scrutineers would be more satisfactory.

The motion was carried unanimously.

The President, on behalf of the Council as well as himself, begged to thank the meeting very cordially for the kind way in which they were always received, although they were sometimes called over the coals for their shortcomings. They had a good many difficult duties to perform, and it was not always easy to avoid an apparent negligence of the interests of their fellow members; but he could assure them that the interests of the whole trade were always present to the members of the Council. They were obliged to use their powers with discretion, and he hoped they should always continue to do so, but at the same time to uphold the interests of the druggists. He was glad attention had been called to the question of voting, and it might be as well in future to have someone with a list to check the names of those who voted; but he should be sorry to see anything like an official scrutiny introduced. He thought they might trust the Council in the ensuing year to make any improvement in the arrangements which might be desirable.

The following Registers were placed before the meeting by the Registrar in compliance with the provisions of the Pharmacy Acts, 1852 and 1868:—

Registrar of Members, Associates, and Apprentices of the Society.

Register of Pharmaceutical Chemists.

Register of Assistants.

Register of Apprentices and Students under the Pharmacy Act of 1852.

Register of Chemists and Druggists under the Pharmacy Act of 1868. Six volumes.

The portrait of Mr. Daniel Bell Hanbury, recently presented by Mr. Thomas Hanbury, was hung behind the President's chair during the meeting.

The meeting was then adjourned to Friday, at eleven o'clock, to receive the report of the scrutineers.

ADJOURNED MEETING.

Friday, May 21, 1880.

MR. GEORGE WEBB SANDFORD, PRESIDENT, IN THE CHAIR.

Mr. W. K. Hopkin, the Chairman of the Scrutineers, said that before reading the report he thought it advisable to make a few remarks respecting the manner in which the present scrutiny had been conducted. Up to last year it had been the practice to sort the voting papers received through the post, so as to bring those together that came from the same district, in order to facilitate the scrutiny of the voting for Local Secretaries. It thus became possible, as mentioned at the meeting on Wednesday, for a Scrutineer to identify the voting from a particular locality. On the present occasion a different plan had been adopted. The voting papers, which had been in the custody of the Secretary since they had been received, were handed over to the Scrutineers without being previously sorted. The Scrutineers were divided into groups of five at a table. In the first place, one Scrutineer of each group examined the envelopes containing the votes received through the post to see that they were duly signed, opened the envelopes and took out the voting papers. Another examined the folded papers to see that not more than fourteen names were left on each. The recording of the votes was then proceeded with in the following manner:—One Scrutineer called out the names of the candidates voted for; a second checked the names as they were being called, and the other three recorded them. At every fifth vote a tally was called to see that the three were all in accord. He might say also that all the voting papers that had been handed in by the Secretary as having been received through the post too late had been examined to see whether the post-mark agreed with this statement. In his opinion the work could not have been done in a more satisfactory manner had it been entrusted to professional hands.

The President said that he regretted the manner in which the subject had been brought forward on Wednesday. With respect to plumping, each voter had a perfect right to use his own judgment as to the way he voted.

A conversation then ensued as to the way in which the personal voting at the annual meeting should be conducted, and the Secretary suggested that the scrutineers should in future be appointed at the commencement of the meeting and that two should be at once told off to see that all the votes are delivered in accordance with the bye-law.

The President said he had no doubt that the subject would receive attention from the Council and that a satisfactory plan would be devised before the next annual meeting.

The Scrutineers then brought up their report:—

Scrutineers' Report.

We, the undersigned Scrutineers, appointed at the Thirty-ninth Annual General Meeting of the Pharmaceutical Society of Great Britain, do hereby certify that we have examined the voting papers committed to us, and report the following:—

Voting papers reported by the Secretary to have been issued		3650	
Voting papers received		1907	
Voting papers issued but not returned			1743
Voting papers received			1907
Voting papers disallowed:—			
Informal having more than fourteen names	4		
Received by post too late	77		
Envelopes unsigned by voters	16		
			97
Voting papers registered			1810

Result of the Poll.

Schacht	1614	Frazer	1389
Symes	1588	Squire	1358
Hampson	1570	Andrews	1048
Savage	1564	Radley	1043
Greenish	1551		
Mackay	1541		
Hills	1535	Spink	995
Gostling	1492	Postans	847
Sandford	1461	Shepperley	681
Atkins	1422	Wills	579

W. K. Hopkin, *Chairmv*

Charles B. Allen.	William Warren.
J. H. Baldock.	W. H. Symons.
G. F. Gutheridge.	W. I. Gulliver.
J. Horncastle.	Isaiah Bourdas, junior.
W. H. Ferguson.	W. Ralph Atkins.
W. Pickard.	Charles A. Blake.
Charles R. Riley.	T. Edward Greenish.
Alfred E. Tanner.	Charles J. Mead.
Thomas Henry Powell.	R. Fisher Young.
Richard A. Robinson.	

The New Council.

The Chairman then declared that the following gentlemen would constitute the Council for the ensuing twelve months:—

Andrews, Frederick, 34, Leinster Terrace, W.
Atkins, Samuel Ralph, Market Place, Salisbury.
Bottle, Alexander, 37, Townwall Street, Dover.
Churchill, Walter John, 46, New Street, Birmingham.
Frazer, Daniel, 113, Buchanan Street, Glasgow.
Gostling, Thomas Preston, Market Hill, Diss.
Greenish, Thomas, 20, New Street, Dorset Square, N.W.
Hampson, Robert, 205, St. John Street Road, E.C.
Hills, Thomas Hyde, 338, Oxford Street, W.
Mackay, John, 119, George Street, Edinburgh.
Radley, William Valentine, 7, Hampton Road, Southport.
Richardson, J. G. F., Houghton House, Stoneygate, Leicester.
Robbins, John, 372, Oxford Street, W.
Sandford, George Webb, 47, Piccadilly, W.
Savage, William Dawson, 4, Park Road East, Brighton.
Schacht, George Frederick, 7, Regent Street, Clifton, Bristol.
Shaw, John, 24, Great George Place, Liverpool.
Squire, Peter Wyatt, 277, Oxford Street, W.
Symes, Charles, 14, Hardman Street, Liverpool.
Williams, John, 16, Cross Street, Hatton Garden, E.C.
Woolley, George Stephen, 69, Market Street, Manchester.

Auditors.

There being only the requisite number of candidates (five) for the office of Auditors, the Chairman declared the following duly elected for the ensuing twelve months:—

Hodgkinson, William, 127, Aldersgate Street, E.C.
Lescher, Frank Harwood, 60, Bartholomew Close, E.C.
Stacey, Samuel Lloyd, 300, High Holborn, W.C.
Thompson, Henry Ayscough, 22, Worship Street, E.C.
Watts, William Manning, 32, Lower Whitecross Street, E.C.

On the motion of the President, seconded by Mr. Spink, a vote of thanks was given to the Scrutineers.

Mr. Hopkin proposed, and Mr. Horncastle seconded, a vote of thanks to the Chairman, which was unanimously agreed to.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

Wednesday, April 7, 1880.

Present—Professor Tichborne, President; Dr. Aquilla Smith, Vice-President; Sir George Owens, M.D., Dr. Collins, Messrs. Bennett (Kingstown), Brunker, Doran (Bray), Goodwin, Hayes, Holmes, Oldham. Simpson.

The minutes of the meetings held on March 3 and 8 were read and signed.

Read a letter from Sir James Gell, Attorney-General for the Isle of Man, thanking the Council for the information they had given him as to the working of the Irish Pharmacy Act.

Read letters, dated February 12 and March 31, from Mr. M. R. Nugent, of Limerick, requesting permission to be examined for the licence under the provisions of a regution passed by this Council on November 5, 1879.

The Registrar stated that there were several other applications of the same nature, which he had been obliged to postpone, pending the decision of the Privy Council. The new regulations had been collected by him, and forwarded to the said Council for confirmation on December 30, 1879, but that up to the present time he had not received any reply, except an acknowledgment of their receipt.

Proposed by Mr. Holmes, seconded by Mr. Brunker, and resolved:—

"That the Registrar be directed to write to the Clerk of the Privy Council reminding him of certain resolutions which were forwarded for confirmation in December last, and stating that some inconvenience has arisen from the fact of their not yet being brought into operation."

The following candidates for the membership, who were duly proposed and seconded (as follows) at the meeting on March 3, were now elected members:—

By the President and Mr. Hayes:—
John Blair, Patrick Street, Cork.
John Patrick Harold, Ormond Quay, Dublin.
John Charles Thomas Day, George Street, Limerick.

By Mr. Holmes and Mr. Doran:—
Andrew M'Connell, Castlepollard.
James Robinson, Lincoln Avenue, Belfast.

By Mr. Bennett and Mr. Hayes:—
Arthur Trevor Owen, Appian Way, Dublin.
Frederick Meyers, Upper George's Street, Kingstown.

By Mr. Holmes and Mr. Hodgson:—
David Baxter, Ballymoney.

The Registrar laid on the table the following books, presented to the Society by the British Pharmaceutical Conference.

Bell and Hills Library Fund.

Medicinal Plants, by Robert Bentley, F.L.S., and Henry Trimen, M.B., F.L.S., 4 vols. Lond. 1880.
Miller's Elements of Chemistry, vols. 1 and 2. Lond. 1877—78.

From Thomas Hanbury, in memory of his brother Daniel Hanbury, F.R.S. and F.L.S.:

Fluckiger and Hanbury: Pharmacographia. Lond. 1874.
Hanbury (Daniel), Science Papers, chiefly Pharmacological and Botanical. Lond. 1876.

Proposed by Mr. Bennett, seconded by Mr. R. Simpson, and resolved:—

"That the marked thanks of this Council be presented to the members of the British Pharmaceutical Conference for their very handsome and valuable donation of books to the Library of this Society."

MEETING OF THE COUNCIL.

Wednesday, May 5, 1880.

Present—Professor Tichborne, President; Sir George Owens, M.D., Dr. Collins, Messrs. Brunker, Doran (Bray), Goodwin, Hayes, Hodgson, Holmes, Oldham, Pring (Belfast), Simpson.

The minutes of the meeting held on Wednesday, April 7, were read and signed.

Read a letter from William S. B. Kaye, Esq., LL.D., Clerk to the Privy Council, relative to the resolution on a course of practical chemistry, which had been sent in for confirmation.

The draft of a reply was read and amended, and the Registrar was instructed to forward a copy to the Privy Council.

Read a letter from Mr. John Watters, M.P.S.I., of Kilkenny, relative to alleged arbitrary action of the Prisons' Board, Ireland.

The Registrar to inform Mr. Watters that the Council regret the circumstances of which he complains, but cannot advise him; they think his best course will be to consult a lawyer.

Read a letter from John Campbell, M.B., Secretary to the Medical Faculty of the Catholic University, requesting that the Laboratory of the School of Medicine, Cecilia Street, be placed on the list of those recognized by the Council for laboratory practice, and inviting an inspection by the Council.

Proposed by Mr. Pring, seconded by Mr. E. M. Hodgson, and resolved—

"That Dr. Collins, with Messrs. Brunker and Hayes, be appointed as a committee to inspect all such schools of medicine in Dublin, as may apply for recognition of their practical courses of chemistry by this Council, and that they be requested to visit the Cecilia Street school during this month, and to report as to its efficiency to next meeting of Council."

Read report from the Law Committee on some cases of compounding by unqualified persons, which had been reported to them, recommending that legal proceedings be taken against the offenders.

Proposed by Mr. Doran, seconded by Mr. Goodwin, and resolved—

"That the report of the Law Committee be adopted, and that the cases be placed in the hands of our Solicitor."

The Examiners' reports of the examinations held in April were laid on the table. At the Preliminary examination, held on Monday, April 5, *ten* candidates presented themselves, all of whom, excepting one, passed.

At the Pharmaceutical examination, held on Wednesday, April 7, *six* candidates presented themselves, of whom the following *four* passed.

John Isaac Bernard, Merrion, Co. Dublin.
Samuel Cheyne Nicholl, 33, High Street, Belfast.
William Livingston Ross, Enniskillen.
George Robert Young, Antrim Ville, Belfast.

Proposed by Mr. Oldham, seconded by Mr. Hodgson, and resolved:—

"That the report of the Examiners for the Preliminary and Pharmaceutical examinations be adopted."

The four candidates who passed the Final examination were now registered as Pharmaceutical Chemists.

Mr. Thomas Sheppard Hance, Limerick, who was proposed and seconded in April as a candidate for the membership, by the President and Mr. Hayes, was now elected a member.

Some bills, together with rent and salaries, were ordered for payment, and the Council then rose.

Chemists & Druggists' Trade Association.

MEETING OF THE EXECUTIVE COMMITTEE.

The meeting of the General Committee, preparatory to the annual general meeting of members, was held at the Inns of Court Hotel, on Tuesday, May 18, at 11 a.m. The chair was taken by the President, Mr. Thomas Barclay.

The Secretary having read the notice convening the meeting,

The President said the first business was to fill up the committee, on which there were four vacancies.

Messrs. Carr (Berwick-on-Tweed), Pasmore (Exeter), Mason (Liverpool), and Joseph Ball (Birkenhead), were accordingly added to the committee.

Mr. Harrison (Sunderland) then moved that the report and accounts be received and adopted, and recommended to the annual meeting. He thought the report could not be considered at all unsatisfactory, seeing that they had a balance in hand of £830, and last year it was only £896, and the past year might be looked upon as one of exceptional expenditure. The only point in the report with which he was not quite satisfied was the part relating to the service of chemists and druggists on juries. Early in the year he had communicated with the secretary telling him that in his opinion and that of many in his neighbourhood, the time was very suitable for taking up this question. Circumstances had now considerably altered, but still he hoped they would not wait until they had a new Pharmacy Act or a Jury Bill, but would endeavour to get the exemption now enjoyed by members of the Pharmaceutical Society at once extended to all on the Register. He believed it would be a long time before a new Jury Bill was passed, even with the present liberal House of Commons, because there were so many conservative notions and ancient prejudices bound up with the ideas of a British jury.

Mr. Phillips (Wigan) seconded the motion, and said he sympathized with the remarks of Mr. Harrison on the jury question.

Mr. Greaves (Chesterfield) took some exception to the part embodying the resolution on the subject of confining the sale of patent medicines containing poisons to registered chemists and druggists. He thought most gentlemen on the Executive Committee resided in large towns, and were hardly aware of the circumstances of rural districts. In his own neighbourhood there was an area of some 500 or 600 square miles with only fourteen registered chemists, and nine of those were in four places; and there were only two examined men in the whole number. Mr. Greaves went on at some length to point out the difficulties which occurred where there was no registered chemist within several miles, until the President inquired if he was arguing in favour of a repeal of the Pharmacy Act. Mr. Greaves replied in the negative, and said that he had done his best to assist in carrying out the Act, but the requirements of the public must also be kept in view, for if they obtained any legislation which was beyond public opinion it would become a dead letter.

Mr. Jervis (Sheffield) thought the greater part of the district referred to by Mr. Greaves was moorland.

The President, in putting the motion, said he must say, in reply to Mr. Harrison, that they were advised by the solicitor (who, he regretted, was unable to attend today) that no steps could be taken in the matter of the jury exemption before an amended Pharmacy Act or a new Jury Bill were brought in. He could not agree that the financial position of the Association was very satisfactory, since their balance had somewhat decreased, and they could not consider the expenditure during the year had been at all exceptional. In reply to Mr. Greaves, he must remind him that their action in connection with the sale of poisons had been quite in accordance with public opinion. The press were almost unanimous in requiring that those who sold poisons, whether in the shape of patent medicines or otherwise, should be registered chemists and druggists. They were not, therefore, simply acting in their own interest in this matter, but in the interests of the public, in moving in this matter. No one would attempt to do anything opposed to public opinion, because if they did they would not only fail, but bring disgrace upon themselves. In country districts he understood it was the habit for people to keep themselves supplied with what they were likely to require from the nearest market town. Mr. Greaves's argument, if carried to its legitimate extent, would upset the Pharmacy Act altogether, and there would be free trade in poisons. He must also remind Mr. Greaves that the Executive Committee represented country districts as well as large towns.

After a few further words from Mr. Greaves in explanation, the resolution was put and carried unanimously.

The President said the next business was to prepare the list of names to be recommended to the annual meeting for the election of the Executive Committee.

Messrs. Throstle, Mackenzie and Davidson were appointed scrutineers. Whilst the scrutineers were examining the papers,

The President referred to the subject of one of the members being summoned (as will appear below), and he also moved a resolution of sympathy with Mr. Jones, the late President, in his illness.

This was seconded by Mr. Hampson, supported by Mr. Cross (Shrewsbury) and carried unanimously.

The President then said Mr. Andrews had drawn his attention to the large amount of outstanding subscriptions which were unpaid. It was a very important matter, as they were rather short of funds.

Mr. Andrews said if a list of defaulters in his own neighbourhood were given him he would look them up.

Mr. Maltby (Lincoln) also volunteered to do the same in his district, saying, that at the time of the Shepperley case he had collected as much as £20 in Lincolnshire. He thought it would be a good plan for the Secretary to send a list of subscribers to some gentlemen in each neighbourhood who would undertake to collect them.

Mr. Symes said he, and he believed several others, had always had such a list forwarded to them, and in going round he often made new members.

Mr. Walker suggested the desirability of appointing local secretaries in the different districts similar to those of the Pharmaceutical Society. There were many persons who were reluctant to pay their five shillings, or did not do so, but if they happened to receive a summons for some breach of the law they sent it up with great alacrity and called upon the Association to defend them.

The President said every member of the General Committee was *ex officio* a local secretary.

Mr. Maltby also suggested that in collecting subscriptions efforts should be made to obtain additional donations so that they might have an invested fund to fall back upon in case of need.

The following list was reported by the Scrutineers to be chosen for recommendation to the annual meeting as the—

Executive Committee for 1880–81.

Andrews, Frederick, London.	Jervis, W., Sheffield.
Arblaster, C. J., Birmingham.	Johnson, T. S., Malvern.
Barclay, Thomas, Birmingham.	Kerr, Charles, Dundee.
Bell, C. B., Hull.	Mackenzie, James, Edinburgh.
Churchill, W. J., Birmingham.	Maltby, Joseph, Lincoln.
Cole, F. A., Colchester.	Owen, John, London.
Cross, W. G., Jun., Shrewsbury.	Phillips, J., Wigan.
Davison, Thomas, Glasgow.	Southall, William, Birmingham.
Delves, George, Exeter.	Stead, T. B., Leeds.
Hampson, Robert, London.	Symes, Charles, Liverpool.
Harrison, John, Sunderland.	Walker, George, Coventry.
Holdsworth, T. W., Birmingham.	Williams, F. P., Manchester.

The Annual Meeting.

The annual general meeting of members was held at 12.30. Mr. Barclay, President, in the chair.

The President said that they must all regret the absence of Mr. Jones, the late President, which was quite unexpected, through his being out of health. He had always taken the liveliest interest in this Association from its earliest inception, and he was sure nothing but necessity would have prevented him being present.

The report, which was taken as read, referred with satisfaction to the abandonment of the appeal in Mr. Shepperley's case, and congratulated the members on the success thus obtained. The second division of the report referred to cases of infringement of the Pharmacy Act, in ten of which convictions had been obtained, whilst eight had been reported during the year by the Secretary to the Registrar of the Pharmaceutical Society, though in one only of these had proceedings been taken in a court of law, when a penalty of five pounds was inflicted. A hope was expressed that in future the Pharmaceutical Society would more frequently utilize the evidence placed at its disposal by the Association. With regard to service on juries, the sub-committee reported that it would be useless to attempt taking any steps for exempting chemists and druggists from service until an amended Pharmacy Act or Jury Bill was before Parliament. The report next referred to several cases in which the Association had successfully defended persons prosecuted under the Sale of Food and Drugs Act; one case, however, the Committee had declined to defend, thinking the accused had not used sufficient care. The sale of poisons under cover of the patent medicine stamp had also engaged the attention of the Committee, and a memorial had been forwarded to the Pharmaceutical Society on the subject. The desirability of the Pharmaceutical Council taking an official part in preparing any revised edition of the Pharmacopœia had also formed the subject of a resolution, and reference was also made to the action of the Association in defending a member prosecuted under the Weights and Measures Act.

The list of members showed a total of 4527 annual subscriptions for the year, being an increase of 181.

Mr. Green (Woolwich) moved that the report and balance sheet be received and adopted. He hoped that what had taken place in the General Committee early in the morning would lead to a further amount of subscriptions.

Mr. Mason (Liverpool) seconded the motion.

Mr. Spink (Westminster) said the report dealt with a variety of matters respecting the general interest of the trade, and there was no doubt that the Association had done good service, but there was one evil not mentioned in the report at all. He did not rise to move a resolution unless it were absolutely necessary, but to make a suggestion, viz., that the Committee should take into consideration the trading proclivities of the Civil Service and select delegates from its body to give evidence before the Parliamentary Committee which no doubt would be going on with its labours when Parliament met, for unless the chemists and traders generally made a firm and determined stand now any effort in future would be absolutely futile. As that Association had been for some years watching the best interests of the trade and the means by which they might be allowed to live, he thought it would be as well to send delegates to the Committee to give evidence. He had attended before the Committee himself, and one of the first questions asked him by the chairman was whether he represented any society; and he felt strongly convinced that if he had appeared in a representative capacity more weight would have attached to his evidence. Considering the way in which they were hampered on all hands by Weights and Measures Acts and other things, and the examination they had to undergo, it was grossly unfair that these people should come and set up in trade and sell things at less than cost price. The stores interfered more with their business than any other; of course their turn-over was very small and consequently according to the ordinary tariff the profits were proportionately high, but these stores had a large business in other matters and were able to put forward their goods in some cases absolutely below cost price. He had the honour to be a candidate for a position in another place, and if he should attain that position he should advocate there what he was now doing, that delegates be selected to attend and give evidence before the Parliamentary Committee.

Mr. Long had much pleasure in supporting the resolution that the report and accounts be adopted, and he also thought it very important that they should do all they could to put down co-operative trading in poisons.

The President thought the question raised by Mr. Spink was of such importance that it had better be dealt with specifically by a separate motion later on.

The motion for the adoption of the report was then put, and carried unanimously.

The President said the next business was to elect the Executive Committee and officers for the ensuing year. He would call upon the Secretary to read the names selected by the General Committee.

This having been done,

Mr. Spink moved that the names selected by the General Committee form the Executive Committee for the ensuing year.

Mr. Brown (Greenwich) seconded the resolution, and it was at once carried unanimously.

The President said it had been usual to elect the officers by ballot, and Messrs. Spink and Urwick were appointed scrutineers to examine the voting papers.

Whilst these gentlemen were examining the papers,

The President said it might be interesting to the members to know that one of their members had been summoned to appear before the magistrates to-morrow morning under the new Weights and Measures Act. He had been summoned not for having ordinary weights used by ordinary traders, but for grain and drachm apothecaries' weights. They had been tested by the inspector, and reported to be not correct. Last night, the Executive Committee determined the Solicitor should be telegraphed for, and he would no doubt arrive that evening and take charge of the case. They did not know to what extent these weights were wrong, and of course were somewhat in the dark at present, but inasmuch as it was the first time that apothecaries' weights had been called in question, they thought it their duty to take it up, especially as the gentleman who had been summoned informed them that he had been always very particular, and had had his weights and scales certified every two or three months, but he had never had his grain and drachm weights tested. It would depend very much on the kind of balance which was used in testing these small weights, because no doubt if one were used with such a fine beam that it would turn with $\frac{1}{100}$th of a grain, hardly any of the weights in the country would be correct. One of the seventeen weights which had been objected to was a 3-grain weight.

Mr. Long thought this question of the weights was a great bogie. For 1*s.* 6*d.* they could save all trouble. He had both his sets of dispensing scales and sets of weights adjusted for 1*s.* 6*d.* each; but still they did not all weigh alike, for after having the Government stamp on them, if you put the 2 grain and the 3 grain together they would not balance the 5 grain. However, that did not signify so long as they were stamped.

Mr. Hampson desired to ask Mr. Long if they were stamped how long they would remain correct. It was very important to bear in mind that under this Act the trader was quite unprotected. If such a thing occurred as that an inspector had a grudge against a man, he might easily file a little off one of the weights, and there was no protection to the tradesman whatever; they were absolutely at the mercy of the inspector. Under the Sale of Food and Drugs Act there was some protection, because the sample purchased was divided into three portions, but it was not so here. Of course, he did not mean to say the inspector would tamper with the weights, but they were absolutely at his mercy.

Mr. Phillips (Wigan) said he believed it would also be now illegal to use scales with anything attached to them to adjust them. It often happened in cleaning scales they got a little bit incorrect, so that they were obliged to put a little bit of lead at the bottom to balance; but he believed that would now be illegal.

Mr. Churchill said he believed that according to the Act it was no use for a country chemist to buy weights stamped with the London stamp, they must bear the stamp of the local authority in his own district. As soon as he got home he should communicate with their own inspector to see if he was ready to stamp the weights.

Mr. Symes thought this view was not correct, . at that weights stamped in London were good in any part of Great Britain.

Mr. Robinson (Norwich) thought inspectors were not very anxious to carry out the law. He had recently inquired of the inspector in his own town, and he told him he had not yet received the standards and did not suppose he ever should.

Mr. Andrews thought there were very few inspectors who could properly test a 3-grain weight.

The President said he might take this opportunity of mentioning the next election of the General Committee. It was a very costly proceeding in the matter of postage and printing and involved a deal of trouble to the members, and, therefore, two years ago they decided that the election of the General Committee should take place in alternate years, and unless there was some good reason for altering it they should do the same again. He would therefore move, "That this meeting directs that the next election of the General Committee take place in 1882."

Mr. Shepperley seconded the motion, which was carried unanimously.

The President said another resolution which would commend itself to the meeting was with reference to the late Chairman. As he had said earlier in the meeting, they all felt the loss of Mr. Jones, and he was sure if he had been in anything like health he would have been amongst them that day. His sympathies were so much with the Association and he had done such good work for it in the past, that he was sure it would be the wish of the meeting that some expression of sympathy should be sent to him and his family. He would therefore move, "That this meeting of the Chemists and Druggists' Trade Association hears with regret of the illness of Mr. S. U. Jones, its late President, which prevents him again sitting on the Executive Committee, and expresses the hope that he may be speedily restored to health." Mr. Jones was elected President at the inception of the Association, when it was looked upon somewhat coldly by some gentlemen in high quarters, and Mr. Jones, in his position as President, was very useful in giving confidence to the members. He did a great deal to consolidate and help it forward, and he deeply regretted his absence from the Executive Committee. He was always at his post, and by the thoughtful and considerate judgment he gave to every question which came before him he rendered the Committee great service. He had, therefore, much pleasure in moving the resolution.

Mr. Hampson, as Vice-President, seconded the motion.

Mr. Innes (Liverpool) supported the motion.

The motion was then put and carried unanimously.

The Scrutineers having now returned,

Mr. Spink begged to inform the meeting that there was no change whatever in the Executive for the coming year, and he thought they might accept gladly this unanimity of feeling amongst those present. He only wished the same unanimity existed among all the members of the trade as apparently existed there, for although there were two or three differences of opinion the vote might be taken as practically unanimous. It was very much to be regretted that a larger number did not come to the meeting.

Mr. Urwick said with the exception of one or two votes the decision was unanimous, and he was very pleased it was so, because it showed that the members were perfectly satisfied with the way in which the business had been conducted, and he trusted the officers would go on and work as thoroughly in the future as they had hitherto done.

The President, in thanking the meeting on his own behalf and that of his colleagues for this renewed mark of confidence, said he could speak, at any rate, for his colleagues, that during the year they had given their best attention to the interests of the Association; their hearts had been thoroughly in the work, and he felt sure the meeting had done well in re-electing them. For his own part he felt great interest in the Association, and had done from the first, and during the past year he had done his utmost to further its interests, and those of the entire trade. The resolution adopted with regard to the report was one for which he would also thank them. That report shadowed forth the work of the Executive during the year, but it by no means showed the amount of work which the Committee had had to go through. The amount of care and anxiety with regard to the various matters which came before the Law Committee especially could not well be stated in words. They were glad to know that they had had a slight increase numbers during the year, but there were still over three thousand remaining outside, and it only needed a little enthusiasm and effort on behalf of the members of the General Committee to largly increase the numbers during the coming year. The work which had been done must commend itself to the trade generally, and he trusted that a strong effort would be made to increase the number of members so that at the next annual meeting they might congratulate themselves on a still further increase. The receipts during the year had been £1256 and the expenditure £1395, which was going in the wrong direction, showing a deficiency of £139, and that was accounted for in this way, that at the last annual meeting they had a balance of £896, whilst this time there was only a balance of £830. When there was a balance in hand there was always a general feeling that it was not the time to increase subscriptions or give donations, and he was therefore glad that at the general meeting that morning Mr. Maltby, of Lincoln, made a very practical suggestion, that they should endeavour to increase the donations in order to have a sort of guarantee fund, which might be drawn upon in the event of any exceptional necessity, so that they need not consider so carefully whether they dare go forward or not in the defence of cases put before them so long as they knew they were cases which ought to be defended. When Mr. Shepperley's case was before them their friends stepped forward very liberally, and he had no doubt they would always have a similar response if necessary; but still it would be better, and make them more free in the Executive Committee if they had some invested funds. It was not unfrequently the case that they had to inquire of the Treasurer how their funds stood when a case came before them, and that somewhat tended to cramp their action. During the past year the donations had been rather small, only £143. The first year they had £1028, and in the second year £375, and in the third year £1645. They had, however, during the last year a special donation, which required perhaps a little attention, and that was £165 from the Apothecaries' Company, which was very welcome. They were well pleased with it for many reasons. A very serious matter in connection with the state of the funds was that over one thousand subscriptions were still unpaid, and that called for the attention of every member of the Association. He believed that there were a large number who had not sent up their subscription because it was so small, and no one had asked them for it, but that morning in the General Committee, several gentlemen had volunteered to go round in their own districts and collect the subscriptions and he trusted the Secretary would have further volunteers in that way before the meeting closed. With regard to the amount received from the Apothecaries' Company they were very glad to receive it, because it showed the case was finished, and it saved them an immense amount of anxiety, and not only themselves, but the whole trade, and the Apothecaries' Company as well, for if it had gone on with that sort of thing it could not have failed to bring disgrace and ignominy upon itself. None of them who mixed much with medical men, but knew that there was no sympathy on the part of the better class of members of that profession with that prosecution, and they might be quite certain now that no chemist would be interfered with in the future who followed his calling in the ordinary way and did not do anything beyond what chemists had undertaken to do since the business had first grown up. During the year there had been some Medical Bills introduced which had been watched very carefully, but they were glad to find that their friends had not in any of those Bills attempted to interfere with the rights of chemists and throughout had abstained from including the penal clause in the Apothecaries' Act. During the year the Association had undertaken to prosecute offenders for infringement of the Pharmacy Act, though they were limited in their action in this matter, and could only prosecute under the 17th section, so that vendors who called themselves chemists though they were not so, and who labelled their poisons as chemists, they had no control over. If, however, they did not comply with the 17th section they could take action, and in ten such cases they had obtained convictions. It was also satisfactory to know that in no case in which a conviction had been obtained had any chemist been called upon to give evidence. This proved the necessity and usefulness of the Association most incontestably. Eight cases had been sent to the Pharmaceutical Society, and in one of those the Secretary had used the evidence forwarded to him, and had obtained a conviction. It was a subject for congratulation that they had thus for the first time obtained concerted action between the two Societies; they were not working in any way in antagonism to the Pharmaceutical Society and so long as that Society would do its utmost to protect the interests of the trade, so long would it have the hearty sympathy of the Association, and anything the Executive could do would be readily done to assist it. They must not forget that the Pharmaceutical Society occupied an entirely different position to themselves, as it not only represented the trade, but the Government and the public; they, on the other hand, were a purely trade organization, and could undertake cases in the police court with regard to adulteration, and many other things which the Pharmaceutical Society could not so well do, and, therefore, he felt there was work, both for the Society and the Association, and they might work harmoniously, although not on the same lines. He mentioned this because the Society was sometimes blamed for not doing what it could not properly do, and he hoped also to secure the co-operation of those members of the Society who had not yet joined. During the past year the Pharmaceutical Society had had an important matter before it, and they heartily endorsed its action with regard to the London and Provincial Supply Association. The Council might feel assured that the Executive watched with great interest and anxiety its action in that matter, and were very glad to find they had had the courage to go to the House of Lords where it wished them every success. It had a good case, and if beaten in the House of Lords it would necessitate the united action of all parties connected with the trade to get an amended Pharmacy Act to prevent such a state of affairs continuing. If the law were weak the sooner it were made strong the better, because it was an outrageous thing that any corporate body, say half a dozen grocers, could employ a qualified chemist, and set up a large trade. There was a law against a chemist taking a partner who was not a qualified man, or even the widow of a chemist carrying on the business with a qualified assistant, and yet according to the latest decision, half a dozen grocers might meet together and employ some nondescript chemist to carry on a large business. If this were found to be the real state of the law they must get the law amended as soon as possible. With regard to the Jury Bill some little feeling had been expressed that the Association might have done something during the year, but their solicitor advised them that it would be unwise to take any action until an amended Pharmacy Act or a Jury Bill came before the House. He was glad to find, however, that their friend Mr. Harrison, who had always been enthusiastic on this subject, was now a member of the Executive, and, therefore, there was no doubt it would receive due attention. With regard to the Adulteration Act several cases had come before them during the year, one of which they could not defend, because it appeared that the individual prosecuted had not used sufficient care, and they felt they could not defend anything in the shape of adulteration. Three cases, however, they had defended successfully. After alluding in some detail to these cases, the President said that magistrates and analysts alike were most of them ignorant of the technicalities of the trade, and they found it was necessary there should be some amendment of the Act. At present they were obliged to pay the costs of the analyst attending to give evidence, although the decision might be in their favour, and they intended the first opportunity to move for an amendment of the Act so that the costs should follow the event. They also wanted a central board established to which the evidence should be sent before any prosecution was authorized, and not leave it in the hands of the local analyst. He believed the Association generally were agreed that it was the right course to take, to go forward and endeavour to obtain such an alteration of the law as would prevent patent medicines containing poisons being sold by unqualified persons. This was one of the objects set forth when the Association was first started, and it was satisfactory to find that that and other objects had been kept steadily in view, and that on the whole the Association had been fairly successful.

Mr. Urwick inquired if the Association would take up cases of sending out poisons by unqualified persons, which the Pharmaceutical Society would not take up.

The President said those were cases which the Executive were always glad to hear of, and though they could not pledge themselves without looking into the case, he was prepared to say that if the Solicitor thought it was a case which they might successfully prosecute, they would take it in hand at once.

Mr. Hampson, as Vice-President, also desired to thank the meeting for his re-election, and said he should endeavour to work for it, if possible, more zealously than he had hitherto done. It was difficult to pick out any special questions on which to speak, as he was interested in most of them, but he should like to say a word on the question of co-operative trading. He had given this subject a great deal of attention, and had argued it at the Pharmaceutical Council. He was very much pleased that a case had been taken into court, and that it was being carried to the highest tribunal. There was one aspect of it he should wish to refer to, namely, its effect on medical practice. They were said to be a branch of the medical profession, and he should like to ask what would be the effect of dispensing being practised in large stores for the bulk of the population, instead of under the conditions which prevailed at present. His impression was that it would react very much against the medical profession if this continued, for they certainly would not have men of intelligence coming into the trade. It was hard enough to get a living now, but if these things went on it would be simply impossible. He heartily sympathized with Mr. Spink with reference to the smallness of the gathering, notwithstanding its representative character. This was the metropolis of Great Britain, and everybody was grumbling about the state of trade, and yet they could not get the room full. That showed how apathetic they were with regard to their own interests. Another matter of importance was the question of the Pharmacopœia. He thought it only just that it should be partly framed by the chemists of the country, and he hoped that matter would continue to have the support of the Executive. The real point they had to consider was what could they do to make pharmacy worth practising. As they all knew, he heartily advocated the case of Mr. Shepperley; but they would have in future to concentrate their efforts in one point—the obtaining of the dispensing of the country. At present, they had not got it; they had simply the fragments from the rich man's table; they were not pharmacists—they were little better than pettifogging hucksters, many of them. The time might arrive when they could appeal to the Legislature on this question, for he contended that it was as much their function to dispense prescriptions as it was for doctors to prescribe. He hoped they would keep that idea before them, and at the fitting time concentrate all their energies upon it.

Mr. Shepperley congratulated the President on the very able manner in which he had explained the report of the past year. He must express his own pleasure on the repose to which the Apothecaries' Act, which had caused him so much trouble and anxiety, was now relegated.

Mr. Spink then moved:—"That this meeting recommends the Executive to appoint delegates to appear before any Parliamentary Committee which may be appointed to receive evidence on the question of co-operative trading."

Mr. Urwick seconded the motion. He thought the Committee did not pay so much attention to any man who volunteered to give evidence on his own account as they would to anyone regularly appointed, and he hoped the Pharmaceutical Society also would adopt the same course.

Mr. Long said it was a most absurd thing that persons should evade the law by two or three combining together. Betting was illegal, but Kerr and Benson were not allowed to escape with impunity because they combined to carry on an illegal business. The great thing was for chemists to be more united. They were the makers of genuine patent medicines, and they might very well put all the other rubbish into the dust hole. Why did they not supply themselves, and not allow other people to take the trade out of their hands?

Mr. Churchill thought that Mr. Long had hit the right nail on the head. Many chemists were the proprietors of patent medicines, and some few that made these articles confined the sale of them to qualified men. He trusted that wherever chemists found that was being done they would heartily support those proprietors.

The motion was then put and carried.

Mr. Alldin drew attention to the fact that the name of one of the judges before whom the case now pending was last tried appeared as a member of one of the co-operative stores.

Mr. Spink said he thought it was always understood that if any judge were interested in the trial of a case which came before him he should leave the bench, and if a judge held a shares in a co-operative society, he did not think it was consistent that he should adjudicate on a question in which it was interested.

Mr. Andrews also thought this was a point of importance which might be dwelt upon by counsel in the House of Lords.

The resolution was then put and carried unanimously.

Mr. Throstle (Cambridge) then moved:—"That this meeting affirms the necessity of early closing and pledges itself by each of its members to favour a system of moderate hours."

Mr. Long seconded the motion.

Mr. Mackenzie said this was a matter which each one could carry out for itself. If everyone would look to his own door, and shut it at the proper time, all would be well, but everybody waited to see his neighbour closed first, and this led to late hours.

Mr. Hampson thought this was a matter which depended a good deal on the action of localities.

Mr. Urwick said every man had the option to close when he liked. He himself, when he commenced, closed every Sunday, and at nine o'clock every evening, although his neighbours did not; but now they had all come to it.

The President thought this was rather a difficult question, and one to be left to the local traders. He would suggest that the resolution should be framed in this manner:—"That this meeting agrees upon the desirability of its members adopting a system of earlier closing, and recommends its adoption as far as practicable."

Mr. Throstle said he would adopt this resolution, and after some observations from Mr. Burton, it was agreed to unanimously.

The meeting concluded with a vote of thanks to the President, moved by Mr. Urwick, and seconded by Mr. Harrison.

Communications, Letters, etc., have been received from Messrs. Saunders, Moss, Greenish, Williams, Burrough, Macaulay, Hind, Levy, Inquirer, Antidote, Fraxinus W.B.O., Q.S., A.D.B.

"THE MONTH."

The law of compensation, which seems to run throughout nature, has this year been manifested in a remarkable manner. The enormous quantity of rain which fell last spring has been succeeded by an equally remarkable drought during the present one, and although the south-west wind seems just at the point of striving for the mastery, there appears but little probability that the old adage that "a dripping June puts all in tune" will come true this summer.

In the London gardens the fragrant lilac and the lovely pink hawthorn present but a very meagre display of blossom, and scarcely perfume the air, while the golden clusters of the laburnum lack both their wonted richness of colour and wealth of blossom. Nevertheless, flowers are fully a fortnight in advance of last year.

May is the month when the study of flowers in a practical manner usually commences in the various schools of medicine and pharmacy, and pleasure and profit may be well combined by a ramble in the green lanes and leafy woods at this season of the year. In the woods the lovely green of the foliage is relieved here and there by the snowy whiteness of the blossoms of wild cherry, or the rowan tree, and the pale blue carpet of the wild hyacinth; the meadows are decked with the still more delicate hue of the cuckoo flower, with its graceful sprays, and the broom, with its profusion of golden blossoms, gladdens the eye and enables one with all the more vigour and earnestness to investigate the truths which lie hid in so much beauty. The curious axillary bulbils of *Dentana bulbifera*, the sensitive stamens of *Berberis vulgaris*, the curious flowers and root of the moschatel and the still more remarkable ones of the fumitory and polygala, the apetalous flowers of the violet, the curious leaves and flowers of *Pinguicula vulgaris*, are all worthy of examination at this time of the year. Nor should the green flowers of the common wood spurge, nor those of the *Arum maculatum*, *Orchis Morio* and *O. maculata*, and the various fir, willow, and other catkin-bearing trees, be neglected by the student of botany. From each and all some useful lesson may be learnt.

Among the especially medicinal plants which may be met with in the country this month are the broom, juniper, bistort and bogbean. In botanical gardens several others may be found.

At Kew the caraway and podophyllum, medicinal rhubarb, and at Regent's Park the angelica and the aconite and *Dicentra formosa* are coming into blossom in the open ground. In the Economic House at Kew *Cissampelos Pareira*, *Pelargonium capitatum*, and *Anacardium occidentale*, or cashew nut, are now in blossom.

The *Anacardium occidentale* will afford an opportunity to visitors to observe the growth of the fleshy peduncle, which ultimately becomes so much larger than the ovary, and forms the "fruit" or edible portion. According to a writer in the *Gardeners' Chronicle*, May 22, p. 660, the fruit, which ripens in Jamaica at the end of June, varies much in flavour in different individuals, some being very astringent, and others deliciously refreshing when eaten fresh. In the candied state he considers them to be scarcely distinguishable from Eleme figs. The juice of the fruit produces an indelible dark brown spot on linen wherever it falls, and is also used as a remedy in attacks of dysentery. The mode of obtaining the kernels for

food is a curious one. The kidney-shaped nut contains an extremely caustic viscid oil (cardol) in the pericarp, which has been known to produce in sensitive subjects all the symptoms of erysipelas when the nut has been bitten and the oil has come into contact with the lips. The nuts are heated in a shallow iron pan until the oil contained in the integument catches fire and they are then stirred briskly till it is consumed. When this has been done they are removed from the fire, and the roasted kernels placed in hermetically sealed bottles until required for use.

In the Regent's Park Gardens the ipecacuanha and the pretty fragrant flowers of *Kæmpferia rotunda* have been in blossom. Apart from the curious structure of the flower of the latter,—common to the Zingiberaceæ, in which two of the three stamens of the inner whorl are abortive and the outer three converted into petals, one of which is larger than the others and forms a labellum,—the manner in which the plant produces its flowers is very curious; the blossoms proceeding directly from the root, only one flower opening at a time and lasting only a single day. The fragrance of the flower also adds considerably to its beauty. This little plant is interesting on account of it having been stated to be the source of round zedoary; it is, however, well known now that both the long and round zedoary are the produce of one and the same plant, the long zedoary being the lateral and the round zedoary the central tubers.

Those who are studying the British flora will find several rare species in flower in the Herbaceous Ground at Kew, of which may be mentioned *Maianthemum bifolium*, *Leucojum æstivum*, *Geranium phæum*, *G. sylvaticum* and *G. sanguineum*, *Doronicum pardalianches*, *Stellaria nemorum*, *Lychnis alpina* and *L. viscaria*, *Linum perenne*, *Alchemilla alpina*, *Potentilla rupestris*, *Linum perenne*, *Meum athamanticum*, *Vicia Orobus* and *Euphorbia cyparissias*, *E. palustris* and *E. dulcis*, *Cypripedium Calceolus* and *Crambe maritima*. One of the most prominent flowers of this month is the iris, of which the two species yielding orris root, *I. Florentina* and *I. Germanica*, are by no means uncommon in gardens, the delicate, exceedingly pale bluish tint of the former making it appear almost white against the dark violet blue flowers of the latter. Another species used in medicine in America, *Iris versicolor*, and the one from which iridin is obtained, is not to be seen so generally in this country, and the rhizomes of other species are not unfrequently sold for it. Those who are desirous of making a practical acquaintance with the meaning of the term viviparous will find an excellent illustration of it in a curious variety of a fern, *Polystichum angulare*, at the Regent's Park Gardens; in this plant a number of young ones are produced along the upper surface of the rachis. In the Palm House at Kew a still more remarkable instance may be seen. The flowering stems of *Cypella gracilis*, after flowering, appear to have produced no fruit, and the vigour of the plant seems to have been diverted to produce young plants from the axil of the spathaceous bract whence the flower arose. In several instances a young plant with a well developed aerial rhizome is thus produced, which appears to originate from the long pendent leaf; careful observation, however, reveals the abortive ovary still remaining in the axil whence the young plant springs, and shows that the young plant really arises from the inflorescence.

In the May number of the *Journal de Pharmacie*, Professor Planchon describes the "Ramou" or *Strychnos Castelnœana*, Weddell, from which the curari of the Upper Amazon is produced.

A fatal case of poisoning by hemlock water dropwort has been recorded from Chelmsford. Several boys, while at play, are stated to have picked parts of the plant, and eaten them. Three were taken ill, and one died after a short illness of an hour or two. The root is the part of this plant generally eaten, from its resemblance to parsnips, and it cannot be too widely known that it is a most powerful poison, death having in some cases on record been produced in three quarters of an hour, while no antidote is as yet known.

Within the last few days a piece of root has been received from a correspondent which is stated to have been sold and used as *Actæa racemosa*. The root is that of *Potentilla Tormentilla*. As the same substitution may possibly occur again, it may be well to point out the characters by which the two roots are distinguished. *Actæa racemosa* is of a blackish colour externally, sparingly furnished with lateral branches and has numerous transverse lines or scars, often ¼ to ½ inch distant from each other, where the leaves have fallen off. Internally it is of a greenish colour in the centre and circumference, with distinct, yellowish, woody rays radiating from near the centre, which is rather darker than the rest of the rhizome and more horny. The large, wiry rootlets have a meditullium resembling a Maltese cross in shape. The taste is faintly bitter and herby. Potentilla root is, on the other hand, rarely branched, is of a red-brown colour externally and marked with numerous small pits on the surface, internally reddish and porous, but hard, and has a powerfully astringent taste.

A specimen of the *stem* of ipecacuanha has during the present week been received for identification. It differs so much in appearance from the *root* that it is not surprising that it is often mistaken for an adulteration. The stem of ipecacuanha often has small portions of the root attached, and may be known by the extreme thinness of its bark from *Richardsonia scabra* and other roots, which are sometimes substituted for ipecacuanha, but hardly ever mixed with it. When, as is sometimes the case, large quantities of ipecacuanha stem are mixed with the root, the sample should either be rejected or picked over, since it is obvious that a wine made with a sample containing so small a portion of bark to its bulk would fall much below the B.P. strength. Indeed, it may be hoped that in the next edition of the Pharmacopœia a given quantity of the bark, separated from the woody meditullium, will be ordered to be used instead of a given quantity of the root as met with in commerce. Such directions would lead to a much greater uniformity in the strength of preparations of this valuable drug than is likely to obtain under present conditions.

At the recent sales of Java bark at Rotterdam, a large quantity of bark was offered for sale in something like the following proportions:—*Calisaya Schukkraft hybrid* 40; *C. succirubra* 25; *C. Hasskarliana* 9; *C. javanica* 8; *C. Ledgeriana* 7; *C. anglica* 6; *C. officinalis* 3; *C. Pahudiana* 0·1. According to the published analyses the root bark in almost every case was equal in the amount of quinine it contained to the richest stem bark of the same species, thus verifying Mr. Howard's previous statement. The best samples of *C. anglica*, *Hasskarliana*, *javanica* and the *Schukkraft*, gave an average of 1—1½ per cent. of quinine, while the *Ledgeriana* furnished 7 per cent. of pure quinine with very little of any other alkaloid.

In the London market a large quantity of the singular bark known as *China cuprea* has lately been offered for sale. This bark is readily distinguished from all other cinchona barks by its remarkably smooth inner surface, which is very fine grained. It yields about 1·75 of quinine and has a short fracture like hard Carthagena bark, but contains a quantity of red colouring matter, which is not easily separated from the alkaloids. Cinchona bark, stated to come from Borneo, has also been offered for sale.

At the recent bark sales in London this month cinchona bark from Jamaica appeared for the first time, and was sold at a good price, the red fetching 4*s*., and the crown bark 6*s*. per lb., the latter price being not quite so high in proportion as the bark deserved. From the *Gardeners' Chronicle* it appears that the sale of cinchona bark from the Government plantations in that island will reach £5000, so that the cultivation of cinchona in Jamaica may be considered to be commercially a success. The credit of introducing the cinchona into that island and Ceylon is claimed entirely for the Kew Gardens by Mr. W. T. Thiselton Dyer, in his recent address before the Colonial Institute.

In the same journal it is also stated that the botanical source of Socotrine aloes, according to specimens brought home by Dr. I. Bayley Balfour, must certainly be *Aloe Perryi*, Baker, instead of *Aloe Socotrina*, as heretofore.

A correspondent writing from the Cape of Good Hope gives it as his experience that Cape aloes is never to be obtained perfectly pure at Port Elizabeth, unless specially obtained as a curiosity, it being always mixed in ignorance with the juice of *Agave*.

Those persons who have ever accidentally tasted the stem of a pansy flower, by putting it in the mouth, will have become acquainted with the fact that the juice of the plant has a pleasant flavour. It is rather interesting to find from a chemical analysis made by M. Mandelin, and communicated to *New Remedies* by Professor Dragendorff, that the plant contains salicylic acid. Some years ago a writer in the *British Medical Journal* called attention to the heartsease as a valuable remedy for the cutaneous disease called *crusta lactea* in children, the decoction of the leaves in milk being taken, and poultices of the leaves applied. Its beneficial action may therefore be now accounted for by the presence of salicylic acid—if that does, as M. Mandelin supposes, exist in a separate state in the plant. As the leaves yield on distillation an acrid oil, possessing the flavour of the plant, it yet remains to be proved if the salicylic acid be not a product rather than an original constituent of the plant.

Salicylate of quinine seems to be increasing in favour with the medical profession. Dr. A. Hewan states that while toxic effects more or less serious result from the administration of salicylic acid and salicylate of soda in doses thought necessary to reduce the temperature, no injurious consequences whatever have hitherto followed the free use of salicylate of quinine given even in its full dose of 3 grains, while greater benefit has been derived from it than from salicylate of soda or salicylic acid. Mr. Dearden, of Church, near Accrington, has published in the *Lancet*, May 1, p. 697, a formula for an extemporaneous preparation of salicylate of quinine, which is as follows:—Salicylic acid, 1 drachm, disulphate of quinine, 10 grains, simple syrup, 1 ounce, strong liquor ammoniæ, 1 drachm, water to 12 ounces. The acid and quinine are put into the bottle with about 8 or 9 ounces of water, the liquid briskly agitated for a few seconds. The bottle is allowed to stand a little while uncorked, the liquor ammoniæ then added, and finally the syrup and the remainder of the water. A few drops more of the ammonia may be required to get a perfectly clear solution. It is necessary to remember that only the natural salicylic acid should be used, or at all events, salicylic acid freed from the other acid which Mr. J. Williams showed some time since to be present in the salicylic acid obtained from carbolic acid. It is impossible to say until more is known of that second acid, how far the cases of poisoning by salicylic acid and salicylates may be due to its presence in commercial salicylic acid.

Whooping cough has lately been very prevalent around London, and, consequently, various remedies have been advocated. According to a recent letter in the *Lancet*, May 8, p. 749, Dr. Mott, of New York, recommends quinine as a remedy for whooping cough, on account of the influence of this drug in preventing the growth and development of the fungus which he, as well as Dr. Letyerich, has found in the sputa, and which is believed to be the cause of the disease. He recommends the quinine to be given in the form of powder mixed up in syrup. Dr. J. Lowe, of King's Lynn, states that he has found the internal administration of benzol a successful remedy in this troublesome disease, when the acute stage is past and the lungs free from congestion. His formula is as follows:—Benzol 2 to 10 minims every four hours in combination with tincture of henbane, compound tincture of chloroform, mucilage of acacia and water. The benzol must, however, be quite pure, in which state it has an aromatic or ethereal odour, and not the strong gas-like odour generally present in ordinary commercial samples. Cases of poisoning by benzol he attributes to impurities contained in it.

Chian turpentine still continues to attract considerable attention in medical circles. In the *Lancet* for May 15, p. 783, Professor Clay gives the tests by which he judges of the purity or genuineness of this substance, which may be briefly summarized thus: If it has a bitter taste it is not pure; if it contain Canada balsam, on heating it the characteristic odour of that substance will be evolved; if it gives off an odour of turpentine when heated and is entirely soluble in alcohol it is not pure; the odour is between that of fennel and elemi, and the taste slightly resembles that of mastic; the powder on the surface shows no trace of crystalline structure when examined under the microscope. Dr. Battye suggests that Strassburg turpentine is the best substitute for Chian turpentine on account of its containing more silica, to which he supposes the efficacy of Chian turpentine to be due, forgetting, apparently, that Dr. Clay expressly states that in his hands Venice and Strassburg turpentines "have not produced the same beneficial effects on cancerous growths as Chian turpentine has done," while he finds Canada balsam to be "positively injurious" in cancer. As there is in circulation in trade some "Chian turpentine" which is nothing more than dried Canada balsam, pharmacists will do well to make themselves well acquainted with the odour of that drug. This so-called Chian turpentine is of a pale yellow colour, perfectly clear and transparent, with a powdery surface, but when chewed or heated is readily recognized by its odour and taste, which are totally different from the fennel-like odour and mastic-like taste of the genuine drug.

The *British Medical Journal*, May 15, page 744, quotes from the *Recueil de Médecine Vétérinaire* a statement by M. Bouley to the effect that garlic has been known to subdue the symptoms of hydrophobia. "A young man who had been bitten by a mad dog speedily presented the symptoms of hydrophobia. His family, in a state of great alarm, scarcely knowing what to do with the sufferer, shut him up in a loft where some garlic had been left to dry. In his delirium the poor fellow seized the bundles of garlic, ate greedily of them, and soon became exhausted and fell into a deep sleep. When he awoke he was cured and the symptoms of rabies had disappeared." Possibly the medicinal properties of garlic have been too much neglected. During the prevalence of cholera the Jews are said to have used with success the application of garlic to the pit of the stomach and the soles of the feet, and it is generally believed by sailors that onions have the property of absorbing diseases, and that those who partake of onions which have been lying in the room in which there is a person ill of an infectious disease will assuredly take the disease. There is often some germ of truth in generally accepted facts.

It is possible that some who in glancing over a recent number of this Journal came across the uninviting words "homatropine" and "oxytoluyltropeine," turned over the page with a half-formed wish that it were occupied with subjects more akin to pharmacy. But this was not the case with all, for by the prompt action of an English pharmacist the chemical curiosity became, within a few days of the first appearance of its description in this country (see before, p. 751), the subject of a physiological research, with the result that the substance with the unfamiliar names promises to take a place in the pharmacy as an addition to our mydriatics. The hydrobromate salt of homatropine or oxytoluyltropeine, the base which is obtained by the treatment of amygdalate of tropine with dilute hydrochloric acid, has been used in a series of physiological experiments by Mr. John Tweedy, who reports (*Lancet*, May 22) that it appears to possess many of the properties of atropine, but in a weaker degree. Dr. Sydney Ringer also adopts this statement as describing its action on the eye, but says that though relatively weaker than atropine it is not merely weaker in the sense that it only does what a weak solution of atropine would do, since its action on the iris and ciliary muscle is very powerful while it lasts. A solution of hydrobromate of homatropine, four grains to the ounce, widely and fixedly dilates the pupil in from fifteen to twenty minutes, and affects the accommodation in an equally rapid manner. Its chief peculiarity and advantage seem to be that its effects disappear much more rapidly than those of atropine, and it is moreover said to be singularly unirritating to the eye. It is important that homatropine should not be confounded with the amygdalate of tropine from which it is prepared, for the amygdalate has been found to be quite inert, in the sense that it does not possess any of the properties of atropine.

In the *Berliner Klin. Wochenscrift*, 1880, No. 12 and 13, Dr. O. Pinner calls attention to the use of a solution of acetate of alumina as an antiseptic in surgical operations. For this purpose a $2\frac{1}{2}$ per cent. solution is used at first, and reduced afterwards to 0·05 per cent., which is found to be strong enough to disinfect and deodorize perfectly. Dr. Pinner finds that a solution of the strength of 1·5 to 2 per cent. will stop all movement in bacteria, and prevent their multiplication in a liquid containing them. A full account of the mode of using it, etc., may be found in the *Medical Times and Gazette*, May 8, p. 507.

Sulphate of soda has been found (*Zeits. d. Oester. Apot. Ver.*, xviii., 43) by Herr Sonneberg to be useful in the treatment of poisonous effects produced sometimes by the prolonged use of dressings with a 5 per cent. solution of carbolic acid. The dose is 5 to 8 grams of sulphate for adults, and 2 to 5 grams for children, in 200 grams of water. The urine, which in such a case has become deep green tinged with brown, quickly reassumes its normal colour and the dressings can then be continued without danger.

A very curious instance of the toleration of opium by an infant is published in the *British Medical Journal* of May 15. In this case to an infant of four months old its mother administered from 6 to 8 drachms of laudanum in twenty-four hours to relieve abdominal pain. As a rule, infants are much more sensitive to the influence of opium than adults, hence this instance of idiosyncrasy is all the more remarkable. It would have been interesting to know whether either of the parents were accustomed to take laudanum.

The sale of the various forms of sea salt is likely to be diminished in London, for it is announced that the Great Eastern Railway Company will undertake to supply sea water to any part of London within their ordinary delivery at the rate of 6*d.* for 3 gallons. The water is to be brought from Lowestoft and delivered at any address in air tight cans for the price named, the cans being left if required until the following day, when the Company's vans will call for them without any extra charge. Not only will Londoners be able to have a "real sea bath in their own room," but can now keep marine aquaria in their own houses.

According to M. Judicis (*Répertoire*, May, p. 198), the methods of adding alcohol, heating and fermentation for the preservation of lemon juice are all unnecessary, since the unfermented juice simply allowed to deposit and filtered through paper may be preserved in well closed bottles perfectly well. The disadvantage in this method is the slowness with which the juice filters.

Killing the slain is a proverbially useless occupation, and ostrich pepsine has so recently received its quietus in this Journal that almost an apology is due for referring to it here again. Exception, however, is craved in favour of a note on a communication from a correspondent at the Cape, who has had peculiar facilities for observing the bird both in the healthy and diseased state. This gentleman states that he is perfectly certain that the digestive powers of the ostrich are very small and only effective on certain kinds of food, and that the tenpenny nails and iron bolts upon which its digestive reputation is based are not digested at all, but simply bent and crushed by a powerful gizzard that is so thick and tough as to be with difficulty cut by a knife. The writer vouches that he has himself seen buttons and coins that have been worn to the thickness of wafers by the grinding action of this organ, and that the hardest stones assume a fine polish under its action. It would be a pity to spoil, by a paraphrase, the *naiveté* of what follows: "When a bird is in poor condition, and fed on maize, by carefully dividing the breast feathers you can hear this gizzard, or living grinding mill, at work." Presuming upon the possession of such an apparatus ostriches eat so enormously that stoppages, which unless relieved will kill a bird in twenty-four hours, not unfrequently result; powerful drastics are then given, of which they are said to require a larger dose than a horse. What this bird's long-enduring stomach can bear is, however, illustrated by the following list of articles which, according to *Nature* (May 20), were found in the stomach of an ostrich that recently suffocated itself at Rome by thrusting its neck through the bars of its cage—four large stones, eleven smaller ones, seven nails, a necktie pin, an envelope, thirteen copper coins, fourteen beads, one French franc, two small keys, a piece of a handkerchief, a silver medal of the Pope, and the cross of an Italian order.

The researches of Messrs. Hannay and Hogarth, by which they claimed to have shown that solids might be dissolved in gases, have attained additional interest since their association with the artificial production of the diamond. The subject is continued in a paper by Dr. Ramsay, read before the Royal Society on April 22, which describes some experiments and gives deductions from them which are not in accord with those of Messrs. Hannay and Hogarth, and if correct, are important in their bearing on views as to the nature of the different forms of matter. It may be stated at once with respect to one of Messrs. Hannay's experiments which has been referred to in these columns, that Dr. Ramsay holds it to be certain that potassium iodide is absolutely insoluble in alcohol vapour. In one of the experiments sufficient methyl formate was introduced into a tube drawn out in the centre to a capillary passage to fill to about two-thirds one of the two chambers; heat was then applied so as to fill the remainder of the tube with vapour and the tube sealed. Upon heating the sealed tube, the liquid, as usual, expanded, and at the moment when the meniscus disappeared it nearly filled one half of the tube. On cooling the liquid always condensed entirely in the portion in which it was originally placed, and this occurred whether that portion was kept higher or lower than the other during the experiment. It was noticed that the half of the tube in which the liquid was placed appeared full after the meniscus had vanished, while the other seemed empty, but Dr. Ramsay has reasons for believing that the specific gravity of the matter in both portions is the same at the temperature at which the meniscus vanishes. When an alcoholic solution of potassium iodide was used it condensed similarly in the portion of the tube in which it was originally placed and no trace of the salt could be found in the gas when the other portion was broken off and examined. Dr. Ramsay's theory appears to find utterance in his definition of the "critical point" as "that point at which the liquid, owing to expansion, and the gas, owing to compression, acquire the same specific gravity and consequently *mix with one another.*"

Among the lectures of the month may be mentioned one delivered before the Society of Arts, by Dr. B. W. Richardson, on the ingenious diving apparatus invented by Mr. Fleuss, in which by the gradual release of compressed oxygen an accessible atmosphere can be maintained in a condition compatible with life. The oxygen is stored up in the helmet in a chamber of the capacity of one-quarter of a cubic foot and capable of bearing a pressure of sixteen atmospheres, into which sufficient oxygen can be introduced under pressure to last for breathing purposes during five hours. A cuirass that is worn contains two metal chambers which are fitted with small particles of porous indiarubber, saturated with solution of caustic soda. The breathing is effected through a leather ori-nasal mask, fitting closely to the face. In the inspiration the air is drawn through two valves, opening inwards, one on each side of this mask, and in expiration it passes downwards through a kind of artificial wind-pipe to the first chamber in the cuirass and then to the second. Here the carbonic acid is taken up by the soda, the moisture condenses and runs into a receptacle, and the nitrogen and the residual unused oxygen pass upward and escape through an opening near the shoulder into the helmet, where it is renovated by oxygen from the store chamber, the supply of which can be controlled by means of a tap in the helmet, so as exactly to compensate for the quantity consumed. Using this apparatus it is claimed that a person may remain under water as long as he can go without food. What is quite as important, perhaps, is that it renders it possible also for a person to remain for a long time without injury in a noxious atmosphere, as has been demonstrated in some experiments conducted under the superintendence of Dr. Richardson, in which Mr. Fleuss remained twenty minutes in the diving bell at the Polytechnic Institution, when filled with carbonic acid, and afterwards for a similar time in an atmosphere of amyl hydride.

The vacancy at the School of Mines caused by the regretted resignation of Dr. Percy, has been filled by the appointment Mr. W. Chandler Roberts, who, since the year 1870, has held the post of chemist to the Mint. It is a curious coincidence that the annual report of the Deputy Master of the Mint for 1879, which has just been issued, contains an interesting summary of the work done in the chemist's department during the past ten years, put forward apparently as a justification of the institution of the office, and as evidence that a mint cannot be properly conducted without constant attention to the progress of metallurgical science. Amongst the points specially mentioned are the adoption of the chlorine process for toughening brittle gold, by which a fertile source of dispute between the Mint and the Bank, as to the right to return bars unfit for coinage, has been removed; the spectroscopic investigation of the alloys of gold and copper, carried on in conjunction with Mr. Norman Lockyer, which have demonstrated the possibility of distinguishing between alloys differing in proportions by only one-thousandth part; and experiments made with Professor Hughes's induction balance, the action of which depends upon the fact that equal and similar volumes of various metals or alloys exercise widely different effects on an electric current flowing round a coil of wire. Professor Hughes's original instrument has been modified and improved, and is now capable of detecting minute differences in the composition of alloys within certain limits, but unfortunately these do not include the gold-copper alloys used for coinage.

The number of pieces struck at the Mint during 1879 was 30,050,344, as against 24,491,230 in 1878, and their value, real or nominal, was £662,664 3*s.* Of these the British coins numbered 27,800,344, having a value of £648,289 3*s.* 0½*d.* The remainder consisted of coinage for the Hong Kong Settlement and Cyprus. Notwithstanding that since the introduction of the bronze coinage in 1860, bronze coins to the value of £1,446,000, or nearly three times the entire value of the old copper coinage, have been issued, the demand for it in this country shows little tendency to decrease, the nominal value of the issue last year having been £38,970. The annual profit or loss on the operations of the Mint usually depends mainly on the amount of silver bullion purchased, and the quantity of worn silver coin withdrawn from circulation, the bullion being converted into coin at a profit to the State, whilst the worn coin, purchased at its full nominal value, is recoined at a loss. The average of the past eight years shows an annual profit of £21,117, but last year there was an excess of loss amounting to £29,499. On the other hand, the profit on the entire bronze coinage struck last year was £35,396. One source of loss is the dirt on the surface of the old gold coins, for which it is estimated that the department pays nearly £300 on every £1,000,000 withdrawn for recoinage.

The value of a medium of inquiry, such as is offered by the columns of this Journal devoted to dispensing queries, cannot be better illustrated than in the many replies, having a direct bearing on some one or other of the subjects, received from different parts of the country. In one of the April numbers of the Journal an inquiry was made for a formula for mist. scillæ, the writer stating that it occurred in a Scotch prescription that had been dispensed in Aberdeen. Mr. G. Wilson, in the Journal of May 15, p. 928, supplies the formula, and says that it is very much used in Scotland. The prescription being a Scotch one, the formula for its preparation from Christison would be used in preference to one from some other sources.

In prescription No. 407, it appears probable that signa quæ was intended by the writer; but whether that, sec. art., or quant. suff. was intended, one or the other, is quite superfluous, the prescription would have been intelligible enough in the absence of either of them. The Latin language often suffers damage at the hands of those writers who deal in elaborate directions.

The question whether zinci phosph. should be read as phosphide or phosphate, in prescription No. 408, is a very proper question for a dispenser to ask himself, when it may be either of the two preparations of zinc differing materially in their relative activity. When a difficulty of this kind occurs the dispenser must be guided mainly by the dose. Phosphide of zinc is given in doses of one-twelfth to one-fifteenth of a grain. The dose, therefore, of the zinci phosph. in the prescription is incompatible with phosphide of zinc, but corresponds with the average dose of the phosphate of zinc. In this case phosphate of zinc should be used by the dispenser in that prescription.

The position of a dispenser requires an amount of intelligence, which is not sufficiently appreciated either by the public on whose behalf it is so often exercised, or by some members of the profession who now and then fail to write their prescriptions with that exactness which could be desired. If brains determine the difference between the exercise of a profession and that of a trade, surely the pharmacist may claim a position on a rung of the ladder a little higher than is sometimes allotted to him.

The prescription No. 409 should be dispensed by dissolving the phosphate of soda in the greater part of the water, adding the tinct. colch., and lastly the quinine dissolved in the dilute phosphoric acid. The mixture should be quite as clear and colourless as water, having the faintest possible opacity due to the tinct. colch., but no colour or precipitate of any kind, or any separation; should either of these occur, distilled water being used, the cause may be looked for in the sodæ phosph. On standing twelve hours, however, there will be a copious deposition of needle crystals, most probably phosphate of quinine. It would materially add to the interest and value of the questions if the writers would state clearly the order of mixing adopted and also the result, together with their reason for requiring further information.

"Salicine" asks a question in No. 410, to which, the remarks just made equally apply. Where is the difficulty and what order of combining produced it? It is presumed that it is something which has resulted from the combination of potass. iodid. with quin. disulph. The quinine should be rubbed to a fine powder and suspended by the mucilage of tragacanth, and the potass. iodid., previously dissolved in the aq. camph. with the vin. aloes, should be added. A decomposition resulting in the formation of hydriodate of quinine will gradually take place, but it will be much retarded by the mucilage of tragacanth. Care must be taken to avoid bringing the potass. iodid. and quinine together without the greatest possible dilution, interposing at the same time the mucilage as a further preventive of decomposition. Two ounces of mucil. tragac. would be a fair proportion for that mixture.

The quinine in No. 411 should not be dissolved, but rubbed to a fine powder and diffused through the liquid, unless the writer's intentions to the contrary are known by the dispenser. It is quite possible that the writer may have intended the quinine to be dissolved, this being the most usual condition in which it is prescribed with ferri sulph. and magnes. sulph., and some dispenerss would assume such to be the case in this instance; but a pharmacist, without any further knowledge than is conveyed in this prescription, would be perfectly justified in sending out the mixture with the quinine in suspension, and with a "shake" label on the bottle. The difficulty in this instance seems to be in the solution or otherwise of the quinine, and the appearance of the mixture would depend on which view is taken by the person dispensing it. A dispenser may expose himself to censure for adding an acid which does not form a part of the prescription; but he could justify his sending out the quinine in suspension, on the principle of a strict adherence to the letter of the prescription without necessarily a lack of intelligence.

THE DIGESTIVE FERMENTS, AND THE PREPARATION AND USE OF ARTIFICIALLY DIGESTED FOOD.*

BY WILLIAM ROBERTS, M.D., F.R.C.P., F.R.S.

Lecture II.

Pepsin and Trypsin—Digestion of Proteids.

Various kinds of albuminous or proteid substances are used by mankind as food. The most important of these are muscular flesh, the casein of milk and egg-albumen from the animal kingdom, and gluten, albumen and legumin from the vegetable kingdom.

Proteids are attacked by the digestive ferments at two points in the alimentary canal, by pepsin in the stomach and by trypsin in the small intestine. Between these two acts of digestion there is a complete break in the duodenum, owing to the abrupt change of reaction from acid to alkaline which occurs at that point.

Gastric digestion is, in all creatures, an essentially acid digestion; but the most varied opinions have been entertained as to the nature of the acid. It has been supposed in turn to be hydrochloric acid, lactic acid, acid phosphate of lime, butyric acid and even acetic acid. Much of this confusion has arisen from not distinguishing between the acid of pure gastric juice as secreted into an empty stomach and the acid of the gastric contents during the digestion of a meal. A good deal of light has been thrown on this subject by the recent researches of C. Richet.† This observer found himself in exceptionally advantageous circumstances for the study of the gastric juice. He had under observation a young man on whom Verneuil had successfully performed the operation of gastrostomy for the relief of impermeable stricture of the œsophagus, the result of swallowing inadvertently a quantity of caustic potash. The complete occlusion of the œsophagus enabled Richet to obtain and examine the gastric juice in a pure state, uncontaminated with saliva. All food had to be administered through the fistulous opening left after recovery, and the observer could at any moment—as in the famous case of Alexis St. Martin—withdraw portions of the gastric contents for examination. Richet also took advantage of the new method of separating the various organic and mineral acids from one another, made public by Berthelot in 1872.‡

Berthelot had found, on shaking up an aqueous solution of any acid with ether and then allowed the two fluids to separate, that a part of the acid passed into the ether, and that the remainder clung to the water, and that the ratio between these two parts was a constant quantity. He called this ratio the *coefficient of partage*, and found that its value was a fixed characteristic for each particular acid. Solutions of the mineral acids were found to yield nothing, or almost nothing, to ether when agitated with it; but organic acids were found to pass into the ether in considerable, though very variable, quantities, the proportion varying in a constant ratio according to the nature of the acid.

Testing pure gastric juice, uncontaminated with food or saliva, by this method, Richet found that almost all the acid was retained by the water, and that only a small proportion—about one in twenty-two—passed into the ether. This showed that the acid of pure gastric juice was almost entirely a mineral acid, with only a minute admixture of organic acid. The organic acid (tested by the same method) exhibited a coefficient of partage closely corresponding with that of sarcolactic acid. The nature of the mineral acid was determined by a method similar to that employed by C. Schmidt, and yielded the same result, namely, undoubted evidence that the mineral acid of pure gastric juice was hydrochloric acid. But

* The Lumleian Lectures, delivered before the Royal College of Physicians.

† 'Du Suc Gastrique,' by Ch. Richet. Paris: 1878.

‡ *Ann. de Chimie et de Physique*, 4e serie, tome xxvi., p. 396.

Richet found that this mineral acid did not behave in the presence of salts of the organic acids quite in the same way as free hydrochloric acid does. The observations of Berthelot had shown that when free hydrochloric acid is added to a solution of acetate of soda, or other similar organic salt, the mineral acid attaches the base entirely to itself and throws the whole of the organic acid free into solution, so that the mixture, when tested by the method of coefficient of partage, behaves exactly like an unmixed solution of the organic acid. When pure gastric juice was put to this test it was found that, although it liberated the organic acid largely, it did not do so to the same extent, by a good deal, as if the mineral acid contained in it had been entirely free. It behaved, rather, as hydrochloric acid does when united with a feeble organic base, such as leucin or peptone; and, on the ground of what appear to be very careful experiments, Richet came to the conclusion that this feeble base was probably leucin, derived from the gastric mucus, and that the acid of pure uncontaminated gastric juice was hydrochloric acid in loose combination with leucin.

Richet next proceeded to examine the free acid actually existing in the stomach during the digestion of a meal in his patient with gastric fistula. He found, as might have been expected, that this differed from the acid of pure unmixed gastric juice in this respect, namely, that it contained a very much larger proportion of organic acids, in comparison to the mineral acid, than pure gastric juice. It was evident that the mineral acid had to a large extent seized upon the bases of the acetates, malates, lactates, butyrates and other organic salts always present in the food and had set free their organic acids. The real work of digestion, then, so far as the acid constituent is concerned therein, is largely performed by various organic acids thus set free from the articles of food which are undergoing digestion.

Richet found that the acidity of the contents of the stomach during digestion, although it varied through considerable limits, had a marked tendency to maintain the normal average. If acid or alkali were added to the digesting mass the mean was presently restored automatically, the stomach in the former case ceasing to secrete acid and in the latter case secreting an increased quantity of acid.

The Effect of Gastric Juice on the Salivary and Pancreatic Ferments.—The observations of Berthelot on the power of a mineral acid to set free the acids of organic salts and to take their place with the bases, and the further observations of Richet, showing that the acids actually free in the gastric contents during digestion were organic acids, have led to the re-examination of a point of some importance, namely, as to whether the salivary, and more especially the pancreatic ferments, were or were not destroyed by the acid contents of the stomach. The matter has a practical interest in this way. If the gastric acid destroys these ferments, it is evidently useless to administer pancreatic preparations by the mouth during digestion, because they would be rendered inert by the acid contents of the stomach. On the other hand, if they are not destroyed in passing through the stomach, but merely lie dormant and recover their activity in the alkaline medium of the small intestine, then we can administer pancreatic preparations during digestion with every prospect of their passing uninjured through the pylorus and proving useful in assisting digestion in the small intestine.

A series of experiments bearing on this question were submitted by T. Defresne to the Académie de Médecine and the Académie des Sciences towards the close of last year, and have attracted some attention. On the ground of these experiments, Defresne arrived at the following conclusions, namely: that saliva continued its action on starch in the stomach without interruption; that the pancreatic ferments in like manner preserved their activity in the presence of the gastric acid; that the acids of the chyme, being organic acids, did not really destroy these ferments, but merely reduced them to a state of temporary inertness, so that when the acidity of the chyme was neutralized in the duodenum they recovered their powers and exhibited undiminished activity both on starch and on proteids.

As the question had a direct bearing on the medicinal administration of pancreatic preparations, and indirectly on the administration of malt diastase and malt extract, I thought it desirable to repeat some of Defresne's experiments and to put the question raised by these experiments to the test in other ways.

One of Defresne's (apparently) most convincing experiments was the following, which I give nearly in the words of the abstract of the paper published in the *Proceedings of the Académie de Médecine* for November 4, 1879. When 20 grams of dilute hydrochloric acid, having twice the acidity of the normal chyme, are mixed with 20 grams of egg albumen, what follows? The acidity of the medium is no longer due to free hydrochloric acid, but to the lactic and phosphoric acids of the white of egg which have been set free. In presence of these acids pancreatine may be digested for two hours in the warm chamber with impunity. And if at the end of this period the acidity of the mixture be neutralized, digestion is accelerated and the pancreatine peptonizes thirty-eight times its weight of albumen.

I repeated this experiment in the following manner:—Forty grams of chopped boiled white of egg were mixed with 40 cubic centimetres of dilute hydrochloric acid of the strength of 4 per 1000. This mixture was subjected to a preliminary digestion of two hours in the warm chamber at 40° C. (104° F.). The object of this preliminary digestion was to allow the hydrochloric acid a sufficient time to seize on the bases, and to set free the organic acids of the white of egg. At the end of this time, 5 cubic centimetres of an active extract of pancreas were added to the mixture. A second experiment was arranged in exactly the same way, except that filtered saliva was substituted for extract of pancreas. The mixtures were kept in the warm chamber for a further period of one hour, and were then filtered and carefully neutralized. On testing the neutralized filtrates, I obtained approximately the same results as Defresne. The diastatic and proteolytic ferments of the pancreatic extract were found active, but not so active by a good deal as if the extract had been diluted to the same extent with simple water. In the second experiment with the filtered saliva, the ptyalin had preserved its activity quite unimpaired.

These experiments, however, involve a fallacy which vitiates the deductions intended to be drawn from them. White of egg has a highly alkaline reaction, and although the acid used in the experiment possessed double the strength of the normal gastric juice, it was found that the mixtures, at the end of the two hours' preliminary digestion, had only a comparatively feeble acidity—in fact, only one-seventh of the normal acidity of the gastric contents. It has long been known that the salivary and pancreatic elements are able to resist a feeble acidity, but the question really at issue is: Can these ferments resist the average acidity of the contents of the stomach, when, moreover, this acidity is rendered still more destructive to them by the presence of pepsin?

I tested the question in this way. A distinction is drawn, and rightly, between acidity due to free hydrochloric acid, and a similar degree of acidity due to an organic acid. Now, lactic acid is a typical organic acid, and it is also an acid which is often, if not always, present in the contents of the stomach during digestion. I prepared a solution of lactic acid corresponding in saturating powers to the normal gastric acid (2 per 1000 HCl). To 50 cubic centimetres of this dilute lactic acid, I added 5 cubic centimetres of a solution of pepsin, and 5 cubic centimetres of an active extract of pancreas. I prepared a second similar experiment, but substituted filtered saliva for pancreatic extract. The mixtures were then placed in the warm chamber for one hour. At the end of this period the solutions were exactly neutralized and tested. They were both found to be absolutely inert. Not a vestige of amylolytic nor of proteolytic power had escaped destruction.

I had an opportunity of trying the same question in a still more satisfactory way. While I was examining the throat of a patient suffering from an ailment which did not affect his general health, a portion of the contents of the stomach was ejected, and fortunately caught in a clean vessel. This was immediately filtered, and about 10 cubic centimetres of clear acid solution were obtained. The period of digestion was three hours after breakfast. One half of this was devoted to testing its saturating power. It was found to possess an acidity very nearly corresponding with that of normal chyme. To the remaining portion five drops of extract of pancreas and five drops of filtered saliva were added, and the mixture was placed in the warm chamber for one hour. At the end of this time it was exactly neutralized, and divided into two equal portions. One portion was tested with a drop of starch mucilage, and found to be absolutely devoid of amylolytic power. The other portion was added to an equal volume of milk rendered slightly alkaline with bicarbonate of soda, and was then placed in the warm chamber. Not the slightest digestive action was produced on the milk in twelve hours.

I may mention that in the above experiments I used milk as the test of proteolytic activity. I had become thoroughly familiar with the behaviour of milk with pancreatic preparations during a long course of observations, and was therefore able to detect the slightest signs of pancreatic action.

With this evidence before me I am unable to accept the conclusions of Defresne and others in Paris, who allege that saliva and pancreatic preparations can resist the normal acidity of the stomach in full digestion, and who recommend the administration by the mouth of pancreatic preparations during the period of chymification. I will in my next lecture point out the time and the method in which these preparations may, I believe, be administered by the mouth with sure prospect of success.

Digestive Proteolysis.—The changes undergone by albuminoid substances in digestion are still very imperfectly understood. It is, however, known that the chief end-product of the transformation is peptone. It is also known that between any native proteid—egg albumen, muscle-fibrine, casein, or legumin—and the end-product, peptone, there are intermediate grades and by-products, which have hitherto proved difficult to define and isolate. The constitution of the proteid molecule is still unknown to chemists. That it is a highly complex aggregation is certain; and it can scarcely be doubted that the way to a better knowledge of its constitution lies in a persevering study of the action on it of the digestive ferments. It has been already seen that in the case of starch the action of diastase furnished the key to the constitution of the starch molecule; and, similarly, it is not unreasonable to expect that the mystery of the proteid molecule will be finally solved by a study of the action on it of pepsin and trypsin. Attention has hitherto been too exclusively directed to peptic digestion, which is complicated by the interaction of an acid. Pancreatic digestion is, in this respect, a simpler process—inasmuch as it requires the interference neither of an acid nor an alkali, but is a reaction, pure and simple, between the ferment and the proteid. This, however, is a question of the future.

Characters of Peptones.—The end-product, peptone, has been fairly isolated and its characteristics defined. If the filtered product of a pancreatic digestion of egg albumen be evaporated to dryness in a watch-glass at a temperature of 104° F. (40° C.), there remains a glassy straw-coloured residue resembling dried gum. With the point of a penknife this can be chipped off in shining scales, which may be easily reduced to a fine whitish powder—this is nearly pure peptone. This substance is extremely soluble in water; and its solutions, even when highly concentrated by evaporation, betray no jellying and no viscosity, but continue diffluent almost to the moment of desiccation; only just before drying up do they assume a slightly syrupy consistence. When the latter point is approached, the solution deposits beautiful white crystalline sheaves of tyrosin and spheres of leucin. From the constancy with which these crystalline bodies make their appearance in pancreatic digestion, it may be inferred that they constitute an essential portion of the final products of the transformation.

The reactions of peptone are mostly of a negative character. Its solutions give no precipitation with nitric acid, nor with boiling, nor with ferrocyanide of potassium and acetic acid. The behaviour of peptone with alcohol is peculiar. When a strong peptone solution is dropped into absolute alcohol, the peptone is precipitated as a white sediment, but it is not truly coagulated into an insoluble modification, as all the other proteids are; for when the alcohol is removed, the deposit is found to have preserved its solubility in water—even after prolonged contact with the alcohol. Solutions of peptone are precipitated by those metallic salts which throw down other proteids, also by tannin when the solutions are neutral. When the solutions are rendered alkaline, the cupro-potassic test (Fehling's solution), added in very small quantity, produces a rose-red coloration, whereas other proteids produce a violet tint. Physiologically, by far the most important reactions of peptone are its extreme solubility in water and its diffusibility through organic membranes. With regard to the latter point, contradictory statements have been made by different investigators. Otto Funke rated the diffusibility of peptone through the membrane of the small intestine higher than that of common salt. On the other hand Von Wittich concluded that peptones did not pass through parchment-paper more rapidly than unaltered albumen. My own observations support the view that peptone is incomparably more diffusible through parchment-paper than the native proteids. In the case of milk, the effect of digestion is very marked in regard to its behaviour in the dialyser. When milk was dialysed for forty-eight hours into twice its volume of water, not a trace of proteid matter could be detected in the diffusate; but when milk had been previously digested for a couple of hours with pancreatic extract, an abundant reaction with tannin and Fehling's solution was obtained after dialysing it for eight hours.

My results with egg albumen were equally striking. I prepared a solution by agitating white of egg with nine times its bulk of water, and straining the product through muslin. When this solution was dialysed into twice its volume of water for thirty-two hours it yielded absolutely no reaction with tannin nor with the cupro-potassic test. But when the same solution was previously digested, either with pepsin and acid or with pancreatic extract, and then dialysed, it gave in five hours a slight but distinct reaction, both with tannin and with Fehling's solution, and in sixteen hours a most abundant reaction.

The theoretical views held by physiologists in regard to the intimate nature of the transformation undergone by proteids in the presence of pepsin and trypsin are still unsettled, but recent opinions converge towards the idea that the process is, in the main, one of progressive deduplication with hydration, similar in type to the transformation of starch by diastase. This view receives a positive support from the recent analyses of Henninger. By operating on highly purified albumen, fibrin and casein, Henninger* succeeded in obtaining peptones in a state of great purity. An analysis of peptones so obtained indicated that they contained less carbon and nitrogen, and proportionally more hydrogen, than their

* A. Henninger, 'De la Nature et du Role Physiologique des Peptones.' Paris: 1878.

original proteids. The differences were, it is true, small, but they pointed distinctly in the direction of the conclusion that there was a fixation of the elements of water by the proteid, in the course of its transformation into peptone.

Henninger also believes that he has succeeded in reversing the process and in reproducing an albuminous substance from peptone by operating on it with dehydrating agencies. He found that when fibrin-peptone was heated with anhydrous acetic acid at 80° C. (176° F.), or was maintained for an hour at the temperature of 160° to 180° C. (320° to 356° F.), it yielded a body which agreed closely in its reactions with syntonin.

The intermediate products which are generated in the course of proteid digestion, and stand between the original proteid and the end-product peptone, are very imperfectly understood. The laborious reseaches of Meissner and Kühne have shown that several such intermediate bodies are produced, but these have not yet been adequately isolated and defined.

(*To be continued.*)

SULPHUR DEPOSITS IN ICELAND.*

BY C. G. W. LOCK.

The principal localaties where sulphur is found are the Hlítharnámar, the Kraflanámar, the Fremri-námar, at Theistareykir, and at Krísuvík, besides minor quantities at Hengill, and other spots. I have spent more or less time at all these places, but my chief experience has been with the four first-named. Vapours are emitted in abundant clouds from vents and fissures in the earth's crust; and around these openings are found deposits of "flowers of sulphur," or sulphur in a very finely divided state.

I am aware that it is the fashion to describe the sulphur mines of Sicily and the sulphur diggings of Iceland on parallel lines. For all practical considerations, however, they are as distinct as a coal-seam and a forest. The Sicilian mines consist of deposits formed in past geological ages, now lying at great depths, and utterly devoid of reproductive power; the Icelandic beds, on the other hand, are the work of to-day, lie on the very surface of the ground, and live and grow with unabated energy, replacing the deposit as fast as it is removed. It is not surprising, therefore, that the minerals themselves show no analogy, beyond the fact that sulphur is present in both. The Sicilian is a hard mass of sulphur-impregnated rock; the Icelandic is a sulphur powder, more or less contaminated with foreign materials. The area comprised in the Icelandic sulphur districts collectively amounts to, perhaps, a dozen square miles; but it must not be supposed that the whole of this is equally productive. The photographs on the table will give an ideal impression of the sulphur grounds; the green spots indicate the live vents. In a very recent consular report, it is stated that an Edinburgh firm now has the whole of the brimstone trade of the islands in its hands. This is emphatically incorrect, and a good opening still exists for anyone who will learn wisdom from experience. In searching the history of the working of these beds, it will be found that the chief causes of failure, when it has occurred, have been constitutional defects in the associations formed for the purpose, and ignorance of the requirements of the case. The sulphur itself has, in no instance, been wanting; indeed, it is being constantly renewed. It forms a layer of varying thickness, covered by an earthy crust, and underlaid by clays, containing sulphur mixed with various acids and salts. The sulphur layer is invariably very wet, in consequence of the steam condensed among it. The sulphur crystals are almost absolutely pure, but the simultaneous formation of other minerals, such as gypsum, and various accidents of broken surface, wind, wash, etc., help to create a mechanical admixture of impurities; so that the bodily removal of the whole sulphur layer would yield a product containing about two-thirds sulphur to one third impurities. Ingenious plans have been devised for separating these impurities. Two or three centuries ago, when the wars of Scandinavia were kept alive with gunpowder made from Icelandic sulphur, the method in vogue was to melt the crude mineral with train oil; the latter, taking up the earthy matters, was easily skimmed off the surface. The site of the refinery at Húsavík may still be pointed out, and deserves a visit; but let us hope that visitors, finding stray remnants of the mineral, will not, like the Edinburgh Reviewer, straightway enlarge upon the "sulphur mines of Húsavík."

The company which worked the northern diggings decided against refining of any kind, a notion being current that, with sufficient care, the sulphur might be gathered in a clean state, apart from mineral impurities. Practice demonstrated, however, that the operation, which appeared so easy in collecting pocket specimens, was exceedingly tedious and costly when the quantity had to be reckoned by tons, while more sulphur had to be left than was extracted. Moreover, the dampness and fineness of the material, coupled with the viscissitudes of climate and transport, rendered the gathered mass a dirty, wet powder. A cargo sent home resembled that contained in the bottle. Its pulverulent condition unfitted it for sulphuric acid manufacture, and its impurity was a bar to its use for gunpowder. It was forced upon the market when stocks were heavy and prices exceedingly low, and it barely found a buyer at a figure that covered its cost. Instructions were then sent to smelt the crude sulphur in *calcaroni*, as is done in Sicily to this day; one moment's thought would have shown the absurdity of attempting to smelt a heap of wet powder in a country where there is no fuel.

It remains to suggest some improvement upon former plans. In the first place, I would advise the removal, from each pit, of all the sulphur earth, to be treated with bisulphide of carbon, in order to dissolve out the sulphur. Before subjection to the bisulphide of carbon, the sulphur earth would require drying; but this might be economically managed by utilizing the abundant natural heat of the steam emitted all around, in some such way as the well-known arrangement for concentrating the boracic acid solutions in the Maremma of Tuscany. Sulphur extracted by the bisulphide process is said to be preferred by gunpowder-makers and others, and has a much higher market value than the best Sicilian produce. The refuse earth may be returned lightly to the pits, so as to serve again as a filter and condenser for the escaping gases; but I would suggest a trial of the plan long ago pointed out by Dr. Foster, that of building, over the vapour-vents, suitably ventilated chambers, constructed of the ever-abundant basaltic blocks, in order to collect the future deposit as "flowers of sulphur," the most valuable form of the mineral.

The summer months should be devoted to shipping the produce, which may be collected and prepared at all seasons. The transport of the refined sulphur to the port, so far from being the great undertaking which some people prophesied, may actually be made a source of profit—at least, in the case of the northern diggings, which are the farthest inland. A tramway is to be condemned absolutely; it would be exceedingly expensive to build; it would cost a fortune to keep in repair; and it would be useless and unused eight months out of the twelve. The island possesses its own transport system, to which the natives are accustomed; it can accommodate itself to the ways, even when they are such as indicated in this sketch; it can be increased or diminished according to need; and it will cost nothing for repair. The basis of all transport in Iceland must be the Icelandic ponies.

* Extract from a lecture delivered before the Society of Arts.

BROMIDE OF ETHYL (HYDROBROMIC ETHER).*

BY JOSEPH P. REMINGTON.

This anæsthetic, which has attracted considerable attention lately, was the subject of a paper by the writer in 1877, which was read before the American Pharmaceutical Association at its meeting at Toronto, Canada. At that time the process which was recommended was a modification of that of Personne, and served well on the small scale to make the preparation experimentally; it was not expected that the demand would at any time be so great as to require a process adapted to a manufacturing scale; but the calls became so frequent that it was found necessary to devise a more practicable method than the one then recommended.

De Vrij's process,† which depends upon the decomposition of potassium bromide by sulphuric acid in the presence of alcohol, was again looked to as a basis for a working formula, and the process recommended by Dr. E. R. Squibb‡ for preparing hydrobromic acid by distilling from a mixture of potassium bromide, sulphuric acid and water, suggested a plan by which the contamination of ordinary ether could be avoided, and this process was subsequently recommended by Dr. Greene.§

In a series of experiments intended to ascertain practically the process which could be adopted if it be deemed advisable to introduce the new agent into the U. S. Pharmacopœia, the following is selected as the best:—

Potassium bromide (not powdered) .	58 parts.
Sulphuric acid, sp. gr., 1·838 . . .	44 ,,
Alcohol (clean), 95 per cent. . . .	44 ,,
Water	28 ,,

Pour the water into a flask having double the capacity of the liquid ingredients above, and gradually add the acid; when the liquid has become cool add the potassium bromide, and having placed the flask in a sand-bath, adjust a thermometer, and with a bent glass tube connect the flask with a well cooled condenser, insert a narrow glass tube in the cork of the flask, and by means of a short rubber tube connect it with a narrow glass tube which is terminated by a syphon; the shorter limb of this syphon is inserted in the bottle containing the alcohol, which is elevated three feet or more above the flask. Heat the contents of the flask to 116° C., and having attached a screw pinch cock to the short rubber tube of the syphon, allow the alcohol to drop or flow in a small stream into the flask, carefully regulating the rate of flow so that the temperature should not fall below 100° C., nor rise above 116° C. When all the alcohol has passed into the flask continue the distillation until the temperature rises to 116° C., and then disconnect the receiving flask. Agitate the distillate with an equal bulk of distilled water, to which has been added five parts of solution of soda (or sufficient to render the liquid slightly alkaline), and when the mixture has clearly separated into two layers, pour off the uppermost layer, and having introduced the heavier liquid into a clean flask, containing a few fragments of chloride of calcium, redistil it.

Bromide of ethyl is a colourless, very volatile liquid, not inflammable, having an agreeable odour, and a hot saccharine taste. Its specific gravity is 1·420. It boils at 40° C. (104° F.). It is very sparingly soluble in water, freely soluble in strong alcohol and ether. When a small portion is evaporated from a porcelain plate by causing it to flow to and fro over the surface, little or no foreign odour is yielded as the last portions pass off, and the plate is covered with a slight deposit of moisture.

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* From the *American Journal of Pharmacy*, April, 1880.

† Watt's 'Dictionary of Chemistry,' vol. ii., p. 528.

‡ *American Journal of Pharmacy*, March, 1878, p. 116.

§ *American Journal of Pharmacy*, June, 1879.

ARIZONA SHELLAC.*

At a recent meeting of the California Academy of Sciences Professor Stillman read a paper on the gum and colouring matter found on the *Acacia Greggii* and the *Larrea Mexicana* or creasote plant. The gum which exudes from these plants is very abundant, and is the product known to commerce as shellac. The same plants produce lac dye. Professor Stillman suggested that California might compete with British India in supplying this valuable product. Mr. B. B. Redding said that these lac-yielding plants were as plentiful as sage-brush from Southern Utah to New Mexico, and from the Colorado Desert to Western Texas.

The lac is most abundant around stations on the Mojava and Colorado deserts, and exudes as the result of an insect's sting. Calcutta exports a million pounds sterling in value annually of shellac, selling at 25 to 35 cents a pound, and almost as much more of lac dye, selling at 30 to 40 cents a pound. In 1876 the United States imported 700,000 pounds of shellac alone. To collect this is simple work for boys, and will prove an important industry. It will require little or no capital. The twigs are boiled in hot water, and the gum rises to the top, is skimmed off, strained and dried on smooth stones, and hand-pressed into flakes, ready to make sealing wax or varnish. The residue, when allowed to settle, makes lac dye. The plants live on a rainfall of three inches a year.

In vol. vi. (Botany) of the Reports of the U. S. Geographical Surveys west of the 100th meridian we find the following information relative to these two plants, which would seem to be worthy the attention of commercial men and manufacturers:—

P. 108—"ACACIA GREGGII, Gray.—A small tree, 10 to 20 feet high, pubescent or glabrous, unarmed or with scattered stout recurved prickles; pinnæ 2 or 3 pairs, on a slender petiole; leaflets 4 to 5 pairs, oblong or oblong-ovate, 2 or 3 lines long, rounded or truncate above, narrower at base, rather thick, and with 2 or 3 straight nerves; flowers in cylindrical spikes an inch or two long, the peduncles equaling or exceeding the leaves; pods thin, coriaceous, flat, 3 or 4 inches long by 5 to 7 lines broad, shortly stipulate, acute, curved, glabrous, and reticulated, more or less constricted between the seeds; seeds half an inch long.—From Western Texas to Southern California; collected in Western Arizona, 1872."

P. 41—"LARREA MEXICANA, Moricand, *Creosote bush.*—Common from Western Texas to Kern County, California, and southward to Mexico. Dr. Loew's examination proves that the reddish-brown exudate on the branches, caused by an insect, will yield a red colouring matter showing all the reactions of cochineal. 'The alcoholic extract of the leaves, on evaporation, yields a greenish-brown residue of a specific and somewhat disagreeable odour, more strongly perceptible on boiling the extract with water. This residue is only to a small extent soluble in water, and the solution has an acid reaction. It yields a light yellow precipitate with acetate of lead. The part of the alcoholic extract that is insoluble in water is easily soluble in alkalies. It also dissolves in nitric acid at a moderate heat, whereby oxidation takes place. On addition of water a yellow brittle mass is precipitated.' The Mexicans are said to use an infusion of the leaves for bathing in with good effect in rheumatic affections." (Also vol. iii., Wheeler's Reports).

P. 80—"LARREA MEXICANA, Moric (*L. glutinosa* Engelmann), Valley of the Gila, Arizona.—This shrub is especially common on the hills bordering the Gila, also on the sandy wastes adjacent to Tucson and Camp Lowell, in Arizona, even imparting its strong odour to the air."

In the third volume of these reports this plant is also called stinkweed and etiontio.

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* From the *Scientific American*, April 10, 1880.

The Pharmaceutical Journal.

SATURDAY, MAY 29, 1880.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

WHAT IS A POTABLE WATER?

THE questions raised of late in reference to the water supply of towns have naturally brought into special prominence the subject of water analysis as a means of ascertaining the quality of water and its fitness for drinking purposes; but notwithstanding the importance of the data sought to be ascertained, such difference of opinion exists as to the significance of the results obtained by different systems of analysis, that in some cases the conclusions arrived at respecting a particular water supply are absolutely contradictory, while in many other cases they are at least discordant.

This discrepancy of opinion as to the wholesomeness of water has reference chiefly to the organic substance present to some extent in all natural water, and it has been rendered very apparent at recent meetings of the Chemical Society by Dr. TIDY's paper on River Water, of which an abstract was published in the Journal last March, and by the proceedings at the last meeting, which are reported in the present number. Dr. TIDY, as the advocate of rivers as a source of water supply, contends that the organic substance in river water undergoes such rapid alteration by atmospheric oxidation that, however dangerous the nature of the impurity and however objectionable the source of the pollution, a moderate flow along the course of a river is sufficient to ensure the total conversion of hurtful impurity into innocuous products and to render the water wholesome and fit for drinking. This is the doctrine put forward by the late Dr. LETHEBY and by Mr. HAWKSLEY, the engineer. It is one that finds favour with the proprietors of water works drawing their supply from rivers and with the local authorities of many towns, as well as manufacturers, both of which regard this doctrine as furnishing a reason for limiting to the utmost the restrictions to be placed upon their action as pollutors of river water by the discharge of town drainage and factory refuse.

This doctrine of spontaneous purification is, however, disputed by Professor FRANKLAND, and as the general result of experiments upon the subject he comes to the conclusion that there is not in the United Kingdom a single river long enough to provide for the oxidation of organic substances introduced into the water by sewage. Filtration of water for a considerable depth through well aerated soil is considered by Professor FRANKLAND to be a much more effectual means of purification, and he holds that while a long flow of water along a river is insufficient for removing all noxious material, downward filtration of polluted water may sometimes afford considerable guarantee that all hurtful impurity has been removed or rendered harmless by the conversion of its elements into other forms of combination. But even in regard to this possible purification of polluted water, Dr. FRANKLAND, as one of the Rivers Commissioners, reports that it is to be distinctly understood that although the purification of water polluted by human excrements may reasonably be considered on theoretical grounds to be some safeguard against the propagation of epidemic diseases, still there is not in the form of actual experience a tittle of trustworthy evidence to support such a view, but, on the contrary, there are cases which show that even very efficient filtration does not prevent the propagation of such disease by water.

Having regard to the importance of the wholesome character of water used for drinking, it becomes a matter of very general concern to consider first what constitutes potable water, and secondly, how to form a judgment on the suitableness of water for drinking purposes. This is especially the case at the present time, now that the Public Health Act has conferred powers on sanitary authorities to institute proceedings with a view to closing impure wells and other sources of supply, and has left the decision of such questions in the hands of local magistrates. Dealing with the matter from this point of view Mr. EKIN, of Bath, has just published a small *brochure* in which he propounds the questions above stated, and considers how far the results of different systems of analysis furnish valuable and trustworthy indications concerning the quality of water.

Leaving out of consideration the mineral constituents that are present to some extent in almost all natural water, as not coming properly within the scope of the term impurity, attention is directed to those materials derived from vegetables or animals, which are commonly spoken of as organic substances, and it is shown that the most dangerous impurity of water is that originating from its having been contaminated with surface drainage containing animal refuse. Examination of water for organic substance is therefore the first and most important thing to undertake in analysing a sample of water, and it may reasonably be taken for granted that the wholesomeness of any sample of water would be in some way proportionate to the amount of organic impurity. But what is the precise relation between the determined amount of organic substance and the quality of water? That is the essential thing to ascertain, and in endeavouring to do so a serious difficulty is encountered. Whatever means may have been adopted to determine the amount of organic substance in water, there will still be a want of means by which animal may be distinguished from vegetable organic substances, and hence it happens that the conclusions drawn from the results of analysis must always be, to some extent, conjectural, and the decision as to the quality of a particular sample of water very much a matter of judgment rather than one of experimental determination.

It is to this point that Mr. EKIN directs especial attention as the one of chief importance. He denounces the custom of laying chief stress on the mere amount of organic substance as one that is misleading and fallacious, and for this reason he contends that the standards of organic purity set up by the Rivers Pollution Commissioners and by other analysts have not in regard to the question of wholesomeness any foundation in fact. For the same reason, in speaking of the several methods of determining the amount of organic impurity in water, Mr. EKIN speaks of them all as being absolutely worthless, so far as distinguishing between organic substance that is dangerous and organic substance that is innocuous. As the result of a fair trial of all methods, he thinks they may probably be relied upon equally as giving a rough approximate indication as to whether organic substance is present in excess or not, and in so far a preference may be due to the method that is least troublesome and most convenient. But he holds that the nature and origin of the organic impurity in water are the points of paramount importance to be considered in deciding upon the wholesomeness of water.

It is only by the aid of collateral evidence that any knowledge of these important points can be arrived at. Sewage and animal excreta convey to water large quantities of putrescible organic material and ammonia, which by fermentation and oxidation give rise to the production of nitrites and nitrates, and by these changes noxious impurities are destroyed, and water gradually becomes purified. As regards the presence of oxidized nitrogen compounds in water, and its bearing upon the sanitary question as to the quality of water, Mr. EKIN holds opinions that are somewhat different from those commonly entertained, and he is decidedly disposed to look with at least suspicion upon water containing a large amount of nitrites and nitrates, inasmuch as they certainly indicate that the water has been contaminated with animal excreta, while at the same time it is not certain that the whole of the noxious impurity derived from that source has been destroyed. This may be the case even with water containing with nitrates only a very small amount of organic substance. In support of this opinion, Mr. EKIN refers to the case of spring water from the magnesian limestone, mentioned in the report of the Rivers Pollution Commissioners as containing on the average as much as 1·686 parts of nitrogen in the state of nitrites and nitrates, and but a minute proportion of organic substance, although at the same time the same water is described as having been previously polluted to such an extent as to mask its true character. In such a case as this Mr. EKIN would dissent from the representation of the water being "unpolluted spring water," as adopted by the Commissioners, and would prefer to class it among those of a suspicious nature at least.

Mr. EKIN considers, moreover, that it is not enough to prove that the organic substance in water is in a minimum amount and that ammonia and nitrites are absent, for waters presenting these apparently favourable characters have been found to give rise to illness, but that it is necessary to prove that the organic substance is harmless, that there are no specific germs or fever poisons present and that the organic substance will not vary with the rainfall. When these points are proved, but not till then, can the water be considered safe. This is certainly a high estimate of what is required in deciding on the quality of water, and though we thoroughly agree with Mr. EKIN as to the desirability of attaining such knowledge as he indicates, we cannot dispel the fear that we are still far from being able to command it. In regard to this point we would refer our readers to the remarks of Professor HUXLEY upon the possible consequences of the presence of bacteria in water, and if we may rely upon his statement, there seems some reason for giving up chemical analysis of water altogether. Whether by such a course the "biological turbidity" surrounding the subject of water supply would be removed or not we do not pretend to say, but so far as the chemistry of the matter is concerned, we are strongly disposed to think that we ought not to reject the aid that analytical results are capable of furnishing when used with caution, and without overweening assertion of the value appertaining to those obtained by particular methods. Above all things we believe that, as Mr. EKIN contends, it is not so much by the actual results obtained by any system of analysis that the quality of water is to be decided, but by making the inferences from those results subject to consideration of various collateral circumstances connected with the history of the water.

To those who are interested in the subject of water supply, we heartily recommend Mr. EKIN's *brochure* as being calculated to help them in forming sound opinions and also in carrying out any inquiry as to the quality of water that they may be called upon to make.

EXEMPTION OF NEW YORK PHARMACISTS FROM JURY SERVICE.

A COMMITTEE appointed by the New York pharmacists has just obtained the extension of the exemption from jury service to every licensed pharmaceutist or pharmacist carrying on his profession as a means of livelihood. It appears that the word "licensed" will limit the exemption to persons holding a licence from the Board of Pharmacy for the city and county of New York.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The annual general meeting was held in Anderson's College, 204, George Street, Glasgow, on Wednesday, May 12, for the purpose of electing the President and office bearers for the session 1880–81. The retiring President, Mr. Kinninmont, F.C.S., occupied the chair.

The Secretary was called upon to read the minutes of the previous meeting, which were confirmed by the members.

The President then asked the Secretary, Mr. John C. Hunter, to give his report of the Council work done during the closing session, of which the following is a summary:—

During the session 1879–80 the Association held six meetings at which papers were read on various subjects, abstracts of which have appeared in this Journal. The Council held three meetings for trade purposes. One of these was a general meeting of the trade to discuss what steps were necessary concerning the sale of patent medicines and proprietary articles by persons outside of the business at prices below their normal value. The result of its deliberations was to appoint a committee to draw out a list of those articles that might be reduced to meet the competition of outside traders, and the Committee was empowered to give its results to the Price List Committee, so that it might print the alteration in price of some articles already in the price list. This having been done, circulars were sent to the trade in and around Glasgow, recommending the adoption of the reduced prices for the articles mentioned therein.

The Council tried to get up a chemistry class under the charge of Dr. Milne, but as the number of students did not come forward it could not be gone on with, much to the disappointment of Dr. Milne, who had given himself a good deal of trouble in arranging the probable hours that might suit those who would present themselves. This was the only educational business of the Council during the session.

The number of members on the roll is just about the same as last session, and the attendance at the meetings during the session has been satisfactory.

The Secretary of the Assistants' Section, Mr. Adam, reports that five meetings have been held during the session, when papers were read on various subjects by Messrs. Lee, Simpson, Paris, Adam and Gilmour, and on the whole the attendance has been fair.

The President called upon the Treasurer, Mr. Maltman, to read his financial statement, which showed a balance of £7 16*s*. 6*d*. over expenditure for the session 1879–80, now closed.

Mr. John Currie, Sauchiehall Street, then said that it was extremely satisfactory to know that the finances of the Association were in a healthy state. He would move the adoption of the reports.

This was seconded by Mr. Brodie and carried by the members.

The election of President and office bearers for the ensuing session was then proceeded with, and the following gentlemen were elected for session 1880–81:—

President, Mr. Robert McAdam (Glasgow Apothecaries' Company); Vice-President, Mr. Robert Brodie; Hon. Secretary, Mr. John C. Hunter; Treasurer, Mr. Maltman; Librarian, Mr. Joseph A. Clarke. Members of Council: Messrs. Daniel Frazer, Alexander Kinninmont, Thomas Davison, John Currie (Sauchiehall Street), John McMillan, John W. Pettigrew, R. C. Rait, William Simpson, William Weir, John C. Steel, William White and John Fenwick. Auditors: Messrs. John Walker and Archibald Paterson.

Votes of thanks were unanimously voted to the retiring President, Mr. Kinninmont; the Treasurer, Mr. J. A. Clarke; and to the Secretary, Mr. J. C. Hunter.

EDINBURGH CHEMISTS' ASSISTANTS' ANNUAL SUPPER.

The Edinburgh Chemists' Assistants' Association held its third annual supper on the evening of Tuesday, May 18, in the Waterloo Hotel. There were about fifty gentlemen present. In the unavoidable absence of Mr. D. Maclaren, Ex-President, the chair was occupied by Mr. J. D. Robertson, President, Mr. Boa acting as croupier. After supper the chairman gave the usual loyal and patriotic toasts, which were warmly responded to, that of the Army, Navy, and Reserve Forces being acknowledged by Mr. C. P. Henry.

In proposing "Success to the Edinburgh Chemists' Assistants' Association," the Chairman said:—The toast which I have now the honour to propose is one in which most of you take a warm interest. It is now nearly three years since the idea of forming such an association was originated. An association existed previous to that date, but in the course of time it died a natural death. After the usual preliminaries the present Association became an established fact. On the occasion of the last annual supper, held at the end of the first session, the chairman paid a high compliment to the members on account of the fact that all the papers read during the session had been contributed by members of the Association, and I am proud to-night to be able to pay you the same compliment, and to say of the session just ended, that all the papers read at our meetings were of a highly interesting nature. In point of numbers our average attendance last session has been better than during the previous session. Though our membership is smaller than it might be, it will, I think, compare favourably with that of kindred associations in other places. Take London as an example, with a population about fifteen times that of Edinburgh and Leith, with, I suppose, a proportionate number of chemists, and I find the London association numbers seventy-five, and ours forty-five. It does not follow from this, however, that we should not do our utmost endeavour to increase our numbers; by all means let every member do his best to accomplish this object. Our present position is very satisfactory; to the future we look, not with fear and trembling, but confident that, with increasing numbers and more opportunities of meeting one another, we shall be able effectually to break down that apparently insurmountable barrier which exists between the assistants in this city. Our aim should be mutual improvement and progress; with these ever in our minds we can, individually, add much to the success of our Association and our annual supper. Gentlemen, I ask you to join me in wishing continued prosperity to the Edinburgh Chemists' Assistants and Apprentices' Association.

The toast having been enthusiastically responded to, a brief address was given by Dr. Andrew Wilson, who said he was honoured and gratified by being invited to be present at the annual supper of the Edinburgh Chemists' Assistants' Association. He had the duty before him of complimenting the assistants on the success of their endeavours to mutually improve themselves and their profession, and he did so with all cordiality. It was a pity that, as Thackeray had said, all the fine things one "thought of in the cab" should flit out of one's head before speechmaking time. Not to say that his "cab thoughts" were ever brilliant; but he found himself there that evening with but one thought, namely, that of saying that the status of pharmacy as a profession was being rapidly advanced. Now, they had the Major and Minor examinations guarding the entrance to pharmacy, and for these examination mercies he supposed they must be devoutly thankful. Examinations were simply a necessity in a profession like theirs, but, as a university examiner himself, he would remind all concerned that examinations were not, as they were too frequently made, an end. They were only a means to an end, and that was the higher culture of the profession, not merely as chemists and druggists, but as intellectual men. Let them not lose sight of that fact. Sometimes the details of examinations were hard and grievous to bear; but whether too stringent or not, their system of examinations would bear fruit in time to come, and would, he contended, raise the professional status. It had been his fortune to meet not a few earnest lads, who, whilst serving behind the counter, had manfully fought their way through a medical curriculum, and were now in the ranks of the medical profession. That spirit of industry and work, he thought, prompting a man to better things, would be fostered by wise examination rules. Last of all, he would say, work for culture. Find in studies (such as botany or some other branch of natural science, or in literature) a source of intellectual recreation, when business cares and worldly worries are laid aside for the nonce. Elevate the intellectual side as individuals, and the advance of the profession was an assured thing. He again congratulated the assistants on their good work of the past session, which seemed to him to augur hopefully for the future.

Mr. Hutton, in proposing "The University and Royal Colleges of Physicians and Surgeons," referred to the many illustrious men who had been trained within their walls. He thought that a friendly relation ought to be maintained between chemists and medical men, as the former had frequently to consult the latter with regard to their prescriptions, and he suggested that much good might result if medical men occasionally consulted chemists with regard to the same subject.

The toast was acknowledged by Dr. Caird, who cordially reciprocated the sentiments expressed by Mr. Hutton, and referred to the many instances in which chemists could be of assistance to medical practitioners.

Mr. Fisher, in proposing "The North British Branch of the Pharmaceutical Society," referred to the deep interest which they all took in the prosperity of the Society at large. They rejoiced to see a friendly relation kept up between the Branch and the parent stem in London, by means of deputations to the various examinations. It was very gratifying to find that the importance of the North British Branch was yearly becoming more apparent by the ever increasing number of candidates who present themselves for examination, many of them hailing from across the border. The advantages which Scotch assistants derived from having a branch of the Society established in their midst could not easily be overestimated, and it must always be with gratitude that they recalled how zealously its leading members fought for its maintenance at a time when its existence was seriously threatened.

The toast was briefly acknowledged by Mr. Robert Stenhouse.

The other toasts were, "The Medical Gentlemen present," proposed by the Chairman, and acknowledged by Dr. Andrew Wilson; "The Office-bearers of the Association," by Dr. Black; "The Ladies," by Mr. Hill; "The Croupier," by Mr. Wallace, and "The Chairman," by Mr. Welsh.

The evening's proceedings were enlivened by a number of excellent songs and recitations, by members of the Association and others.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, May 20, Professor H. E. Roscoe, President, in the chair.

The following certificates were read for the first time:— P. S. Brown, E. Moritz and F. E. Matthews. It was announced that the Longstaff Medal had been awarded to Dr. T. E. Thorpe, of Leeds; the presentation will probably take place in October.

The President then called on Dr. Frankland to read a paper on—

The Action of Air upon Peaty Water. By Miss Lucy Halcrow and E. Frankland.—Dr. Tidy in his paper on "River Water" (*Chem. Soc. Jour.*, 1880, 295) contends that the peaty matter in running water is rapidly oxidized. He instances the water of the Shannon, which he alleges loses thus more than 38 per cent. of its organic matter during a flow of one mile, and the water supply of a town in the north of England, which similarly loses 50 per cent. of its organic carbon during a flow of less than four miles through an open brickwork conduit. If peaty matter in solution in water possesses this extraordinary affinity for oxygen at ordinary temperatures, it cannot be necessary to appeal for proofs of it to large bodies of water which are always more or less liable to alterations from other causes. The authors have, therefore, studied upon an experimental scale the action of exceptionally strong peaty water upon atmospheric air, so as to ascertain how far air loses oxygen by contact with such water, and have submitted to eudiometrical analysis, limited volumes of atmospheric air which had been exposed for various periods to the action of large volumes of peaty water from unpolluted mountain sources. A sample of peaty water, freely exposed in a stratum of 5 inches deep to the action of sunlight and air without shaking in a glass bottle for seven days, lost only 6 per cent. of its organic elements, at the same time depositing a slight brownish sediment. Four experiments are given as to the composition of the air which had for some time been in contact, without shaking, with peaty water; the following will serve as an example:—Original water contained 0·0399 parts of organic carbon and 0·074 N per 100000; after a year it contained 0·0354 C and 0·069 N; the air which had been in contact with the water contained CO_2 0·10, O 20·76, N 79·14. The results prove that the extent to which the peaty matter of the upland water was oxidized in periods of more than a year was very small indeed, as the carbon alone would have been sufficient to have taken up the whole of the oxygen from 100 c.c. of air. Experiments are next quoted in which the peaty water was violently agitated with air in accurately stoppered bottles of about 500 c.c. capacity, half filled with the sample under examination. The water before use contained in 100 volumes 2·01 vols. of air having the composition 1·99 per cent. CO_2, 31·96 per cent. O, 66·05 per cent. N, and was, therefore, well aerated. Four experiments are then given in which the water was well shaken with the inclosed air, in one case on the connecting rod of a steam engine making one hundred strokes per minute for ten and a half hours at temperatures from 18° to 30°. In no sample was the colour materially altered and the composition of the enclosed air remained almost unaffected. Thus the air in the bottle which had been attached to the steam engine contained 0·12 per cent. CO_2 20·75 per cent. O, 79·13 per cent. N. Analyses were also made of air which had been shaken up with the Kent Company's water, the Colne Valley Company's water, and pure distilled water respectively. An analysis of the atmospheric air used gave CO_2 0·12, O 20·94 per cent., N 78·94 per cent. The volume of air contained in each bottle was 234·5 c.c., and from this the organic carbon alone in the water (0·00728 grm.) would remove during complete oxidation 0·0194 grm or 13·5 c.c. of oxygen, leaving the residual air with only 15·1 per cent. of oxygen. If we compare the percentage amounts of oxygen found in the different samples of air which had been in contact with peaty water with those found in the air which had been similarly shaken up in the Kent and Colne Valley Companies' waters and in the organically pure distilled water, and lastly with the percentage of oxygen in the air of the room in which the experiments were made, it is evident that minute quantities of oxygen have been absorbed by nearly all the peaty waters, but even in an extreme case in which the water travelled more than twenty miles on the connecting rod of a steam engine, the amount of oxygen absorbed by 250 c.c. of extremely peaty water was only 0·345 c.c., which is scarcely one thirty-ninth of that required for the complete oxidation of the organic carbon alone, or in other words only $2\frac{1}{2}$ per cent. of the organic matter was oxidized. Assuming that all the oxygen taken up was employed in the oxidation of organic matter, and deducting from this percentage the amount of oxygen absorbed by the Kent and Colne Valley Companies' waters, we have only 1·6 per cent. of total organic matter in the peaty water oxidized in the steam engine experiment. The authors, therefore, conclude that if peaty matter dissolved in river water is spontaneously oxidized (of which there is as yet no sufficient proof) the process takes place with extreme slowness, and cannot be accomplished to any considerable extent in the flow of a river. During the experiments a considerable precipitation of brown peaty matter was observed when the strong bog drainage was mixed with a small bulk of distilled water. The cause of this precipitation the authors intend to investigate.

The President, in proposing a vote of thanks to Dr. Frankland and Miss Lucy Halcrow (who was present at the meeting), said it would perhaps be advisable not to take the discussion on this paper until Dr. Frankland had read a further communication.

Dr. Frankland, in ackowledging the vote of thanks, said that the work in the paper was almost entirely carried out by Miss Halcrow.

The President then said that the discussion on Professor Tidy's paper would now take place. He suggested that it would be well to limit the discussion to the point of the oxidation of organic matter in rivers. He then briefly mentioned the chief statements in Professor Tidy's paper, on which he based his assertion that organic matter is rapidly oxidized in running water, and called on Dr. Frankland to open the discussion.

Dr. Frankland said he must apologize to Professor Tidy for confining himself on that evening to the question of oxidation. There were many portions of the paper in which he cordially agreed with Professor Tidy, and his researches on the water of the River Nile and on Filtration were of the highest value. He should, however, consider only the question of oxidation. Can running water be at all times safely used for dietetic purposes a few hours or days after it has been mixed with sewage? This is a question of vital importance to many millions of people in this country. Twelve years ago there was a general impression amongst chemists and others that polluted water quickly regained its original purity by spontaneous oxidation. This opinion had no foundation in quantitative observations; indeed there was not a single experimental fact to support it, for the previous condition of water analysis did not permit of the quantitative investigation of organic matter dissolved in water. Two classes of persons strongly interested in its acceptance were chiefly instrumental in the organization and diffusion of this opinion. These were the pollutors of river water and water companies drawing their supplies below the sewer outfalls of towns. Both these influential classes have always contended that even the most abominable of organic rubbish is destroyed by oxidation, in fact utterly burnt up during the flow of a few miles. This was a comfortable doctrine and therefore a popular one; nevertheless it did not pass entirely unchallenged; indeed it is difficult to imagine how any chemist, accustomed to the habits of organic compounds, could accept such an opinion without proofs. In 1865 Professor Brodie entered his protest against the popular doctrine. The first Rivers Pollution Commissioners, R. Rawlinson, J. T. Harrison and Professor Way, concluded "that as a water supply, the Thames polluted with the sewage of the inhabitants of the river basin is open in kind, if not in degree, to the same objections as well water infiltrated by liquid from an adjoining cesspool. Well water so tainted may appear to sight, taste and smell to be harmless, and has been known to be drunk for a length of time without apparent mischief, but beyond all doubt that same water is liable under particular conditions to become poisonous." The prevailing opinion was, however, in favour of the rapid oxidation of organic matter in running water when the Second Rivers Pollution Commissioners, of 1868, undertook the quantitative investigation of the subject. During six years they determined the rate of oxidation during the flow of intensely and moderately polluted rivers, and secondly in artificial mixtures of sewage and water by prolonged agitation with air, and thirdly by observing the diminution of dissolved oxygen in a mixture of sewage and water excluded from the air. For the determination of the rate of oxidation in strongly polluted water, the rivers Mersey, Irwell and Darwen were selected as streams offering favourable conditions for quantitative experiments, because after being intensely polluted each of them flows for several miles without encountering any further material pollution, and their waters are well mixed by weirs, etc. The speaker then detailed the analyses, which unmistakably disclose the fact that a flow of between 11 and 13 miles at a temperature of 18° C. produces but little effect upon the organic matter dissolved in the water, and that at or below 13° C. oxidation is practically arrested, although in the case of the Irwell the water was most effectively aerated by falling over six weirs. The results may be summarized thus—

						Percentage reduction of organic elements.
Irwell after a flow of	11	miles at	6·5° C. .	.		1·7
„	„	„	„	„	12·7° C. . .	0·0
„	„	„	„	„	17·8° C. . .	26·5
Mersey „	„	13	„		4·5° C. . .	20·5*
Darwen „	„	„	„		8·7° C. . .	0·0

Next, as to the rate of oxidation in a river less polluted in which animal and vegetable life still flourished. For this purpose the Thames between Reading and Shiplake Paper Mill was chosen. Every care was taken to ensure fair and strictly comparable samples. Some difficulty was experienced in effecting this owing to the great distance necessary to ensure a complete mixture between the waters of a main stream and those of a tributary. Thus, the Kennet, after joining the Thames, flows nearly two miles before its individual character ceases to be apparent, and it is only after the passage of the weir and rapids at Sonning Bridge that a thorough mixture takes place. The samples were taken on a bright sunny day at the end of May, and therefore under circumstances very favourable to oxidation; but the reduction in the proportion of organic matter was exceedingly small, only 5·7 per cent. at 16·7° C., so that allowing for the retardation of the process by night, etc., it would be incorrect to assume that the river would clear itself of organic matter by a flow of seventy miles. These results were checked by experiments with artificial mixtures of sewage and water. The mixture was violently agitated every day, and was daily syphoned off, and allowed to fall slowly about 3 feet at a temperature of about 20° C. In ninety-six hours the organic carbon was thus reduced 6·4 per cent., and the organic nitrogen by 28·4 per cent. After one hundred and ninety-two hours the reduction was 25·1 per cent. carbon and 33·3 per cent. nitrogen. This shaking, etc., was supposed to be equivalent to a flow of ninety-six and one hundred and ninety-two miles respectively, at a rate of one mile an hour. Similar experiments with a mixture of urine and water gave similar results. By studying the rate at which atmospheric oxygen disappears when dissolved in polluted water, it was again proved that oxidation takes place very slowly, the results being that in the first period of twenty-four hours, 6·8 per cent. of the sewage was destroyed; in the second period of twenty-four hours, 8·9 per cent.; in the third period of forty-eight hours, 14·3 per cent.; in the fourth period of twenty-four hours, 5·4 per cent.; in the fifth, 5·8 per cent.; in the sixth, 2·1,

* No correction for unpolluted affluents.

making all together 43·3 per cent. That even this oxygen was not all used up in oxidizing the carbon was proved by the fact that the quantity of carbonic acid present remained constant. The Rivers Commission, therefore, concluded from the experiments made upon rivers and artificial mixtures of sewage and pure water that the oxidation of the organic matter in sewage proceeds with extreme slowness, and that no river in the United Kingdom is long enough to effect the destruction of sewage by oxidation. For six years these results have never been called in question. Dr. Tidy, however, whilst conceding the accuracy of the experiments, objects to the conclusions, and from his own experiments concludes that peaty matter is rapidly, and sewage matter still more rapidly, oxidized in running water, and states that in his opinion the oxidation of organic matter in sewage proceeds with extreme rapidity, and that after a run of a few miles, if the dilution be sufficient, the removal of the whole of the organic impurity will be effected. This conclusion is founded upon the results of analyses of samples of water taken from the Severn, the Shannon, and from certain conduits in the north of England, and also upon experiments made with sewage matter flowing through glass-lined troughs. A careful examination, however, of the conditions under which the samples were taken and the experiments made proves that they are in most cases consistent with the results arrived at by the author of the present paper, while none affords any trustworthy basis for the conclusions arrived at by Professor Tidy. As regards the Severn, the analyses, if they prove anything, prove too much. Thus comparing sample No. 2 with sample No. 3, it appears that a flow of 30 yards has reduced the organic elements by 32 per cent.; the river should therefore be quite pure after flowing 100 yards. The next mile only produced a diminution of 12 per cent. more. This discrepancy is doubtless due to a want of care in taking the samples, and is caused by the varying admixture of the pure water from the affluent, the Teme, with the polluted water of the Severn. This is indeed proved by the chlorine determinations, which show for the first 30 yards flow a diminution of 41 per cent.; whilst during the next mile only another 11·4 per cent., and proceeding therefore, *pari passu* with the diminution of organic matter. Professor Tidy suggests that the rapid decrease of the chlorine in 30 yards is caused by its absorption by vegetation, but produces no proof of such a powerful, and at the same time irregular, absorption. The river Wear is next considered. It is stated that between Bishop Auckland and Durham, a flow of 13 miles, the whole of the sewage of the former town is oxidized, and indeed the river is purer than it was above Bishop Auckland. Even the nitrates themselves appear to be oxidized, so that the Rivers Commissioners testify that the Wear at Durham is a "good water." The fact has apparently been completely overlooked by Professor Tidy that during this 13 miles flow a considerable tributary of highly ferruginous water enters the Wear; the potency of iron in removing various organic matters from water being well known, and referred to by the Rivers Commissioners. It is therefore probably to this ferruginous tributary and to the influx of a larger affluent, the Brownie, that this diminution of organic matter is due. At all events no one can allege that the cleansing is due solely to oxidation. As regards the alleged statement of the Rivers Commissioners, they really said that the water was good *considering its source*, having previously described the impurity of the latter. As to the evidence drawn from the composition of Thames water at Lechlade and Hampton, the only evidence on the subject is furnished by two samples taken at Lechlade, on April 18, 1868, and at Hampton, on May 4, 1868, the former containing ·133 and 0·033 of organic carbon and nitrogen, the latter 0·260 and ·024. At Lechlade the river was running 100,000,000 gallons daily, at Hampton, 554,000,000. A flood had also occurred on April 21–24. But granting that the Thames at Hampton contains no more organic matter than at Lechlade, it by no means follows that the sewage of a million people has been got rid of. For:—1st. Its volume has been augmented more than fivefold, to some extent by pure spring water. 2nd. A considerable proportion of the sewage drains into cesspools, etc., and only enters the Thames after a flood. 3rd. When the Wey mixes with the Thames about 6 miles above Hampton the mixture becomes turbid, and a precipitation of organic matter takes place. 4th. For several miles above Hampton the Thames runs through a vast deposit of flint, gravel and sand, which sops up its water like a sponge, restoring it again at a lower level, and thus vast volumes are exhaustively filtered through gravel and sand, and the organic matter is consequently oxidized in a porous medium, a most potent agency in nature for the removal of organic matter. As regards the Shannon, Professor Tidy's observations were limited to a portion of 37 miles, 23 in Loch Derg, and 14 in the river. It was found that in flowing through Loch Derg the organic elements diminished from 1·02 to 0·84 per cent., *i.e.*, about 18 per cent. The next sample, taken a mile lower down, shows a diminution of more than 38 per cent. The next sample, 4 miles lower down, shows an increase of 75 per cent. Four miles lower, at the foot of the Castle Connell falls, a further sample was taken, it showed a diminution of 28 per cent. The last sample was taken above the junction of the river Mulkear, and here the organic elements had again increased 53 per cent. Thus from the analyses a run of a mile, having a surface of less than one-tenth of a square mile, reduces by oxidation the organic elements 38 per cent., whilst the passage through Loch Derg of 23 miles, exposing a surface of over 50 square miles *plus* 2 miles of river, diminishes them by only 18 per cent. After leaving this oxidizing section, the river flows 4 miles and arrives at O'Brien's Bridge, and has gained 75 per cent. of peaty matter. To account for this increase by an influx, even of black peaty water, requires an augmentation of the river by one-third of its total volume. This increase is quite incredible, and the author concludes that somehow or other the samples taken did not fairly represent the main body of the river, and that the conclusions drawn by Professor Tidy are therefore quite unwarranted. The analyses of the peaty water flowing through an open and a closed conduit quoted by Professor Tidy are probably in a similar way rendered fallacious, owing to the probable introduction *en route* of spring water into the open conduit. The mysterious influence which so favours the oxidation of polluted water running in rivers with numerous unpolluted affluents appears to be always absent when the water is put under conditions admitting of the application of accurate experimental tests. Professor Tidy therefore constructed a series of V shaped troughs, lined with glass, altogether 200 feet long; by means of this apparatus he finally demonstrated the oxidation of sewage in water. To these experiments the author objects, 1. That the water was exposed to an enormously greater solid surface than in any river. 2. It is not stated that the sewage was filtered, and loss might occur by deposition on the troughs. 3 and chiefly. After a short time the urea in sewage would be transformed into ammonic carbonate. Thus there is no evidence whatever of the destruction by oxidation of the dead organic matter by a flow of 12 miles, still less is there any ground for assuming that the organized and living matter of sewage is destroyed under like circumstances. Bacteria develop, multiply and flourish for weeks in attenuated liquids. Here the author read a letter from Professor Tyndall, in which, after apologizing for his compulsory absence, he designates Professor Tidy's views on germs as very plausible, but utterly chimerical, and continues, "Well, what about the germs of bacteria, do they commit suicide by endosmic action? So far is this from being the case that Dr. Tidy cannot take a single drop of water from his tap that does not contain living germs, capable when placed in a proper nutritive fluid of developing themselves into countless multitudes of bacteria. Pray ask Dr. Tidy what reason has he to suppose that other germs must behave differently from those of *Bacterium termo*." The author then criticizes the assumption that the epithelial scales from scarlet fever patients, etc., are daily oxidized and disappear, and challenges Professor Tidy to prove by a delicate balance any marked diminution of weight in such a mass of organic *débris* from oxidation. The author then upholds and justifies his statement as to the immunity which would be conferred on the metropolis from epidemics of cholera if it had a supply of pure water, by reference to statistics from Bethlem Hospital, Millbank Prison, etc. In conclusion, the author agrees with Professor Tidy when he says of water supplied to a community, "Art may be fairly asked to improve a good water, but it is simple madness to ask her to deal with bad water;" and again, "that impure water has been one of the most active causes of disease is a fact which, to my mind, has been proved beyond doubt. The researches of Dr. Ballard on typhoid, etc., supply evidence that should make us very jealous indeed of allowing to be used for drinking a water over which hangs the merest shadow of a suspicion. No one can be too strictly a water purist." The question therefore, Can running water be at all times safely used for dietetic purposes a few hours or days after it has been mixed with sewage? is answered by the author in the negative.

The President said that all must compliment Dr. Frankland on the complete, clear, and withal good-natured criticism to which they had listened with so much interest. He would ask Professor Huxley to say something on the subject of bacteria.

Professor Huxley did not wish to take part in the chemical controversy, but it had struck him on reading over Dr. Tidy's paper that there was a good deal of what he might venture to call "biological turbidity" in it. To this turbidity he would, as far as was in his power, act as a filter. He would state briefly only what were demonstrable facts. Diseases caused by what people, not wisely, call germs, *e.g.*, splenic fever, pig typhoid, etc., are caused invariably by bodies of the nature of bacteria; these could be cultivated through twenty to thirty generations, and then when given to the ox or the pig would invariably give rise to the characteristic disease. There was no reason even to imagine that any body capable of causing disease by such means could be anything but a body having the nature of a bacterium. Now, bacteria are just as much plants as mushrooms or cabbages, or the *Wellingtonia gigantea*, so that we know under what conditions bacteria can live and what they can do. Bacteria can be sown in Pasteur's solution just as mustard and cress can be sown in the soil; they thrive, and the liquid becomes milky; and he would ask the President whether there was any known method by which if one drop of this Pasteur's solution were placed in a gallon of water its constituents could be estimated?

The President having answered that he thought that it was doubtful,

The speaker continued, every cubic inch of such water would contain 50 to 100,000 bacteria, and one drop of it would be capable of exciting a putrefactive fermentation in any substance capable of undergoing that fermentation. For purposes of public health the human body may be considered as such a substance, and we may conceive of a water containing such organisms, which may be as pure as can be as regards chemical analysis, and yet as regards the human body as deadly as prussic acid. He was aware that chemists might consider this as a terrible conclusion, but it was true, and if the public were guided by percentages alone, they might often be led astray. The real value of a determination of the quantity of organic impurity in a water is, that by it a very shrewd notion can be obtained as to what has had access to that water. If it be proved that sewage has been mixed with it there is a very great chance that the excreta of some diseased person may be there also. On the other hand, water may be chemically gross and yet do no harm to anyone, the whole source of damage being, in the belief of the speaker, in the diseased germs. As to the bursting of the envelopes by endosmosis, it was a question whether they had any envelopes; bacteria would be large if $\frac{1}{20000}$ of an inch in diameter, and moreover, ordinary water was full of them, and in it they could be shaken for an indefinite period without harm. As long as bacteria had nutrition there was no reason to suppose that oxidation or endosmosis would affect them. If, however, they were deprived of nourishment and exposed to sunlight, the case might be very different.

The Secretary then read a few remarks which had been sent by Dr. Mills. Dr. Mills has calculated the ratio of $\frac{\text{oxygen consumed}}{\text{sum of organic } C+N}$ and finds that it is not constant, but varies in different streams. He does not think it possible to determine the peat in a water by its tint depth, owing to the difference of colour. River water commonly contains a slimy or pectinous material which tends to separate out on any substance which acts as a nucleus. This has, in the author's opinion, a most potent influence on the purification of river water. The oxygen theory of the natural purification of waters seems utterly untenable. The criticisms of the author coincide in several respects with those already advanced above by Dr. Frankland. In conclusion the author expresses his admiration of the patience with which Dr. Tidy has collected his facts, and of the meritorious accuracy of his analytical results.

Professor Bischof called attention to the omission of the cholera years in the statistics given by Professor Tidy.

Professor Tidy in his reply relied mainly on the powerful testimony given in his behalf by the statistics of the last ten years. Notwithstanding the possible contamination of a large bulk of river water by a minute drop of a fluid containing germs, yet there were as many cases of fever in towns supplied solely by well water as in those supplied by river water; this holds good for towns all over England as well as in different districts of the same town. He took exception to the laboratory experiments of Dr. Frankland on oxidation; they were doubtless most interesting and satisfactory experiments as regards shaking fluid up in bottles, but they did not represent the flow of a river. There was no vegetation, no animal life. As regards the diminution of sodium chloride in the Severn, he contended that plants did cause a decrease in the quantity of sodium chloride in running water. As to the Shannon, he knew every inch of it, and perfect streams of black drainage entered into Loch Derg and elsewhere, quite sufficient to account for the discrepancies noted by Dr. Frankland. He collected the samples of water himself, and did his utmost to collect them fairly. He had no interest whatever in commending any water. In conclusion, Professor Tidy said that although his paper might be considered in some respects an attack on Dr. Frankland, he wished to thank him for the freedom and the kind way in which he had met him at every turn, and expressed a hope that Dr. Frankland would join him in fighting the prevailing heresies on this question which tended so to upset the public mind.

Dr. Frankland having declined, owing to the late hour, the right of reply, the meeting, which had been crowded all the evening, separated shortly after eleven, and the Society adjourned to June 3.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, May 13. Mr. R. H. Parker, Vice-President, in the chair. Mr. W. Elborne read a paper on "The Recovery of Residual Tinctures from Marcs by Upward Diplacement with Water." The paper will be published in an early number.

After a discursion, in which the Chairman, Messrs.

James, Allen and Wright took part., the thanks of the meeting were awarded to Mr. Elborne.

Mr. A. F. Dimmock made a report on analytical chemistry on "Vortmann's Method for the Detection of Chlorides in the Presence of Iodides and Bromides." This method is based upon the action of chlorides, bromides, and iodides when heated with peroxide of lead in acetic acid solution. The bromine is completely dissipated as free bromine; the iodine is partially liberated as free iodine, the remainder forming iodate of lead. With chloride all the chlorine remains as chloride of lead. To the solution containing the three salts acetic acid is added, then peroxide of lead, and the solution boiled for half an hour, after which it is filtered and the filtrate tested for chlorides in the usual manner.

A discussion ensued, in which the Chairman, Secretary, Messrs. Allen and Branson took part. Mr. Dimmock announced his intention of working at the method quantitatively, as Vortmann had given no results in his original paper read before the Berlin Chemical Society.

The meeting then adjourned.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The annual general meeting of the above was held at the rooms of the Association, 32A, George Street, Hanover Square, on May 12.

On the motion of Mr. O. Wallis, Mr. F. W. Branson took the chair.

The minutes of the previous meeting having been read and confirmed, the Honorary Secretary, Mr. F. W. Maggs, read the following report:—

"The Council present the report of the third session, with full confidence that it will be received with satisfaction by all the members. The number of members during the year has been increased by twenty-one. Fourteen scientific and eight social meetings have been held, with an average attendance on paper nights of twenty members and four visitors. A programme of meetings, issued in September, has with three exceptions been carried out. The Council has met for the transaction of business on eleven occasions, and numerous committee meetings have also been held. A very successful conversazione, held at St. James's Hall on October 22, was largely attended. The annual dinner was held at the Holborn Restaurant on January 28, at which ninety-one members and friends were present. A testimonial consisting of a complete series of Dickens's works was presented to Mr. E. Cardwell, in October, in recognition of his services as Honorary Secretary, and as a mark of the esteem in which he was held by the members. The retiring Council tender their thanks to all who have assisted their efforts, and trust that their successors will receive such support as will enable them to promote the continued success of the Association, and render the institution a permanent one."

The adoption of the report was moved by Mr. Wrenn, seconded by Mr. Hardwick and carried *nem. con.*

The Treasurer, Mr. O. Wallis, then read the financial report:—The income for the past year had been £68 11*s.* 5*d.*; made up of balances of previous year, £18 11*s.*; seventy-five members' subscriptions, £18 15*s.*; three honorary members' subscriptions, £3 13*s.* 6*d.*; nineteen donations from wholesale firms and friends, 19 guineas; six donations from members, 6 guineas; balance from dinner account, £1 6*s.* 11*d.* The chief items of expenditure had been rent, £30; conversazione, £16 0*s.* 6*d.*; miscellaneous, £12 5*s.* 11*d.*, leaving a balance in hand of £10 5*s.*

On the motion of Mr. Piper, seconded by Mr. Lapthorne, the report was adopted.

In the discussion which followed, various methods were proposed for still further increasing the scope and usefulness of the Association, amongst them, one for the establishment of a branch, to suit the convenience of members residing in other parts of the metropolis, but after due consideration the scheme was postponed for the present. Some slight alterations in the rules relating to honorary members were proposed by Mr. Hardwick, which, after discussion, were carried.

The following are the Officers and Council for the ensuing session:—

President, Mr. F. W. Branson; Vice-Presidents, Mr. F. W. Collinson and Mr. G. F. Snow; Hon. Treasurer, Mr. C. Parkinson; Council, Mr. A. Davidson, Mr. S. Hardwick, Mr. F. W. Maggs, Mr. C. B. Miller, Mr. A. J. Phillips, Mr. W. P. Robinson, Mr. F. J. C. Squire, Mr. O. Wallis and Mr. W. A. Wrenn; Hon. Secretaries, Mr. J. H. Hartridge and Mr. C. A. Tharle.

Parliamentary and Law Proceedings.

Prosecutions for Defective Apothecaries' Weights.

At the Southwark Police Court, on Wednesday, the 19th inst., the first prosecutions for contravention of the Board of Trade new denominations and standards of apothecaries' weights and measures, made by Order in Council last August, took place.

The first case was against William Wilkinson, chemist and druggist, 114, Lambeth Walk.

James Strougnell, inspector of weights and measures, testified to seizing seventeen weights upon defendant's premises on the 20th ult. Eight of the weights were too heavy and nine too light, and were as follows:—One 2 drachm weight one grain heavy; one 2 drachm weight five-tenths of a grain heavy; one 2 drachm weight one and a half grain heavy; two 2 drachm weights one and a half grain light; one 2 drachm weight one grain light; one 1 drachm weight two-tenths of a grain light; two 2 scruple weights three-tenths of a grain light; one 2 scruple weight two grains light; one 4 grain weight one-half grain heavy; four 4 grains weights three-tenths of a grain heavy; one 3 grain weight one-half grain light; one 3 grain weight three-tenths of a grain light.

In reply to Mr. Glaisyer, Solicitor to the Chemists and Druggists' Association, who defended, the witness said he examined the avoirdupois weights upon defendant's premises and found them all correct. The standard for apothecaries' weights was issued last August, and not at the time the Act was passed. He believed all or most of the weights seized were in use. They were in a small drawer under the scales. He thought some of them were new and believed defendant handed them to him. He did not remember whether defendant told him how recently he had had his weights examined. Witness had not published any notice of the standard set up for apothecaries' weights. He believed defendant or his assistant asked to be recommended a place to buy fresh weights, but as a rule witness did not recommend anyone as it would be unfair to the different makers. Witness advised defendant to get fresh weights, and he promised to do so.

Mr. Glaisyer: Is this the first case of a chemist being brought before the court with respect to apothecaries' weights?

Witness: Yes, I believe it is.

Mr. Glaisyer: Here or eleswhere?

Witness: Yes, I believe so.

Mr. Glaisyer said he was not prepared to dispute the statement of the inspector, and he accepted the fact that some of the weights were heavy and others light. He would urge, however, in mitigation of the penalty, that defendant, as far as he had been able to do so, had had his weights examined periodically. There was no charge with regard to the avoirdupois weights, which the inspector found perfectly correct. With regard to the apothecaries' weights the standard had been set up more recently than the Act of Parliament, and the defendant, in common with his brother chemists, was unaware that the standard had been started. Moreover, the person who had examined the defendant's weights had not correct apothecaries' weights to examine them by. This was the first case of the kind, and might act as a warning to chemists throughout the country to have their weights according to the standard. Four of the weights, he was told, were perfectly new and had never been used, and were supplied by a first class firm. Until recently there was no standard by which dispensing weights could be properly tested, and immediately defendant knew what was required he purchased new weights stamped and marked.

Mr. Mews (Chairman on the Bench) said: As this is the first case which has been brought, we shall simply order the defendant to pay a nominal fine. It is quite necessary that chemists, as well as persons in other businesses, should have correct weights. The fine is 1*s.* on each weight, altogether 17*s.*

Horatio Pass, chemist and druggist, 245, Wandsworth Road, Lambeth, was also fined 1*s.* in each case for having twelve incorrect apothecaries' weights, viz.:—One 2 drachms three-tenths heavy; two 1 drachm three-tenths heavy; one 2 scruples four-tenths heavy; one 2 scruples three grams light; one ½ scruple three-tenths heavy; one 1 scruple three-tenths heavy; one 1 scruple half a grain light; one 6 grains three-tenths heavy; one 5 grains three-tenths heavy; one 3 grains three-tenths heavy; one 2 grains two-tenths heavy.

In this case defendant pleaded that he did not know the Act was in operation; that he had been unable to get any information on the subject. He added that there appeared to be a difficulty as to whether weights stamped in one district would be right in another.

Magistrates' Clerk: The Act is in operation all over the country.

Defendant: But you cannot get the weights stamped in the different districts.

Messrs. Poingdestre and Truman, chemists and druggists, 187, Newington Butts, Edward Wood, chemist and druggist, Northcross Road, Crystal Palace Road, and Robert John Smith, chemist and druggist, 38, Thornton Street, Surrey, were also ordered to pay small fines for having incorrect apothecaries' weights.

These offences were proved by Mr. James Webb, Inspector, and George Carr, his assistant.

Defendants all pleaded ignorance of acting illegally. Mr. Smith said some of the weights seized upon his premises had not been in use for thirty years, and that until the seizure he was unacquainted with the new Act. Mr. Wood stated that the weights seized upon his premises had been used merely for compounding and not for retail.

In each case the weights seized were forfeited.

Poisoning by Chloral Hydrate.

On Wednesday, May 19, Mr. George Collier held an inquest at the Prince of Wales Tavern, Bishop's Road, Victoria Park, on William Tickell, age 62, an inmate of Bethnal Green Workhouse, who, it was alleged, died from an overdose of chloral.

Mary Ann Styles, a paid nurse at the workhouse, stated she had had charge of deceased in the infirmary for three years. He was suffering from palsy and heart disease. At 11 o'clock on the night of Thursday, the 13th inst., he received his usual draught of chloral, which was given by direction of the doctor. He had the same dose as was nightly given him—two tablespoonfuls. Witness did not know what quantity of chloral was in the draught. After she had given it him he complained of pain in his throat. The witness then sent for the night superintendent, Mrs. Wagstaff. Tickell died about 12 o'clock. Witness, in reply to questions, said it was not her duty to send for the doctor, but to communicate with the night superintendent. Witness went on duty at 6 p.m., and would continue until the same hour next morning.

Emily Wagstaff, the night superintendent, said she was called to see the deceased about 10 minutes to 12 o'clock. He died just as she entered the ward. It was the witness's duty to administer the draught through the nurse, who took it from her and handed it to the patient. The witness gave the quantity ordered by the doctor, namely, 20 grains.

Dr. Boyd, assistant medical officer, stated that when the death occurred he had been only two days on duty. His business was also to dispense medicine, and instead of filling the bottle intended for the ward in which the deceased was lying with drachms of concentrated solution of chloral, he mistook the prescription for ounces, the symbols with the exception of an additional line or mark being identical. In consequence of the witness mistaking the drachms for ounces, the deceased and four other patients received 160 grains instead of 20, being eight times the proper quantity. He could only account for the death of the deceased through his having a diseased heart. The other patients slept soundly and were drowsy during the day, and directly the witness discovered what had occurred he took means to repair it. Chloral was very uncertain in its action. He gave the overdose in ignorance.

Dr. T. R. King, resident medical officer, stated that deceased suffered from heart and lung disease. Two of the patients under his care were taking half as much again as the dose administered in the present case, and they felt no effect but drowsiness. Chloral was largely used as a substitute for opium.

After some discussion twelve jurymen out of sixteen returned a verdict in accordance with the medical evidence—viz., that the deceased died from heart disease, but they considered his death was accelerated by an overdose of chloral administered inadvertently by the assistant medical officer.—*Hackney and Kingsland Gazette.*

BOOKS, PAMPHLETS, ETC., RECEIVED.

The Spirit of Nature. Being a Series of Interpretative Essays on the History of Matter from the Atom to the Flower. By Henry Bellyse Baildon, B.A. London: J. and A. Churchill.

Proceedings of the American Pharmaceutical Association at the Twenty-Seventh Annual Meeting, held in Indianapolis, 1879. Philadelphia: 1880. From the Secretary.

An Elementary Text-Book of Botany. Translated from the German of Dr. K. Prantl. The Translation Revised by S. H. Vines, M.A., D.Sc., F.L.S., With 275 Woodcuts. London: W. Swan Sonnenschein and Allen. 1880. From the Publishers.

Obituary.

Notice has been received of the death of the following:

On the 7th of May, at Troon, Mr. William Rankin, Pharmaceutical Chemist, late of the firm of W. Rankin and Co., Kilmarnock. Aged 78 years. Mr. Rankin, became a Member of the Pharmaceutical Society in 1848.

On the 11th of May, 1880, Mr. Joseph Hill Appleton Chemist and Druggist, Attercliffe. Aged 69 years.

On the 19th of May, Mr. Hiram Ogden, Chemist and Druggist, Broughton, Manchester. Aged 46 years.

Dispensing Memoranda.

Reply.

[407]. The prescription cited by Mr. R. A. Cripps, with its *s. q.* of doubtful signification, occurs in an examination paper for the 1878 Bell Scholarships, and may be found on page 226 of the 'Pharm. Calendar' for 1879. Possibly *signa quæ* was the "full Latin" required by the examiner.

Q. S.

Queries.

[409]. How should the following be dispensed and what should its appearance be ?—

℞	Quiniæ	gr. x.
	Ac. Phos. Dil.	ʒj.
	Sodæ Phosph.	ʒj.
	Tr. Colch.	ʒss.
	Aq. ad	℥viij.
M.		

QUERIST.

[410]. How should the following be dispensed ?—

℞	Potassii Iodid.	ʒss.
	Quiniæ Sulphat.	gr. xxiv.
	Vin. Aloes	ʒxij.
	Mucil. Tragacanth	q. s.
	Aq. Camph. ad	℥vj.

M. Sig. One tablespoonful three times a day.

SALICINE.

[411]. Can any reader of the Journal inform "Associate" what the appearance of the following mixture should be. It has been dispensed by a well-known West End firm. Would such firm be likely to add acid to effect the solution of the sulphate of quinine ?—

℞	Quin. Sulph.	gr. xij.
	Ferri Sulph.	gr. xv.
	Magnes. Sulph.	ʒx.
	Sp. Myrist.	ʒiij.
	Aq. Chlorof. ad	℥x.

M. Ft. mist. Two tablespoonfuls to be taken twice a day in a little water. D. D.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

WEIGHTS AND MEASURES ACT.

Sir,—One of your editorial articles of Saturday last refers to the recent prosecutions under the above Act, and to "the disparaging suggestions" which have been made on account of the Journal having contained a considerable amount of matter referring to the various provisions, etc.

No one will doubt but in keeping the subject constantly before us your intentions were good, but it is proverbial that we may have too much even of a good thing, and we have all heard of the evil which resulted from calling "Wolf!" when no wolf was near.

Now, sir, at the time your warnings appeared the inspectors were quite unprepared with standards for verification of weight and measures, therefore application to them was useless and constant agitation would simply have the effect of annoying them and causing them to visit the applicants in an unpleasant way when it was within their power to do so.

You say "One of the defendants, in fact, pleaded that he did not know the Act was in operation, and that he had been unable to get any information on the subject." As regards "not knowing the Act was in operation" it is quite clear he has not been a reader of the *Pharmaceutical Journal*, and as to information, I presume he meant official information from the inspector, and it is undoubtedly true that most of these persons are not in a position to give it.

The Weights and Measures Act is still, I believe, a very imperfect piece of legislation; but had it provided that on receipt of the standards for apothecaries' weights and measures the inspectors should give notice to the chemists and druggists that they were prepared to examine and verify, then it would have operated more justly than it does at present, it would have been less inquisitorial in its bearing and would have saved the inspectors from appearing in the character of official informers.

CHARLES SYMES.

TINCT. SENEGÆ AS AN EMULSIFYING AGENT.

Sir,—In reference to an article of Mr. Collier's, recommending tincture of senega as an emulsifying agent for fixed and volatile oils, I would beg leave to disagree with that gentleman regarding the statement he makes that senega would not be objectionable in small doses, and that emulsions made with it would be equally as fine preparations as those made with acacia. I have lately experimented with senega on different oils according to formulæ given by Mr. Collier, and find that in most cases the oil separates in the course of twenty-four hours, and I cannot understand why the latter process should be adopted when we fulfil all the requirements of an elegant and satisfactory emulsion by the use of acacia, and at the same time without altering the medicinal properties of the oil administered. In some cases senega would I think be most objectionable to many practitioners, not only on account of its exciting violent attacks of sneezing in some cases, but also on account of the taste which is so disagreeable to many, and so repulsive to the stomach, since I am aware of numerous cases in which the minute dose of senega could not be retained.

I would also beg leave to differ with Mr. Collier in the assertion he makes that liquor potassæ is used when not required, merely as an emulsifying agent, as in the whole course of my seventeen years' varied dispensing I have never noticed one single instance in which it was used unless its presence was indicated.

In conclusion I would state that pharmacists, medical practitioners, and the public generally are satisfied with the elegant emulsions so simply made with acacia, and until we discover some better substitute, why discard one of the most useful preparations of the Pharmacopœia in favour of one that is by no means its equal ?

JOSEPH LEVY,
Dispensing Chemist for Western Railways, Cape Town.

CLAY'S CHIAN TURPENTINE EMULSION.

In a recent communication to the Journal, Mr. Martindale says of this formula "Mix it as you will the sulphur will separate from such a mixture and aggregate the resin in masses, first to the top and then at the bottom of the bottle." That this is not exactly correct anyone may demonstrate for himself who will commence by throwing the ethereal solution on the powdered tragacanth in a mortar, gradually adding the water, and finally the sulphur first rubbed down with the syrup. I have now before me a bottle of the emulsion mixed in this manner a week ago, from which no such separation as Mr. Martindale describes has taken place; on the contrary a very slight shaking is sufficient to restore it to its original condition.

Plough Court. CHARLES EVE.

Querist.—Apply to the Registrar under the Dental Act, 315, Oxford Street.

W. J. Smith.—The specimen consists principally of stem, which is often mixed with the root. See p. 954.

H.—(1) *Saxifraga granulata.* (2) *Plantago lanceolata.* (3) *Carex*: send specimens later on in fruit. (4) *Medicago lupulina.* (5) Probably *Ranunculus bulbosus*: the stem and root should be sent.

"*Dens.*"—Your proper course would have been to have registered as having practised dentistry on your own account. With respect to your present position you are recommended to consult a solicitor, as a decision must depend upon the result of an investigation of facts.

Student and *W. R.*—See the remarks on the dispensing of pills containing carbolic acid in "The Month," before, pp. 326 and 425, Nos. 360 and 371.

B. and *W.*—The restrictions of the Pharmacy Act apply to the keeping open shop for the retailing, dispensing or compounding of poisons.

S. L.—The name belongs to an isomeric modification of turpentine oil, which is described in Watts's 'Dictionary,' vol. v., p. 924.

J. Hicking.—*Thlaspi occitanum.*

Theta.—It is illegal for any but registered persons to retail preparations containing scheduled poisons, unless they are exempted as patent medicines.

Fraxinus.—(1) Send a specimen in fruit. (2) *Alopecurus pratensis.*

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Ridley, Moss, Lynch Bros., A. D. B., J. C. L.

THE RECOVERY OF RESIDUAL TINCTURES FROM MARCS BY UPWARD DISPLACEMENT WITH WATER.*

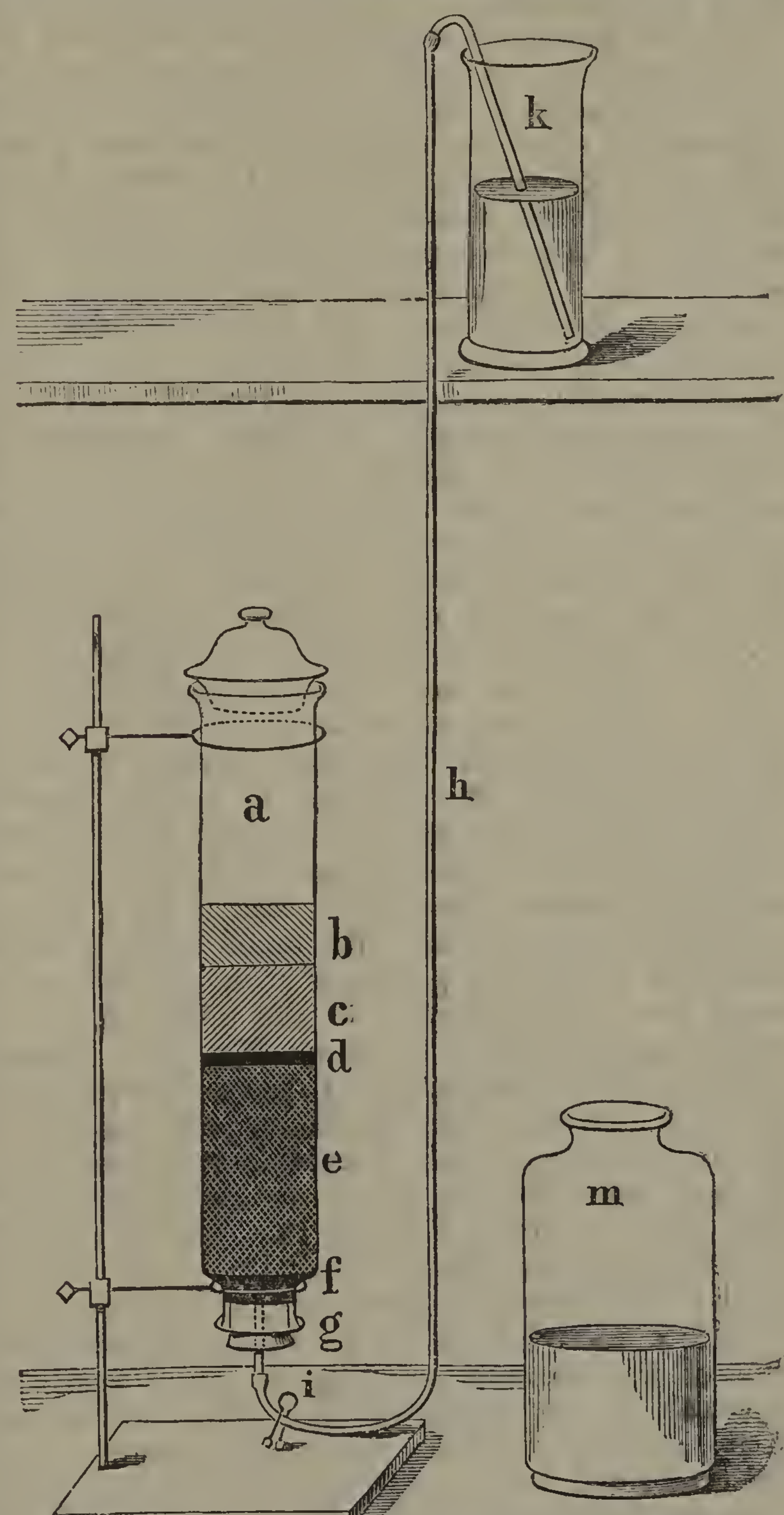
BY WILLIAM ELBORNE,

Bell Scholar in the School of Pharmacy of the Pharmaceutical Society.

The preparation of tinctures occupies a prominent position in the routine of all engaged in practical pharmacy. Accordingly, it is a subject which has been closely investigated and with which all pharmacists are more or less familiar; nevertheless, the results of my experiments will, I hope, be interesting. It will be proper first to review the four different processes of the Pharmacopœia, namely, simple solution, maceration, percolation, and maceration with percolation combined. As the majority of tinctures (38) are made by the last process, namely, maceration and subsequent percolation, it was some of this class that were first prepared and to which I will first allude. The directions in this process are to macerate in three-fourths of the spirit, percolate, continue percolation with remainder of spirit, press, mix, filter and make up to the required volume with spirit. I presume the object of continuing percolation with the remainder of the spirit is chiefly to displace the concentrated tincture produced by maceration, so that by the subsequent pressure of the marc there may be the least quantity of the active constituents retained by the exhausted drug, which retention varying with different drugs will more or less inevitably occur in spite of their marcs being submitted to hydraulic pressure. It follows, therefore, that the preparation of tinctures is attended by certain losses of the weak tincture formed by continuing percolation with remainder of spirit, which implies not only some loss of strength to the tincture, but, what is commercially of great importance, loss of spirit. The use of the tincture press which is involved in the B. P. process has to many persons objections which are tolerated for want of a more easy and economical process. Attempts have been made to dispense with it altogether, but have resulted in failure or only partial success. Amongst them is that of pouring water upon the marc with a view to displacement of retained tincture, but I am aware of the objections raised against this process and especially pointed out by Professor Redwood (*vide* 'Practical Pharmacy,' p. 92).

It will be convenient to allude to these objections, as the result will show that they tend favourably in support of the process which I am about to bring before you:—First, the specific gravity of water being higher than that of rectified or proof spirit, it naturally permeates down into the spirit which at the same time has a tendency to rise into the water, thus materially assisting the diffusion or mixing of the two liquids; secondly, vegetable tissues possessing a greater affinity for water than for spirit, the latter is readily liberated from them and rendered free to rise into the water. Having mentioned the disadvantages of this process, I arrive at that which forms the leading feature of this paper, namely, upward displacement or the removal of the residual tincture retained in a marc by means of water (the heavier liquid) rising from below.

Working on this principle, the objections above mentioned are inapplicable and the results are fairly satisfactory. One impediment, however, is the slight diffusion which takes place at the line of contact, but this may be partially remedied by using a modification of the menstruum. Of the group prepared by maceration and percolation, the following proof spirit tinctures were made, viz.:—Træ. aurantii, calumbæ, cinchonæ, cinnamomi, lupuli, rhei, and with rectified spirit, træ. aconiti and zingiberis fort. The quantity prepared of each was one pint, and in those made with proof spirit, specific gravity ·920, I used a spirit having specific gravity ·915, made by diluting the requisite quantity of rectified spirit with distilled water to 19 ounces instead of 20, and adding $2\frac{1}{2}$ drachms extra of rectified spirit, thus allowing for the contraction of volume, and for use of the mixture immediately. My mode of procedure is to powder the ingredients and macerate them with the whole of the spirit specific gravity ·915 for the



a. Percolator after upward displacement; b. Tincture; c. Water; d. Glass; e. Marc; f. Glass; g. Cork; h. Indiarubber tube; i. Clamp; k. Vessel containing distilled water; m. Receiver containing percolated tincture.

specified time with occasional agitation; the supernatant liquid is then drawn off, the dregs stirred up and transferred to a cylindrical percolator and allowed to drop until the liquid passes clear and

* Read at a meeting of the School of Pharmacy Students' Association, May 13, 1880.

bright; the receiver is then attached and both the turbid and supernatant liquids returned to the percolator. Instead of tying a piece of muslin over the bottom of the percolator, as is usually done, a cork is inserted with a hole bored through the centre capable of admitting a piece of ordinary glass tube, above which is put an inch layer of coarsely pounded glass to prevent the orifice becoming choked. Percolation being complete, another half-inch layer of glass is placed on the top of the marc to prevent the floating of solid particles. Having removed the receiver and supported the percolator on a retort stand, the open end of a piece of glass tube two inches long is inserted in the cork, the other end of the tube being previously drawn out in the flame so as to leave only a capillary opening. To this end is attached about a yard of indiarubber tubing communicating with a vessel placed above containing distilled water, the pressure of a column of water being thus obtained. The indiarubber tube being filled with water and adjusted to the percolator, the wire clamp attached to the lower portion of the tube is removed, when a slow and steady flow of water commences; after the lapse of an hour and a half sufficient displacement will have been effected, the water having risen considerably above the marc and with it will have been removed the retained tincture, which forms a dense stratum upon its surface. On dipping a glass rod into this upper stratum and applying it to a flame, the displaced tincture burns nearly as readily as the percolated portion, indicating its comparative strength of spirit. Nevertheless, diffusion will have taken place to a slight extent and is perceptible by the gradual shading off of the highly-coloured tincture into the water beneath it. To finish off the tincture, its measure was brought up to 19½ ounces by the addition of the requisite quantity of surface liquid from the percolator, the product filtered and made up to a pint with proof spirit. Thus having measured the product of percolation, I know exactly how much surface liquid to draw off to bring the measure up to 19½ ounces, which is done by means of a glass siphon, and having mixed the two products, filtered by the automatic method through a thin 3 inch paper, and made up to a pint with proof spirit, I have produced a tincture prepared at a comparatively small loss. On reference to the table below the results arrived at will be seen. The first column indicates the percentage loss of tincture prepared by the B. P. process, and represents notes taken by Mr. Umney when these tinctures were prepared on the large scale with the use of the hydraulic press.* The second column, showing the loss by upward displacement, was obtained by taking the specific gravity of 2½ ounces of liquid distilled from 8 ounces of surface water left in the percolator after completion of the tincture, referring to tables specially compiled for estimating the percentage of alcohol in its aqueous mixtures, and to that result adding the centesimal loss by filtration. With the proof spirit tinctures, in each instance the specific gravity of distillate was very constant, indicating an average final loss of 5 drams to the pint. The third shows the specific gravity of completed tincture taken in a Regnault's bottle, and the fourth, the amount of solid constituents contained in a fluid ounce, obtained by evaporating to dryness over a steam-bath.

* *Pharmaceutical Journal*, October 22, 1870.

	Loss per cent. (by vol.) by B.P. process.	Loss per cent. by upward displacement.	Specific gravity of tincture.	Amount of dry extractive matter per fl. oz. (in grains).
Tinct. aconiti . . .	7·9	2·5	·858	8·68
Tinct. aurantii . .	6·3	3·85	·948	13·7
Tinct. cinchonæ . .	15·0	5·0	·944	13·4
Tinct. cinnam. . .	10·0	3·03	·942	7·99
Tinct. calumbæ . .	7·1	3·0	·940	7·39
Tinct. lupuli . . .	10·0	2·89	·948	9·32
Tinct. rhei	5·0	2·7	·950	15·9
Tinct. zingib. fort. .	37·0	7·5	·848	7·9
Tinct. cinchonæ (by upward displacement and distillation), sp. gr. . .	—	—	·945	—

As regards the practical working of upward displacement, I have found it answer successfully with the above tinctures. In each prepared with proof spirit, the water did its work with comparative uniformity and absence of clogging, with the exception of tinct. zingib. fort. The time occupied in the various displacements was generally from an hour and a half to two hours, and in the case of tr. rhei, three hours. Also, when the percolator was quite empty the water required fifty minutes to rise to the same level at which all the displacements were brought; this is mentioned to draw attention to the capillary tube which regulates the supply of water. The percolator was 2 inches in diameter and was cylindrical, which form is preferable to any other for this process as it exposes the liquids to a uniform surface. In allusion to the preparation of tr. rhei, having drawn off the requisite supernatant tincture in a glass measure, it was stirred up and set aside for one hour previous to mixing it with the product of percolation; at the expiration of that time about a ¼-inch layer of what probably was coagulated albuminous matter had risen to the surface, which before mixing was strained off through a double fold of fine muslin. Upon examining the tincture twenty-four hours afterwards, a further deposition had taken place and filtration was necessary, thus rendering useless my previous precaution; a similar occurrence accompanied the preparation of tr. aurantii. Bearing upon this point—several B.P. tinctures are prepared from drugs which, resembling rhubarb and orange peel, contain a large quantity of mucilaginous and albuminous matter; accordingly with these similar depositions might be expected, resulting from the matter taken up by the extra half ounce of liquid drawn from the percolator in excess of the original quantity of menstruum used in bringing the measure up to 19½ ounces. These matters are precipitated by the alcohol which the respective tinctures contain and may be eliminated by filtration. Tr. aurantii and rhei were therefore set aside for twelve hours previous to being filtered and have since then kept their brightness. In tr. cinchonæ the liquid drawn off was slightly turbid, but this was not filtered, for on mixing with the percolated portion its alcoholic strength was sufficient to render the product quite bright. This tincture is liable to deposit, and with the view of preventing such deposition, in drawing off the displaced portion the approximate ½ ounce of liquid containing diffused tincture was rejected and the measure brought up to only 19 ounces (the original quantity) making up to a pint with proof spirit. Tr. aurantii was prepared by maceration and percolation instead of maceration only. In the preparation of tr. zingib. fort. for the verification of the first result it was prepared again. For the displacement of the first tincture, the column of water being doubled, it required thirty-six hours with a loss of 20 per cent. For the second lot, half a pound of sand was mixed with the powdered ginger, and percolation being complete, a piece of wire gauze was placed upon the marc and kept firmly in its position by suitable means to prevent the marc being forced upwards; the displacement was then effected by putting the percolator in connection with an ordinary water tap; with such a pressure the fittings require a little extra adjustment in the way of corks and tubes being tied, else sooner or later they will be blown out of their places. Nevertheless, this modification answered very well indeed and required three hours for its performance; so much as $8\frac{1}{2}$ ounces of bright tincture containing no trace of admixed water were taken from the surface of the percolator, the loss in this case being 7·5 per cent.

It will be admitted that the great objection attending the preparation of tr. aurantii, tr. rhei and the like, is the mucilaginous matter taken up by the lower part of the displaced portion; therefore I have prepared a pint of tr. cinchonæ in another way. Having drawn off what is seen to be strong tincture, the approximate 8 ounces of liquid from the percolator is transferred to a retort and distilled until sufficient liquid has come over to bring the tincture up to a pint. By this method the albuminous matter is avoided and the loss reduced to a minimum or to no loss at all except that of a little time; nevertheless, I think that if the distillation were roughly done with a flask and long glass tube, good results might be obtained.

In conclusion, I am not aware that upward displacement by hydrostatic pressure has been practised in pharmacy up to the present time, although the principle is extensively resorted to for filtering purposes in the arts.

The above experiments were conducted in the laboratories of the Pharmaceutical Society.

THE EXHIBITION OF PHARMACEUTICAL APPARATUS, ETC.

The desire on the part of the Council to afford to the members of the Society attending the annual meeting an opportunity of seeing recent improvements in pharmaceutical apparatus and other objects of interest was evidently thoroughly appreciated. The doors had hardly been opened five minutes on Tuesday morning, May 18, before the visitors began to flock in, and from that time until ten o'clock on Thursday night, during the hours that the Exhibition was open, the rooms were never at any time entirely empty, even during meal times, and on Wednesday after the meeting the room containing the apparatus was crowded to excess.

So anxious were some to see what was to be seen, that many came late on Thursday night. During the three days that the exhibits were open for inspection, it is estimated that at least one thousand persons visited the Society's rooms.

That the Exhibition has led to useful results both to the visitors, and in many cases to the exhibitors, appears certain from the expressions of opinion which have been heard

It will of course be impossible to mention in detail and more fully than we have done already all the objects exhibited, but for the benefit of those persons who were unable to visit the Exhibition a short account of the articles which are believed to have been the most interesting will be given in these columns, and the apparatus illustrated as far as possible, where it has not already been figured in this Journal. For the sake of convenience the chemical portion of the Exhibition will be treated of first, afterwards the scientific and pharmaceutical apparatus, and finally the aerated waters and articles used for invalids, shop-fittings, etc.

The show of drugs and chemicals was rather small, although many of the articles exhibited attracted considerable attention from the visitors. Messrs. Burgoyne, Burbidges, Cyriax and Farries, exhibited a series of rare quinine salts, prepared by Messrs. Jobst, of Stuttgart, including the anetholate, eugenate, carbolate, etc.; also, in fine crystals, santonate of sodium, a salt which is undeservedly neglected in this country. A specimen of German opium, with the rare alkaloids, laudanine and pseudomorphine, were also shown. All the above specimens have been liberally presented to the Museum of the Society since the close of the Exhibition. The same firm also exhibited a large series of specimens of new American drugs, and the solid and fluid extracts of them prepared by Messrs. Parke, Davis and Co. Among those hardly known in this country were noticeable damiana, *Rhus aromatica*, yerba santa, *Cereus Bonplandii*, *Rhamnus Purshiana*, and *Berberis aquifolium*. One or two others, such as *Eucalyptus globulus*, kava-kava, caroba, and *Grindelia robusta*, are, however, not altogether new to English pharmacists.

Several resinoid principles, such as are used by the Eclectics, were also exhibited by this firm, including apocynin, chilonin, eupurpurin, hamamelin, stillingin, and xanthoxylin. These active agents have also been presented to the Museum of the Society. Some empty gelatine capsules for enclosing nauseous drugs, manufactured by Parke, Davis and Co., seemed generally approved of. These consisted of two halves, about one-quarter of an inch in diameter, and one half overlapping the other, so that by moistening the edge of the one half of the capsule, after filling the other, the two fitting together perfectly, they adhere and are then easily swallowed. These capsules were exhibited in different sizes. What may be termed "elegant pharmacy" was also represented by another American firm—Messrs. S. M. Burroughs and Co. A large bottle of distilled extract of hamamelis, or witch hazel bark, presented a beautiful blue fluorescence, and except for a slightly opaline character might almost have been supposed to be a solution of quinine. Effervescent citrate of caffeine and compressed tablets of mixed pepsine and pancreatine were among other novelties. The latter, from their slightly mucilaginous character, are easily swallowed, and not unpalatable. The chlorate of potash tablets, prepared by Messrs. Wyeth Bros., were also present. These are said to be prepared by drying and then powerfully compressing the dried salt, and it is claimed for them that they thus furnish a more concentrated solution of the salt when dissolved in the mouth, and that they are less disagreeable to the taste than the lozenges.

One of the most attractive objects in this room was a fine mass of crystals of pure iodine contained in the hemispherical vessel in which they were sublimed, exhibited by Messrs. Fletcher and Fletcher. This firm also exhibited concentrated liquors for the preparation of various chemical syrups. A bottle of one of these liquors, that of iodide of iron, was left open to the air during the whole of the Exhibition, and remained apparently unaltered in colour, and showed no trace of oxidation at the margin or surface of the fluid. A new salt, iodide of bismuth and quinine, and a fine specimen of metallic bismuth, stated to be purified by a new process from arsenic, tellurium, selenium, copper, etc., and pure bismuth salts, were also exhibited, the nitrate being particularly fine. Chian turpentine, evidently genuine, was exhibited by Messrs. Hearon, Squire and Francis; and Messrs. Mackey, Mackey and Co. The former firm also exhibited a magnificent specimen of cusparia bark in quills, 1½ inch in diameter, and more than 2 feet long; also some gourds of curari. A new salt of cerium, the ammonio-citrate, was also exhibited by Messrs. Mackey, Mackey and Co. Messrs. Morson and Son exhibited some beautiful sublimed crystals of menthol, sublimed chrysophanic acid, and the new anæsthetics, ethidene dichloride and isobutyl chloride. The former has been the subject of frequent experiments of late; but the latter, probably owing to the difficulty of obtaining always the same liquid and not one of its isomers, does not appear to have been so favourably received by the medical profession. Salicylate and sulphate of eserine, the former nearly white, and in small acicular crystals, are also recent introductions. These specimens seemed to be free from the tendency to redden, so characteristic of physostigmine or eserine in a state of purity and in presence of traces of ammonia or other alkali. Some fine crystals of hydrobromate of conia, a powerful but little known salt, cotoin, and paracotoin, were also exhibited by the same firm. A specimen of jaborandi was remarkable for its fine green colour and powerful odour.

Messrs. T. Christy and Co. also exhibited a number of rare and little known drugs and alkaloids, etc. Coca has been tried in this country, and pronounced by many to be a failure. It has not, however, been fairly tried, since those who use it in Bolivia, etc., are careful always to use "coca fresca," and the coca which arrives in this country has generally lost a good deal of its aroma. It has not yet been proved how far the properties of the leaves may be due, as is the case in some degree with coffee berries, to a volatile oil. The alcoholic extract made from the fresh plant in Bolivia is therefore claimed to be the best representative of the active properties of the leaves that can be obtained in this country. The sample of Goa powder exhibited was remarkable for the brightness of its colour. A specimen of Paraguay tea was accompanied by a gourd in which the tea is brewed, and a "bombilla," or tube strainer, through which it is sucked. Curari, papaw leaves, Japanese belladonna root, said to contain 1·35 of pure atropine per 1000, sassy bark, some very large quills of *Alstonia constricta*, and some fine pieces of white quebracho bark, and other rare drugs, formed a curious and almost unique collection. In addition to these were tannate of pelletierine, the new alkaloidal salt of pomegranate root bark, sulphate of duboisine and salts of pilocarpine and eserine, prepared by M. Petit, of Paris.

Messrs. Gerrard and Tanner also exhibited a large specimen of sulphate of duboisine, salts of pilocarpine and other rare alkaloids. Spirit of wine can scarcely claim the merit of novelty, but the specimen exhibited by Mr. J. Burroughs, of Chelsea, was stated by the exhibitor to be pure, and more fit for perfumery, etc., than the ordinary article.

Remarkably fine specimens of valerianate and salicylate of quinine were exhibited by Mr. T. Whiffen; other specimens of the latter salt were also to be found in the exhibit of Messrs. Mackey, Mackey and Co., and in the form of an effervescing preparation in that of Messrs. Young and Postans. Some time since Dr. Fayrer recommended fresh Indian bael fruit in preference to the extract made from the dried fruit, for diarrhœa, and this want appears to have been met as far as it is possible to do so by the importation of the fresh fruit preserved by means of sugar, a specimen of which was exhibited by the last named firm. The natural history of araroba may be said to have been illustrated to a certain exent by Messrs. Symes and Co., who exhibited not only microscopical slides showing the deposit of araroba in the wood, but also specimens of chrysarobin and chrysophanic acid, which, it will be remembered, was shown by Liebermann and Seidler to be formed from chrysarobin and not to exist naturally in araroba.

Around the walls of the room which contained the chemical exhibits were hung a series of the diagrams from Dr. Dodel-Port's beautiful 'Botanical Atlas,' which is now being prepared by Messrs. W. A. and K. Johnston for publication in this country. The large diagrams of the prothallium of ferns, the insect fertilization of flowers, and of the schizomycetes and other cryptogams will, it is believed, prove a most valuable acquisition to lecturers on botany. The same publishers also exhibited their well-known 'Balfour's Botanical Diagrams.'

Scientific and chemical apparatus was well represented, this portion of the exhibits being located in the Chemical Museum. Messrs. J. Orme and Co.'s table attracted a large share of attention, Hickley's patent telephone having been fitted up so as to communicate with the room at the top of the house in which the gas-heating apparatus was exhibited, and many of the visitors being desirous of trying its powers of communication with friends upstairs. The electric bells, electromotors, and especially the Geissler's tubes, which were frequently lighted up, formed a constant source of attraction; Balmain's luminous paint, and the Society of Arts (Fletcher's) blow-pipe cabinets, and Crookes's radiometer were also evidently objects of interest to some of the visitors.

Bayley's cuprimeter, for the colorimetric estimation of copper, recently described before the Chemical Society (April 1), Mann's gravimeter, a new apparatus for ascertaining the specific gravity of cement and other solids in a very easy manner, and Orme's carbonic acid apparatus for estimation of that acid in carbonates, were among other useful articles exhibited.

Messrs. Townson and Mercer also showed a number of interesting objects. Among these a copper water oven for drying substances below 212°, with a condensing worm attached, Zenetti's chlorine with apparatus, a Rheocord and Wheatstone's bridge, and a student's chemical balance, the only one exhibited, were more especially worthy of notice; but the most attractive articles exhibited by this firm were Fletcher's gas apparatus, the whole collection of which was placed in another room, and will be described later on.

Messrs. Dollond and Co. exhibited, among other articles of interest, a spirometer, which received a large share of attention from the younger visitors, who were evidently desirous of becoming acquainted with the capacity of their lungs, and Beale's compact urinary test cabinet. There was also a series of chemical and clinical thermometers, one of the latter with an improved flat bore, presenting a broad line of mercury to the eye, and hence more easily seen, with an indestructible index, which seemed to be especially approved of; the price of this instrument is stated to be reduced one-half.

The only regrettable incident at the Exhibition occurred in connection with this exhibit. A small case of clinical thermometers, valued at two guineas, was not to be found on Friday morning, when the articles were removed by the owners. The Exhibition could hardly have been visited by a kleptomaniac, or his propensity would have been further indulged, and it can only be supposed that the case may have been packed by accident among the goods of some other firm, in which case it is hoped this notice may be sufficient to direct it to its rightful owners.

Messrs. Dollond and Co. also exhibited Lowne's Patent Short Length Mercurial Barometer and Combined Thermometer, which is claimed to possess the advantage of a column of mercury 4 to 8 inches in length instead of 30 inches, and hence smaller size, greater portability and cheapness; it also has a fixed scale combined with great accuracy. In this instrument the closed end of the mercury tube consists of a globe containing carefully dried gas, and to prevent a difference of pressure arising from alteration in the temperature of the external air the mercury in the U-tube joins that contained in the stem of the thermometer, so that the height of the mercury in the barometer is not altered by heat, but only by atmospheric pressure.

THE DIGESTIVE FERMENTS, AND THE PREPARATION AND USE OF ARTIFICIALLY DIGESTED FOOD.*

BY WILLIAM ROBERTS, M.D., F.R.C.P., F.R.S.

Lecture II.

Pepsin and Trypsin—Digestion of Proteids.

(*Continued from p.* 961.)

Comparison of the Action of Pepsin and Trypsin.—The action of pepsin and trypsin, although similar in the main results, is certainly not identical. There is a markedly larger production of leucin and tyrosin in tryptic than in peptic digestion. Moreover, the action of the two ferments on different proteids appears to vary both in character and in energy. Milk is much more readily digested by pancreatic extract than by artificial gastric juice; but in the case of egg-albumen the advantage lies decidedly with the gastric juice. The study of the digestion of egg-albumen by the two methods yielded some interesting results. I employed for this purpose a dilution of egg-albumen with water, in the proportion of one in ten. This remains uncoagulated after being boiled in the water-bath, and furnishes a favourable medium for studying the digestion of albumen, much more favourable than the chopped boiled white of egg usually employed. It permits the ferment to be at once brought into uniform and intimate contact with the particles of the albumen, thus obviating the irregularity and want of constancy which necessarily attend the operation of a solvent acting on solid pieces of variable size, which can only be attacked progressively from their surfaces. In the raw state, this solution is digested with extreme slowness by artificial gastric juice; and pancreatic extract is nearly inert on it; but after being boiled it is attacked with energy by both the gastric and the pancreatic ferments.* When the boiled solution was treated, in the warm chamber, with pepsin and hydrochloric acid the transformation of the albumen went on rapidly and without interruption to its close. In the earlier periods of the action, the mixture gave a dense precipitate with nitric acid and with ferrocyanide of potassium, but this precipitation became progressively less and less pronounced, until, at the end of two or three hours, these reagents only produced a slight haze. The albumen was now completely digested, or at least as nearly so as could be reached, for this remnant of a reaction persisted even after a further digestion of twenty-four hours.

When the same solution was treated with pancreatic extract, the progress of events was different. For an hour or two (the time varying with the quantity of extract added) there was no apparent change; but at the end of this time the mixture lost its diffluent condition, and became converted into a gelatinous mass, exactly resembling a thin starch jelly. By-and-by the gelatinous matter broke up into little masses, which floated in a transparent liquid. At this point, the action seemed to be arrested. The floating masses of jelly remained almost undiminished in quantity after twenty-four and even forty-eight hours. When the mixture was filtered, the liquid portions came through perfectly transparent, and the jelly-like matter was left in the filter. The filtrate was found to be a rich and very pure solution of peptone, uncontaminated with any undigested or half-digested albumen. The jelly-like matter was found to be insoluble in water, hot or cold, but it dissolved readily in acids, and was rapidly digested by pepsin and hydrochloric acid. If a large amount of pancreatic extract were used, a considerable proportion of the jelly-like matter was slowly dissolved; but the main result was always the same, the pancreatic ferment was only able to convert a part of the albumen into peptone, whereas the gastric ferment converted the entire quantity, with the exception of an insignificant residuum.†

In the case of milk the relation of the two ferments is reversed. Tryptic digestion of milk is rapid, and leaves only a very slight residue, whereas peptic digestion is slow and leaves a large residue. I have some further observations to make on the digestion of milk by pancreatic extract, but it will be more convenient to take up the subject when I come to speak of the use of this ferment for the preparation of artificially digested food.

Peptogens.—I may here advert to a singular view advanced by Schiff in regard to the production and secretion of pepsin and trypsin. Schiff found that when an insoluble aliment, such as white of egg (or fibrin, or meat which had been deprived of its soluble portions), was introduced into the stomach of a fasting animal no pepsin was secreted, and the albumen remained undigested; but

* The Lumleian Lectures, delivered before the Royal College of Physicians.

* In cooking this solution it is advisable to use the water-bath, for otherwise some of the albumen coagulates and cakes on the bottom of the vessel, and the liquid froths up in an inconvenient manner.

† Most observers have noticed the occurrence of this indigestible residuum (named "dyspeptone" by Meissner) in the artificial gastric digestion of proteids. I have noticed the same in the digestion of milk by pancreatic extract.

if with the albumen certain soluble aliments were introduced into the stomach, then pepsin was produced, and digestion immediately began. To these substances, which had the power of provoking the formation and secretion of pepsin, Schiff gave the name of "peptogens." Among the most effective peptogens were found to be solutions of dextrine, extract of meat (or soup), infusion of green peas, bread (which contains dextrine), gelatin, and peptones. On the other hand, solutions of grape sugar, soluble starch, fat-emulsion, or gum, had no peptogenic effect; and milk and coffee had not much. Schiff further found that peptogenic substances were just as effective when they were injected into the blood, or into the cellular tissue, or introduced as enemata into the rectum, as when they were introduced directly into the stomach. On the other hand, when peptogens were injected into the small intestine their influence was not observed; their effect seemed to be annulled by some action of the mesenteric glands, or by some change induced in them in their passage along the thoracic duct. On the ground of these experiments—and they were numerous and oft-repeated and gave constant and decisive results—he concluded that the absorption into the blood of these soluble aliments was a necessary preliminary of proteid digestion and that no pepsin or trypsin was secreted unless these substances existed beforehand in the blood. The first act, according to Schiff, of gastric digestion was the absorption from the constituents of a meal of these soluble peptogens by the veins of the stomach. On this followed immediately the secretion of pepsin, and the commencement of digestion proper.*

These views and experiments of Schiff have not been allowed to pass without challenge, but they have not yet been overturned. If they should be substantiated, they will give, curiously enough, a scientific sanction to the prevailing custom of commencing dinner with soup.

The Milk-curdling Ferment.

You all know that one of the most striking properties of gastric juice is to curdle milk. This property is utilized on a large scale in the industrial art of making cheese. Rennet, which has been used for that purpose from remote antiquity, is simply an infusion of the fourth stomach of the calf in brine. The curdling of casein by rennet does not depend upon the acid of the gastric juice, for it takes place when the milk is neutral or even faintly alkaline. It has until lately been believed that this property was an inherent attribute of pepsin, but this opinion is no longer tenable. Brücke succeeded, by a process which I need not particularize, in producing pepsin which had an energetic action on proteids, but which did not possess, except in the feeblest degree, the power of curdling milk. Mr. Benger also found that an extract of pig's stomach in saturated brine, while it possessed energetic action as a milk-curdler, had comparatively only feeble proteolytic powers. We must therefore regard the agent in gastric juice which curdles milk as a distinct substance from pepsin.

In the course of my experiments on pancreatic extract, I made the unexpected observation that the pancreas also contained an agent capable of curdling milk. I found this property in the pancreas of the pig, the sheep, the calf, the ox, and the fowl. In whatever way the extract of the gland was made, whatever solvent was used, this property of curdling milk was present in it; but the brine extract exceeded all others in curdling capacity. If a few drops of extract of pancreas be added to some warm milk in a test-tube, the milk becomes a solid coagulum in a few minutes. Some minutes later, the whey begins to separate from the curd. In short, the action resembles exactly that of calf's rennet; and, so far as I know, you could make cheese with pancreatic rennet as perfectly as you can with gastric rennet. There is, however, not an absolute identity of the two agents. I said just now that gastric rennet produced curdling in neutral and even in faintly alkaline milk; but if the alkali exceed a very small proportion, ordinary rennet does not curdle milk. I found that an alkalescence exceeding that produced by one grain of bicarbonate of soda to an ounce of milk altogether prevented the milk from being curdled by gastric rennet. But this is not so with pancreatic rennet. You may add 2, 3, or 4 grains of bicarbonate of soda to each ounce of milk, and still the pancreatic rennet will induce curdling with undiminished energy. Milk is likewise curdled by pancreatic extract, when quite neutral, and even when very faintly acid. Indeed, it appeared to me that a very faintly acid milk curdled more actively with pancreatic extract than neutral milk, but not so actively as alkaline milk.

That the curdling agent of the stomach and pancreas is a true ferment, and not some inorganic chemical agent, seems to be proved by the fact that boiling, or even heating to 160° F. (70° C.) instantly destroys its power. I found, moreover, that like other soluble ferments, it is precipitated, but not truly coagulated, by alcohol; for it recovers its solubility and activity when the alcohol is removed, even after a contact of several weeks.

The curdling ferment of the pancreas is a distinct body from trypsin, as the following experiments show. 1. Some brine-extract of pancreas (which was known to possess proteolytic energy) was acidulated with hydrochloric acid in the proportion of 1 per 1000, and then placed in the warm chamber at a temperature of 104° F. (40° C.) for a period of three hours. It was then carefully neutralized with bicarbonate of soda. When thus treated, the extract was found to have lost its proteolytic power, but its curdling action on milk was almost as energetic as ever. 2. A portion of the same brine-extract of pancreas was filtered under vacuum pressure through porous earthenware. The filtered product was found to possess an undiminished faculty of curdling milk, but it had almost no power of dissolving the curds. The curdling ferment had evidently traversed the earthenware freely, but only traces of trypsin had passed through.

What is the real function of the curdling ferment? Seeing its striking reaction with milk, one's first idea is that it must have something to do with the digestion of casein. But a little consideration shows that this idea is altogether improbable. Although all mammalia start life on a milk-diet, milk does not form a part of the normal diet of any adult creature except man. Nor can its universal presence in the mammalian digestive organs be regarded as a vestigial phenomenon—a "memory" of the suckling phase of their existence—for the same curdling property is found in the stomach and pancreas of the fowl, which never at any period of its life fed on milk. Moreover, it may be doubted whether the ferment in question is the actual agent which curdles milk on its passage into the stomach; for the acid of the gastric juice, which also curdles milk, would probably be beforehand with it, inasmuch as its action is a good deal more prompt than that of the ferment. In the pancreatic digestion of milk, the occurrence of curdling has appeared to me to be a distinct hindrance to the process. Has this ferment any true digestive functions? I think this is quite open to doubt. Its action on milk is apparently akin to that of the fibrin ferment on the blood, and it may likewise have some kindred purpose, but what that purpose may be I am unable to conjecture.

Emulsive Ferment: Digestion of Fats.

The digestive change undergone by fatty matters in the small intestine consists mainly in their reduction into a state of emulsion, or division into infinitely minute particles. In addition to this purely physical change, a small portion undergoes a chemical change whereby the glycerine and fatty acids are dissociated. The fatty acids thus liberated then combine with the alkaline bases of the bile and pancreatic juice, and form soaps. The main or principal change is undoubtedly an emulsifying process, and nearly all the fat taken up by the lacteals is simply in

* See Schiff's 'Leçons sur la Physiologie de la Digestion,' vol. ii., p. 200 *et seq.* Paris: 1867.

a state of emulsion, and not of saponification. It is, however, quite certain that both these processes do take place in the small intestine, though in very unequal degrees. The only question in connection with the digestion of fat which I propose to examine is: Whether these changes are produced by the operation of soluble ferment, or by some other and different agencies? In his latest utterances on this subject, Bernard* insisted that the digestion of fat, like the digestion of starch and proteids, consisted in the action of a soluble ferment, which he named *Ferment Emulsif.* This ferment, he alleged, first emulsified and then saponified fats. In the intestine, the change scarcely went beyond emulsion—in this condition fat was found in the contents of the lacteals. Saponification took place almost exclusively further on, and later in the blood. It is certainly established that the pancreatic juice exercises a marked influence on the digestion of fats; and it is in the pancreas, according to Bernard, that the emulsive ferment is to be found. Bernard demonstrated that healthy pancreatic juice has quite a special faculty of emulsifying fats. Pancreatic tissue has also the same property. If a portion of fresh pancreas be rubbed up with fatty matter and water, you get an emulsion which is fairly persistent. I have not had an opportunity of examining the behaviour of pancreatic juice with fatty matter, and cannot therefore speak of its properties; but it is singular if, as alleged, the effect of pancreatic juice and pancreatic tissue on fat be due to the presence of a soluble ferment, that the extracts of pancreas possess none of the same power. I have made extracts of pancreas in various ways—with simple water, with chloroform-water, with dilute spirit, with solutions of boracic acid, of borax, and of both combined, with glycerine and water, with brine, and with solution of salicylic acid and of salicylate of soda; and yet I could not satisfy myself that any of these extracts possessed any special power of emulsifying fats, nor of liberating the fatty acids and inducing saponification. Paschutin† states that the emulsive ferment of the pancreas can be extracted by a solution of bicarbonate of soda. An extract of pancreas, made by myself with 2 per cent. solution of bicarbonate of soda, was indeed found to have a very marked emulsifying power; but it had the same power, even in an enhanced degree, after being boiled, which showed that its emulsifying properties could not depend on the presence of a soluble ferment.

I was equally unsuccessful in my attempts to verify the alleged power of extracts of pancreas, and of crushed pancreatic tissue, to liberate the fatty acids. When fresh pancreas, finely triturated with sand, was digested with milk in the warm chamber, I could not obtain satisfactory evidence of the development of free acid from the decomposition of the fat of the milk by a soluble ferment. The pancreas itself yields a slightly acid solution when infused in water, and a mixture of milk and pancreatic tissue always showed a slight acid reaction; but when this primary acidity was neutralized, no further production of acid took place until such a time had elapsed as was sufficient to permit the development of organized ferments and the origination of the lactic fermentation. If the development of organized ferments were prevented by the addition of antiseptics—such as chloroform or a combination of boracic acid and borax—a mixture of milk and crushed pancreas remained neutral for several days. The same results followed when I operated on emulsions made with crushed pancreas and lard or olive oil. In my numerous observations on the digestion of milk with various pancreatic extracts, I never could detect the production of an acid reaction, unless organized ferments were permitted to intervene.

I obtained similar negative results with almond emulsion. Bernard attributed the formation of an emulsion when almonds (or other oily seeds) were rubbed up with water, to the presence in the seeds of a soluble ferment. But I found, to my surprise, that almonds which had been boiled for seven hours still produced a perfect emulsion. As all known soluble ferments are destroyed by boiling, this result seems irreconcilable with Bernard's view. I also found that almond emulsion, kept in the warm chamber for six or eight hours at a temperature of 100° F. (38° C.), showed not the slightest evidence of an increase of its original faintly acid reaction. It appeared to be more probable that the fatty matter in the almond existed in the seed in the condition of a solid emulsion; and that the formation of a fluid emulsion by trituration with water was due simply to the liberation of the minutely divided oil-particles, rather than to the intervention of a soluble ferment.

It is with considerable hesitation that I venture to place myself in even apparent contradiction with so great an observer as was Claude Bernard; and I by no means pretend that these observations traverse the main conclusions for which he contended as to the digestive transformation of fat in plants and animals. The views which Bernard developed on the digestive process are based on inductions so wide, and observations so multiplied, that I feel satisfied that their substantial accuracy will be ultimately established in regard to fat, as they have already been established in regard to starch and cane sugar.

Some observations made by Brücke promise to throw a fresh light on the digestion of fat. Brücke found that oils and fats which contained an admixture of free fatty acids—in other words, which were more or less rancid—were emulsified by a slight agitation with a weak solution of carbonate of soda. J. Gad extended these observations, and showed that even simple contact of a rancid oil with the alkaline solution was sufficient to effect a mechanical division of the oily matter. I have repeated these observations, and the results are very remarkable. The different behaviour of two specimens of the same oil, one perfectly neutral and the other containing a little free fatty acid, is exceedingly striking. I have here before me two specimens of cod-liver oil—one of them is a fine and pure pale oil, such as is usually dispensed by the better class of chemists; the other is the brown oil sent out under the name of De Jongh. I put a few drops of each of these into these two beakers, and pour on them some of this solution, which contains 2 per cent. of bicarbonate of soda. The pale oil, you see, is not in the least emulsified; it rises to the top of the water in large clear globules; the brown oil, on the contrary, yields at once a milky emulsion. The pale oil is a neutral oil, and yields no acid to water when agitated with it—in other words, it is quite free from rancidity; but the brown oil, when treated in the same way, causes the water in which it is shaken to redden litmus paper. I was surprised to find that olive oil (salad oil), which appeared quite sweet and had not the slightest taste or smell of rancidity, gave a milky emulsion with the soda solution. This oil did not yield any acid reaction to water when agitated therewith. Nevertheless, it evidently contained a little free fatty acid (probably oleic acid, which is insoluble in water, and therefore does not acidify water shaken up with it); for, when a portion of this oil was washed with a strong solution of carbonate of soda, and then allowed to separate, the oil thus freed from acid no longer gave an emulsion with the weak soda solution. It would appear that an admixture of only a very small proportion of free fatty acid is sufficient to induce emulsification—a quantity so small as not to cause any appreciable rancidity to the senses of smell or taste. This specimen of almond oil is to all appearance perfectly sweet; but it communicates a rather sharp acid reaction to water shaken up with it, and it gives, as you see, an instantaneous and perfect emulsion with the soda solution.

The bearing of these observations on the digestion of fat is plain. When the contents of the stomach pass the pylorus, they encounter the bile and pancreatic juice,

* Claude Bernard, 'Leçons sur les Phénomènes de la Vie,' tome ii., page 346. Paris: 1879.

† Hoppe-Seyler, *Physiologische Chemie*, p. 257. Berlin: 878.

which are alkaline, from the presence in them of carbonate of soda. Thus the fatty ingredients of the chyme, if they only contain a small admixture of free fatty acids, are at once placed in favourable circumstances for the production of an emulsion without the help of any soluble ferment, the mere agitation of the contents of the bowel by the peristaltic action being sufficient to effect the purpose.

This view of the matter renders it necessary that fresh inquiries should be made into the effect of gastric digestion on fats. It has hitherto been supposed that fatty and oily substances undergo no change in the stomach; but it is quite possible that something may have been overlooked. It was noticed by Richet, in the patient with a gastric fistula, that the fatty matters were detained a long time in the stomach, and that they only passed through the pylorus with the last portions of the meal. It is also a familiar experience to most dyspeptics, that rancid eructations are a frequent occurrence in the later stages of gastric digestion. If it should turn out that, among the complex operations taking place in the stomach, there occurred some slight decomposition of the neutral fats, and a liberation of a small quantity of free fatty acid, such a result would supply the necessary condition for the emulsification of the neutral fats in the duodenum. In speculating on this subject, it is difficult to shut one's eye to the possibility of the intervention of formed or organized ferments in the digestive process. It is well known that fatty acids are liberated in the decomposition of neutral fats by bacterioid ferments (zymophytes); and the presence of ferments of this class in the living stomach has been so repeatedly observed that it may well give rise to the suspicion that they are a normal ingredient of the gastric mucus, and have a normal function to perform in the digestion of some portions of our food. It is not, however, desirable to push speculations of this kind in advance of observed facts; and I only mention them as hints for further inquiry in regard to the digestion of fat.

(*To be continued.*)

A VISIT TO THE NATIVE CINCHONA FORESTS OF SOUTH AMERICA.*

BY HENRY S. WELLCOME.

During the past year, while in South America, I visited some of the principal cinchona districts, and the following notes are based upon my personal observations and information obtained from native bark dealers and gatherers.

The cinchona forests of Ecuador—of which I shall speak in particular—were for many years the only source from whence the world was supplied with barks; they still yield large quantities, and are being actively worked.

The bark-producing territory of Ecuador is divided into two general districts, known as Bosque de (forest of) Guaranda and Bosque de Loja.

The vast tract of wilderness extending from the boundary line of New Granada, about 1° north latitude, south to 2° south latitude, covers with its rich verdant mantle the western slope of the gigantic Chimborazo and the outlying ranges of the Cordilleras, from the waters of the Pacific up to an altitude of over ten thousand feet, encompassing within its higher limits the picturesque city of Guaranda.† This district is now the source of the larger portions of barks exported from Guayaquil;‡ many miles of its entangled forests have never yet been explored.*

The older cinchona district, known as Bosque de Loja, was the source of the first barks taken to Europe, or of which we have any authentic history. This district extends from 2° south latitude south to the boundary line of Peru, about 5° south latitude, and, like the Bosque de Guaranda, covers the western slope of the Cordilleras below the timber line. The cinchona bark, with which the Countess of Chinchon,† wife of the Viceroy of Peru, was cured of fever, in about the year 1640, was collected near the town of Loja. Howard considers it well established that this bark was none other than the Royal Crown Loja quill.‡ It is of interest, too, that the cure of the princess was probably due less to the alkaloid quinia than to the lower alkaloid cinchonidia, which predominates in that bark.§ The Loja forests still continue to furnish barks to the Guayaquil market; but there has been a gradual falling off in quantity during the past few years, which is not surprising, considering that they have been worked constantly for over two hundred years, and been more thoroughly explored than any other forests of South America.

To reach the southern portion of the Bosque de Guaranda a small steam launch plies between the city of Guayaquil and Pueblo Nuevo, a small town about seventy-five miles distant, on one of the eastern branches of the Guayaquil River. The trip is an exceedingly interesting one; hundreds of Indian canoes and balsa rafts|| are met, laden with fish, vegetables and fruit for the Guayaquil market.

We passed innumerable little floating islands, covered with exuberant growths of aquatic plants. Loathsome alligators crawl up the river-banks and bask in the warm sun; great numbers of white herons flock along the shore. Here and there little hamlets of bamboo nestle in shady nooks, surrounded by groves of oranges, mangoes and bananas.

Occasionally we are startled by the thundering boom of the ever active volcano, Saugay.¶ To the north, towering far above the clouds, we saw the lofty summit of Chimborazo, "grand monarch of the Andes," in all its resplendent glory; a dazzling pinnacle of everlasting snow, emblematical of a spotless purity, that presents a mocking contrast with the people who dwell upon its slopes, and call it their father. According to a legend cherished by the Chimbo Indians,** "many years ago

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* From the 'Proceedings of the American Pharmaceutical Association,' 1879.

† The first cinchona trees discovered within the Guaranda district were found near this city, hence the name of the forest.

‡ Guayaquil, the main shipping port of Ecuador, is a city of 30,000 inhabitants, situated on the Guayaquil River, sixty miles from its mouth. The river is navigable to this point by large ocean steamers.

* The limits of these districts are not clearly defined, and can be stated as approximations only.

The northern portion of the Guaranda forest is also known as "Bosque de Esmeraldas," from the name of an adjacent seaport on the coast of Ecuador, from whence some barks from that portion of the district are exported.

† It is not known whether Linnæus corrupted purposely or by error when he gave the name "cinchona" to the new genus (which he established for it) to commemorate the name of the Countess of Chinchon, through whose beneficent efforts the great remedy first became generally known in Europe.

‡ From *Cinchona condaminea*; grows to the height of eight to twenty feet, and at an altitude of 6000 to 9000 feet.

§ At that time the Royal Crown barks were considered the finest quality, but have long since ceased to hold that regard; under the advanced knowledge of quinology analysis shows it to rank low in the yield of the alkaloid quinia. By cultivation, in the East Indies, it has been made to increase its percentage of the valuable alkaloids.

|| Balsa rafts are made by lashing together with bejucos the trunks of a tree called balsa palma; they are as light as cork and exceedingly buoyant. Rigged with masts and sails these craft cruise along the coast, and sometimes venture well out to sea.

¶ The volcano Saugay was active at the time of the Spanish conquest, and has been in constant eruption ever since. It discharges every thirty or forty minutes; the explosions are often heard in Guayaquil, over one hundred miles distant, and her ashes fall in the streets.

** The descendants of the Chimbos now live in the Valley of Chimbo, on the western slope of Mount Chimborazo.

their nation was founded by the great Chimbo razo (Chimbo father); they prospered under his wise guidance and became a powerful people, but finally the great father died and changed to the mountain of snow (Chimborazo), that he might furnish his children with water to drink. But on the very day that the mighty Inca nation* conquered them, Chimborazo was so stricken with grief that his head fell off." An irregular spur, jutting out from the north side of the mountain, just above the snow-line, is pointed out as being his head.

Arriving at Pueblo Nuevo peons† and beasts are engaged and equipped for the journey, on muleback, or, as sometimes facetiously termed, "on the hurricane deck of a mule." All travel and transportation must be done on the backs of beasts or Indians, as wheeled vehicles are useless for want of roads. In the higher altitudes llamas serve as beasts of burden, and in the valleys of Quito and Riobamba I have seen sheep, goats and cattle used for the same purpose.

From Pueblo Nuevo extends a few miles of the narrow gauge railroad‡ constructed under the administration of the late President Garcia Moreno. It was his greatest ambition to open to the outside world the glories of the higher Andes. But shortly after the road was begun an assassin's knife checked his energetic and enterprising career.

The trail through the forest is simply a rough bridle-path, worn by years of travel, though not improved by use, sometimes leading us through low marshy places of nearly bottomless mire, where the beasts floundered about, sinking deeper and deeper, until they and ourselves were nearly submerged. Proceeding to the interior the forest growths show greater exuberance; the trees are so netted with vines, creepers and trailing lianas, and the foliage so closely woven together, as to present almost impenetrable walls on either side of the way, draped with rich verdure, while leaves of bright and varying tints light up and relieve the sombre shades.

The many beautiful flowers attract and please, but do not so deeply impress and charm one as does the gorgeous foliage in which nature has so lavishly grouped the choicest gems and wrought such perfect harmony in her infinite variety of elaborate designs and rich colourings.

Before reaching the highlands we passed through forests of the ivory-nut palms, with their long, graceful, feather-like branches; and a few scattering trees of *Cinchona magnifolia* (a valueless variety) are met with.

Occasionally we found clearings, with extensive haciendas of cacao, coffee, sugar-cane and annatto, and halted for the night at one of these estates. The huts are constructed of bamboo, and erected on stilts, to prevent the entrance of animals and reptiles, as also for safety in times of floods, which frequently occur during the wet season.§ The house-furnishing is very simple; neither chairs, tables, beds or stoves are found in these huts; fire is used for cooking only, and is prepared on a flat rock or on the ground. The fare is quite as meagre; our bill consisted of calde, locro and roasted plantain. Calde is their most substantial dish; it is prepared by boiling together—in something like the style of an Irish stew—the tough, rank meat of a gaunt black pig of the country, with potatoes,‖ onions, garlic and Chili peppers. Locro is a peculiar mushy soup, made by boiling potatoes and eggs together with various condiments. Plantains are roasted by burying them in hot coals and ashes before removing the peel.

Food is served in a rough carved bowl of wood, or calabash; the liquid portion taken with a wooden spoon and the solids fished out with the fingers.

The natives in these forests do not burden themselves with extensive wardrobes. The young, under fifteen years of age, often appear in the innocence of perfect nakedness.

There is something peculiarly fascinating about the careless simplicity of these people, their procrastinating manner of life and romantic surroundings.

In the place of beds we found repose upon the floor; but the nights at the equator are too delightful for sleep; the skies are so clear and transparent that one can seem to peer into the remotest depths of space, and, verily, to view the realms of Deity. Nothing can surpass the enchanting splendours of the tropical skies; the stars shine out in the great azure dome with a brilliancy unknown in our northern climes, while myriads of more distant luminaries cluster like clouds in the background.

We miss the Dipper of the constellation of the Great Bear, but are amply repaid by a view of the Southern Cross in its stead.

The bright moon and starlight penetrating the mingled foliage of the lofty forest trees produce mystic shadows, delineating divers grotesque, unearthly forms, and adding to the weirdness of our surroundings; the lightning-beetle* flashes out a vivid gleam of greenish-yellow light, that, to the brilliancy of a diamond, is like contrasting the electric light to a tallow dip.

Balmy, zephyr-like breezes gently fanned us into such a dreamy, fanciful mood that we could easily have imagined ourselves transported to a fairy-land, were it not for the ravenous onslaughts of cannibalistic fleas and mosquitoes, forcibly reminding us that we were yet beings of flesh and blood.

At midnight the temperature fell to about 50° F., and a damp, clammy chill came over us, making us wrap more closely in our blankets.

After continuing our journey for some distance into the foot-hills, we left the regular trail and struck into a newly cleared way to the north, keeping our peons ahead, with machetes† in hand, to cut away the bejucos‡ which hang in loops that threaten to catch beneath the chin and jerk one from his beast. Very strong clothing is required in travelling through these forests, for the many hooked branches play havoc with one's habit and often cut ugly flesh-wounds.

In crossing the rivers a tree felled across, from bank to bank, served as a foot-bridge, over which we passed, while our mules were made to swim; it is not without considerable danger that these crossings are made, and frequently serious accidents occur.

In some of the more travelled Andean trails, where the banks are very high and abrupt, the rivers are crossed by hammock or swinging bridges, made of bejucos. The small mountain streams are usually forded; frequently we follow up their banks, recrossing sometimes half a dozen times within a mile.

The cheery, musical ripple and murmur of those crystal clear waters, breaking over the numerous rocky declivities, which form an almost continuous array of rapids, with now and then furious cascades, produce a

* The ancient Peruvians found in possession of the country at the time of the conquest by Pizarro.

† Peon, an Indian servant, labourer, or slave.

‡ A German engineer has recently contracted with the Ecuadorian Government to extend the road to Quito, but considering the present financial condition of the country, the realization of such a stupendous feat of engineering in our day is extremely doubtful.

§ The wet season, called "invierno," lasts from December until May; during those months frequent heavy rains occur, and, together with the melting of snow on the high mountain-peaks, produce furious floods.

‖ Potatoes were first introduced into Europe from Ecuador.

* *Pynophorus noctilucis.* In the evening these beetles are worn as jewellery by the native women, and with very charming effect. The insect is attached to the clothing by means of a sort of harness of thread. The light proceeds from two small lobes on the thorax; they continually dim and again intensify the glow of these little lanterns, producing a peculiar wavering brilliancy that is quite dazzling.

† The machete is a large heavy knife carried by the natives; it has a blade fifteen to twenty-five inches in length.

‡ Bejucos, a name applied to all woody climbing vines.

most grand and striking contrast with the sombre silence of those majestic forests.

I was greatly disappointed on entering for the first time a tropical forest at midday, by the almost oppressive silence that prevailed and apparent want of animal life. Occasionally we heard the zip of a humming-bird and traced, like a flash, the glitter of its brilliant plumage in the sunlight as, for a moment, it darted from one flower to another, then, fairylike, disappearing in an instant.

Great numbers of beautiful butterflies floated silently past, waving their banner-like wings, so resplendent with lustrous hues.

Now and then a reptile glided across our pathway, and a gang of monkeys, taking fright at our approach, would scramble away into the tops of the higher trees.

Little else of animal life was seen during the day, but at twilight and in early morning the whole forest seemed to be alive: above all, in the hubbub of unearthly noises, could be distinguished the shrill screeches of the macaws, toucans and parrots, and the yelling or howling of monkeys.

Little music could be found in all these discordant sounds. It is remarkable that among the many tropical birds of gay plumage there are very few sweet songsters; their notes are nearly always harsh and shrill.

Getting fairly into the mountains the difficulties and dangers increase; zigzagging up almost vertical cliffs, only to find steep descents, and descending to climb again. In these mountains it is necessary to trust entirely to the mules.* Often having to go through narrow passageways, between huge boulders, dodging projecting rocks, then winding our way around the mountain-sides in narrow grooves, barely wide enough for the beasts to gain a footing, sometimes along the verge of frightful precipices of several hundred to a thousand or more feet. In some of the older trails there can be seen in the far depths of the chasms below whitened skeletons of human beings and mules, and now and then ghastly human skulls are found placed in niches cut into the bank along the passage, invariably with a cross above them, being tenderly suggestive of lurking dangers. Words are inadequate to picture the terribly broken and precipitous character of these Andean ranges; on every side traces of eruptive violence are distinctly visible; every rock shows the marks of a tremendous crushing force; the irregular masses of rock and earth heaped together form tortuous ridges and bold craggy spurs, with numerous intersecting fissures, ravines and vast chasms; every physical feature is modelled on a scale of magnificence and grandeur. Towering proudly above the Guaranda and Loja cinchona districts, and grouped within a radius of one hundred miles, are the lofty trachyte and porphyritic peaks of more than twenty volcanoes,† four of which are now active. Ecuador is a very hot-bed of eruptive elements; she is frequently convulsed by earthquakes, and at irregular intervals her volcanoes break forth with terrific fury, belching their fires high into the heavens, ejecting volumes of molten lava, and devastating the surrounding country with showers of stones, ashes and mud.

It must have caused our planet to quake to its very centre when nature's mighty convulsive forces burst their subterranean bonds, upheaving, rending and fragmenting the earth's surface, forming midst that awful chaotic tumult these vast cordilleras, with summits so near to heaven that they will never be defiled by the footprints of mankind.

In many places, while penetrating the forests, we were obliged to dismount and climb, while our mules were lifted almost bodily up the jagged steeps by the peons; but finally we reached a point beyond which it was impossible to take the animals. Leaving them in charge of a peon, we proceeded on foot, picking our way through the blind mazes of dense jungle, clambering over the decaying trunks of fallen trees, continually ascending and descending steep places until we gained a point on one of the great spurs, where we saw spread out before us a boundless undulating sea of wilderness, as far as the eye could reach, a gorgeous expanse of matted verdure, illumined by showy blossoms of glowing colours; here and there tall, slender columns of the palms pierced the forest roof and gracefully waved aloft their drooping, feathery branches.

The surpassing grandeur of this view was enrapturing beyond expression. On every hand the manifold and varied beauties unfolded themselves with almost bewildering rapidity; but suddenly a huge bank of clouds drifted upon us like a Newfoundland fog, curtaining the scene for a few moments and then quickly passing off.

Our cascarillero* soon descried some cinchonas in the distance, by the glistening leaves, which reflected brightly the vertical rays of the sun.

This characteristic reflex of the foliage, together with the bright roseate tints of the flowers, afford the means of discovering the cinchonas among this mass of forest giants. In prospecting by the appearance of the leaves alone a novice is easily misled by the india rubber tree, which has a glossy leaf very like the magnolias of our Southern States, and when seen at a distance reflecting the bright sunlight is easily mistaken for the cinchona.

Our cascarillero led us down a steep, slippery bank, formed of a reddish-yellow micaceous clay, which yielded like grease beneath our feet; we were obliged to cling to vines and limbs for support, as every few steps rocks would detach and fly crashing through the thickets below.

Finally reaching the bottom of the ravine, we followed the sinuous course of a small stream until suddenly our guide shouted "Cascarilla!"† and we were gladdened by the sight of several fair-sized trees of *Cinchona succirubra* on a slope near by.

(*To be continued.*)

* The sagacity of a mule is truly wonderful. They are the only safe animals for travelling in these mountains. They are far preferable to donkeys.

† Many of these volcanoes are continually mantled with snow.

* The bark collectors are called cascarilleros.

† Cascarilla is the Spanish word for bark.

THE STIGMATA OF MAIZE.‡

Professor Castan has recently called attention to the stigmata of maize as a remedy which he has found to be of great use in gravel and nephritic colic. In the latter disease there ensued after the administration of the drug a marked decrease in the painful symptoms, and he therefore supposed that the stigmata acted less as a diuretic than as a local anæsthetic.

The different results which the use of the stigmata of maize has given at the hands of different observers, appears to be due in large measure to the fact that the strength of the extract varies, according to the nature of the soil, to the climate, to the time, to the mode of picking, and to the manner of drying the stigmata. The formula for the preparation of the syrup is not yet fixed, since the quantity of the active principle varies in different samples of the stigmata. The *Pharmaceutical Union* adopts formulæ which contain in one case six, and in another twelve grams of extract to the kilogram of syrup. The latter receipt is based on the assumption of a strength of 12 per cent. This quantity appears, however, to be too small, since the best samples of stigmata yield 25 to 30 per cent. of extract, or on an average, 27·5 per cent. The kilogram of syrup will therefore contain 27·5 grams with this strength (27·5 pro mille). The daily dose of the syrup will be two to four spoonfuls, representing about one to two grams of the extract. In all cases the syrup should be used in preference to an infusion of the stigmata of maize.

‡ From *The Practitioner*, June, 1880.

The Pharmaceutical Journal.

SATURDAY, JUNE 5, 1880.

THE PHARMACEUTICAL EDUCATION OF THE FUTURE.

The report of the proceedings of Council last Wednesday will have an especial interest from the fact that one of the subjects to which most time was devoted is of very considerable importance, both in regard to the interests of pharmacy and those of the public. Thanks to the work of the Pharmaceutical Society of Great Britain it is now essential in carrying on the business of pharmacy that the pharmacist, though assuming no higher position than that of a tradesman, should differ from other tradesmen by having, not only a thorough training in the practical branch of his business, but also a sound acquaintance with certain branches of science bearing upon his practice, and that he should give proof of possessing such qualification before being entitled to carry on business. This distinction involves the possibility of attaining somewhat more of a professional status than has generally been enjoyed by chemists and druggists in this country, and thus becoming, as in other countries, more closely related to medical practitioners as forming a branch of the medical profession.

The promotion of education has always been the leading idea of the efforts made by the Pharmaceutical Society for the furtherance of these objects, and naturally the condition of the educational system will always be a subject to fix the attention of its Council. We do not wonder, therefore, to find an early pupil of the Society's School of Pharmacy, now holding the honourable position of Vice-President of the Council, bringing forward a motion for a special inquiry into the mutual relations of pharmaceutical education and pharmaceutical examination, with a view to reporting thereon to the Council. It is not, we think, a strained interpretation of the proposal to infer there is something wanting somewhere, and that the Committee will have to make known the nature of the want, and suggest fitting remedies.

At the very outset the Vice-President emphatically declares the standard and purpose of the examination to be perfect, or as nearly so as he could judge after giving very particular attention to the way it was conducted. He also speaks with no less decision as to the able and kindly way in which the individual examiners perform their duties. Consequently we cannot from this point of view suppose that there is any defect in the present method of examination which has induced Mr. Schacht to urge upon his colleagues this inquiry. It is true that he goes on to say that there is a certain class of candidates for examination with which the examiners experience great difficulty, and the picture he presents of the circumstances causing this difficulty is a sorry one; but notwithstanding this, and notwithstanding the suggestion that the hands of the examiners might possibly be strengthened for dealing with such cases, he does not say a word to indicate that he has observed any incapability of testing thoroughly the actual merits of candidates. On the contrary, he distinctly says that in the ordinary course a very few minutes suffice to show an examiner whether a candidate is well grounded or perfectly incapable of passing. And when we learn from Mr. Schacht that these two classes constitute the minority of the candidates, there cannot be much reason for hesitating as to the seat of the defect for which he seeks to provide a remedy.

It is, then, the education,—technically speaking, the pharmaceutical education,—of the majority of the candidates for examination that must be defective and in regard to which it may be necessary to take measures to ensure improvement. We will not here speak of those devices, superadded to ignorance, by which attempts are made to deceive the examiners, but will be content to accept the statement that candidates sometimes present themselves totally ignorant of the subjects they ought to know. Mr. Schacht speaks of this circumstance as calculated to excite astonishment at their audacity, but perhaps a somewhat more liberal estimate of their ignorance will more charitably account for it.

How, then, are we to hope pharmaceutical education may be improved? This is a question of vast importance to the entire body and especially to the younger members of it. We fear there is not much to expect from an extension of that system which is perhaps in the abstract the most perfect one, under which the young initiate learns all he requires to know during the period of his apprenticeship. It is but rarely that the pharmacy can be regarded as a school of pharmacy, and in various ways the tendencies of the age do not favour its being so. Some of our best pharmacists will not undertake the trouble and responsibility of teaching apprentices. Then, also, the manufacture of pharmaceutical preparations has become so much a special trade that there is less opportunity now than in the past for learning, even in the best establishments.

We may therefore look upon it that the idea of the pharmacy being the school of pharmacy is rather a reminiscence of the past than a dream of the future. And this brings us face to face with the question, What is to be the nature of the school of pharmacy of the future. How and where are the youths who determine to engage in this occupation as the business of their lives to acquire such sound and thorough knowledge of the subjects which are essential for carrying on that business as will enable them, not only to face the Board of Examiners without a misgiving or a fear, but also to prosecute their business with all the advantages to themselves arising from perfect mastery of their art and with that guarantee of security to the public which will justify their claim to a semi-professional position?

This, we take it, is the question which it is intended by the motion of Mr. SCHACHT to consider; it is truly a grave one, and there are many reasons for giving it every attention.

DEATH OF MR. W. W. STODDART.

MANY of our readers will see with regret the announcement on another page of the death on Tuesday last, from heart disease, of Mr. WILLIAM WALTER STODDART of Bristol. As a former member of the Council of the Pharmaceutical Society, as President of the British Pharmaceutical Conference, and in connection with the classes of the local Association, Mr. STODDART for many years took an active part among the leaders of pharmacy, and we hope to be enabled on a future occasion to refer more fully to his valuable services.

DEATH OF DR. ALFRED SWAINE TAYLOR.

THE Pharmaceutical Society has also just lost one of its Honorary Members in ALFRED SWAINE TAYLOR, M.D., F.R.S., the distinguished toxicologist, who died from heart disease, on the 27th ult. Dr. TAYLOR was born in 1806. He studied medicine and surgery under Sir ASTLEY COOPER and Mr. J. H. GREEN, and became M.R.C.S. Eng. in 1830, M.D. St. And. in 1852, and a Fellow of the Royal College of Physicians in 1853, having meanwhile been elected a Fellow of the Royal Society in 1845. Dr. TAYLOR was the first occupant of the chair of Medical Jurisprudence in Guy's Hospital, and as an authority upon medico-legal questions he had a great reputation.

THE ROYAL SOCIETY.

THE following is a list of the gentlemen who were elected Fellows at the meeting of the Royal Society on Thursday last:—THOMAS CLIFFORD ALLBUTT, M.A., M.D., F.L.S.; Professor JOHN ATTFIELD, Ph.D., F.C.S.; HENRY FRANCIS BLANFORD, F.G.S.; The Rev. WILLIAM HENRY DALLINGER; WILLIAM TURNER THISELTON DYER, M.A., F.L.S.; Lieut.-Col. HENRY HAVERSHAM GODWIN-AUSTEN; The Right Rev. CHARLES GRAVES, D.D., Bishop of Limerick; Professor DAVID EDWARD HUGHES; HENRY M. JEFFERY, M.A.; Professor FREDERICK M'COY, F.G.S.; J. FLETCHER MOULTON, M.A.; Professor CHARLES NIVEN, M.A., F.R.A.S.; JOHN RAE, LL.D.; Professor J. EMERSON REYNOLDS, M.D.; WILLIAM A. TILDEN, D.Sc.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A MEETING of the above Association will be held on Thursday next, the 10th inst., when the following communications will be read:—"Chian Turpentine," by Mr. R. H. PARKER; "Note on Cinchonas forwarded to India," by Mr. R. W. HOUGHTON. A Report on Botany will be made by Mr. D. HOOPER on "The Medicinal Flora of Afghanistan."

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, June 2, 1880.

Present—Messrs. Andrews, Atkins, Bottle, Churchill, Frazer, Gostling, Greenish, Hampson, Hills, Radley, Richardson, Robbins, Sandford, Savage, Schacht, Shaw, Squire, Symes, Williams and Woolley.

Mr. SANDFORD having taken the chair, the minutes of the Council meetings of May 5 and 19 were read and confirmed.

Mr. ATKINS suggested that it would be very desirable in future to shorten the reading of the minutes by omitting to read *in extenso* letters which had been received and entered.

Mr. RICHARDSON supported the same view. With the increasing pressure of business he feared that ere long the reading of the minutes at full length would very seriously encroach on the time of the Council.

MODE OF ELECTING MEMBERS OF COUNCIL.

Mr. BOTTLE desired to call attention to the mode of conducting the annual election of members of Council, which did not seem in all respects satisfactory, and gave notice of a motion to refer the matter to the Library, Museum and Laboratory Committee.

Mr. RICHARDSON said he would second the motion.

DEATH OF MR. STODDART.

Mr. SANDFORD said that under ordinary circumstances he should have at once called on the Council to elect his successor in the Presidential chair, but before doing so he had a very painful duty to perform, inasmuch as Mr. Schacht had just informed him of the decease on the previous day of their old friend Mr. Stoddart. At the previous meeting the Council had to regret the death of an old friend and good man, Mr. Cracknell, and now in Mr. Stoddart the Pharmaceutical Society had lost one of its brightest ornaments. Having been associated with him for about eight years on the Council, he felt very much grieved and depressed at the loss the Society had sustained, for although other occupations had of late kept Mr. Stoddart away from its meetings, yet he had always advanced the honour of pharmacy and the Pharmaceutical Society. He was quite certain that all the members would join in sending a message of condolence and sympathy to Mrs. Stoddart and the family. He would therefore move—

"That the Council, having heard of the death of Mr. Stoddart, desire to express to Mrs. Stoddart and the family of the deceased gentleman their most sincere sympathy at the loss which they have sustained, and at the same time to convey the assurance of the high esteem in which the late Mr. Stoddart was held by the Council."

Mr. SCHACHT said there could be but one feeling in all their minds, and he should perhaps best consult that feeling by simply seconding the motion in silence.

The motion was carried unanimously.

ELECTION OF PRESIDENT.

Previous to ballot being taken,

Mr. ATKINS inquired of Mr. Sandford if he had quite determined not to accept office again.

Mr. SANDFORD having stated that he could not accept the Presidency again,

A ballot was taken in the usual way, and—

MR. THOMAS GREENISH

was unanimously elected President.

Mr. GREENISH, on taking the chair, begged to thank his colleagues for the compliment they had paid him. It must be a source of pain to every member of the Council that one who was so thoroughly conversant with the business and so courteous in his manner as Mr. Sandford, should be unable, from considerations of health, to retain his position as President. He felt it a disadvantage to follow him, but he felt sure that Mr. Sandford would be as happy to afford him any advice and assistance he might require, as he should be to take advantage of it. He could only bow to the decision of the Council, and endeavour to the best of his ability to perform the duties, relying on its cordial co-operation and support.

Election of Vice-President.

On a ballot being taken—

MR. GEORGE FREDERICK SCHACHT

was re-elected Vice-President. He said he was much obliged for this renewal of the confidence of his colleagues, and he would take that opportunity of thanking them for conferring this honour upon him a year ago; he had gained a great deal from his experience in that responsible position, and he had only to assure them he would do his best to make that experience available to the advantage of the Society.

Election of Treasurer.

On a ballot being taken—

MR. JOHN ROBBINS

was elected Treasurer. He thanked the Council for the honour conferred upon him, and could only say he would would do his best to fulfil the duties of the office, and he hoped that at the end of the year he should leave a good balance for the incoming treasurer.

Vote of Thanks to the late President.

Mr. Bottle moved that a record should be placed on the minutes of the appreciation by the Council of the services rendered by the late President, Mr. Sandford. It had been his privilege to sit at the Council table for many years in connection with Mr. Sandford; he feared to say how many years Mr. Sandford had been a member, but he thought nearly thirty, and for nearly twenty years he had had the privilege of sitting there in his company. He had always experienced the greatest kindness from him, and had found him courteous to every member of the Society. Mr. Sandford had rendered immense services to the Society, and the members of the Council must have all regretted that in the early part of the year he had been compelled to tender his resignation, as he felt the pressure of the duties rather too heavy for him.

Mr. Savage, as another old member, had much pleasure in endorsing everything which had been said by Mr. Bottle. He might even go further and say that a more efficient President never occupied the chair. Though some members must occasionally differ from him they all felt the most entire confidence in him.

The Vice-President, as one who had during the past year been most intimately associated with the late President in his official duties, desired to add his testimony to what had been so well expressed by Mr. Bottle. Although he had at times felt constrained to differ from him on points of policy, he had never been treated with any the less cordiality on that account. He had much pleasure in supporting that motion.

Mr. Frazer, as a Scotch member, also bore his testimony to the good qualities of Mr. Sandford and to the kindness with which he had received him on his first election to the Council.

Mr. Symes, as a younger member than those who had yet spoken, desired also to express his sense of the kindness, courtesy and ability with which Mr. Sandford had always conducted himself in the trying position of President.

The President said the only objection he had to this motion was that some gentlemen seemed to suppose that they were going to lose Mr. Sandford's services, whereas he expected to have a great deal of work out of him yet. He had always told Mr. Sandford that he considered him a very obstinate man, but Mr. Sandford was always very courteous, and he felt that the Council could ill afford to spare him from that chair. He was sure, however, that it would still have his assistance. He would, therefore, put the motion—

> "That the best thanks of this Council be given to Mr. Sandford for the able and courteous manner in which he has filled the office of President."

The motion was carried unanimously.

Mr. Sandford said it would not be becoming in him to take up much time in returning thanks, but he must say a word or two in gratitude for the kindness which had been expressed that morning, and which he had experienced ever since he had the honour of sitting at the Council. He had, as Mr. Bottle had said, been there about thirty years, and for many years he had occupied the Presidential chair. Last year he took that position contrary to his own judgment, but in accordance with the wishes of the Council, and he had endeavoured as far as possible to carry out the duties to the best of his ability. As the President had said, he was somewhat obstinate, but he was delighted to hear his friends say that with all his obstinacy he had always been found courteous. As for differing in opinion, it must be expected that when twenty-one men got together there would be, and there should be, differences of opinion. Things would not go on well if all were of the same opinion. They should respect each others' opinions, and he always endeavoured to do so. He was very glad to see Mr. Greenish in the chair. As for rendering him any assistance, he did not think it would be wanted; but Mr. Greenish might depend on him at any moment for any aid he could give him. He must say, before sitting down, that he was not in failing health, but he was in advancing years, and he felt the time had come when he ought to have a little more leisure. But it would be always a pleasure to him to do all he could to forward the work of the Pharmaceutical Society.

Vote of Thanks to the Vice-President.

Mr. Hills moved a vote of thanks to the Vice-President for his services during the past year, which was seconded by Mr. Sandford, and carried unanimously.

The Vice-President briefly acknowledged the compliment.

Secretary and Registrar.

Mr. Elias Bremridge was unanimously appointed Secretary and Registrar.

Assistant-Secretary and Deputy-Registrar.

Mr. Richard Bremridge was also unanimously appointed Assistant-Secretary and Deputy-Registrar.

Standing Orders.

It was unanimously resolved that the Standing Orders of the Council be adopted for the ensuing year.

Elections.

Members.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Bucher, William Henry ....Crediton.
Hugill, Arthur Major ....Chislehurst.
Lord, William Henry ....Birmingham.
Williams, James Edward ......London.
Winfrey, Richard..................Long Sutton.

Chemists and Druggists.

The following registered chemists and druggists, who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Evans, Frederick William ......Treherbert.
Milne, William......................Torquay.
Parsons, George Henry ....London.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Bowling, John Henry ....Pembroke Dock.
Hornby, Charles Haycock ......Stockport.
Parkes, George James Robert...Wolverhampton.
Pugh, George ....London.
Robertson, John ....Arbroath.
Sanders, Thomas Scholes.........Salford.
Scoley, Thomas Edward ....London.
Wilson, William Wallace ......Glasgow.
Yeats, Thomas Flasby ....Liverpool.

Modified.

Greaves, John ....Cardiff.
Llewelyn, Ynyr ....East Molesey.

ASSOCIATES.

The following, having passed their respective examinations, and tendered (or paid, as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Fraser, John ....Chester.
Gelsthorpe, James ....London.
Glanville, George Grantley......London.
Illingworth, George Skeen ....Aberdeen.
Powell, John Alfred ....Reading.
Priestley, Walter Herbert ......Barnstaple.
Webster, Geo. Samuel Gothard...Alfreton.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society :—

Dobie, Robert Douglas ....Glasgow.
Duplock, Walter ....Petersfield.
Fox, Frederick William ....Lincoln.
Hucklebridge, Philip ....London.
Jolley, Sam Herbert ....Heaton Norris.
Metcalfe, Percival William ...Bradford.
Morrell, Frederick ....London.
Orry, John George ....East Kirkby.
Rae, Robert S. ....Annan.
Routly, John..........................Brighton.
Wheeley, John Thos. Martin ...London.
Wood, George Alfred ....Bridgnorth.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

ADDITION TO THE REGISTER.

The Registrar reported that—

Thomas Manning, Harleston, Norfolk,

having made the statutory declaration that he was in business before the passing of the Pharmacy Act, 1868, and this declaration having been supported by a duly qualified medical practitioner, his name had been placed on the Register.

APPEAL FROM THE REGISTRAR'S DECISION.

The Council then went into Committee to consider the correspondence, etc., relating to an appeal by Mr. Joseph Robinson Lund, of Bradford, from the decision of the Registrar not to put him on the Register.

On resuming, it was resolved that Mr. Lund's name be placed on the Register.

APPOINTMENT OF COMMITTEES.

The Council then proceeded to appoint the Committees for the ensuing year, the following being the result of the discussion:—

General Purposes.—The whole of the Council; four to form a quorum. To meet at six o'clock on the evening before the Council meeting, and at such other times as may be required.

Finance.—Messrs. Andrews, Gostling, Richardson, Savage, Squire and Symes. To meet at half-past four on the day previous to the Council meeting.

Library, Museum and Laboratory.—Messrs. Andrews, Bottle, Hampson, Hills, Richardson, Robbins, Sandford, Squire and Williams. To meet at twelve o'clock on the second Wednesday in each month, except August and September.

House.—The same as above. To meet at eleven o'clock on the same days.

Benevolent Fund.—Messrs. Bottle, Churchill, Hampson, Hills, Mackay, Radley, Robbins, Sandford, Shaw, Williams and Woolley. To meet at half-past three on the day preceding the Council meetings.

Evening Meetings.—The three Professors, the Editor, and the Curator of the Museum. The Committee to meet at twelve o'clock on the Wednesday preceding the Evening Meetings, and at such other times as may be found desirable.

Mr. WILLIAMS proposed the appointment of a Committee such as was appointed some time ago, consisting of the London members, to confer with the President whenever occasion might arise.

After some discussion, however, Mr. Williams withdrew the motion, it being the general opinion that the President should take the responsibility of action in any emergency which might arise, taking such advice as he might deem desirable.

Pharmacy Act Amendment.—Messrs. Andrews, Bottle, Hampson, Mackay, Sandford, Squire, Symes, Williams and Woolley. To meet as occasion may require.

Special Committee to Consider the Condition of the Society's School.—Messrs. Andrews, Bottle, Gostling, Hampson, Robbins, Sandford, Savage, Squire, and Williams.

Previous to the appointment of this Committee being agreed to, some discussion took place as to the desirability of postponing it for a time, and the Council ultimately went into Committee to consider certain matters referred to. On resuming the Committee as above constituted was agreed to.

The President and Vice-President are *ex officio* members of all Committees.

APPOINTMENT OF EDITOR AND SUB-EDITOR OF THE JOURNAL.

Dr. Paul was re-appointed Editor of the Society's Journal for the ensuing year, and Mr. F. Passmore the Sub-Editor.

LOCAL SECRETARIES.

The appointment of Local Secretaries was deferred for a month in order that the Library, Museum and Laboratory Committee might recommend a list of names.

The SECRETARY said that last year there were 323 towns eligible to have local secretaries; the number now eligible was 306, and the number of towns from which votes had been received was 210. There were no additions to the list this year, but 16 towns had been removed from it.

REPORTS OF COMMITTEES.

FINANCE.

Messrs. Hampson, Robbins, Schacht and Squire, having acted as a Finance Committee and examined the accounts presented during the month, recommended them for payment.

The report and recommendation were received and adopted.

LIBRARY, MUSEUM AND LABORATORY.

The Librarian's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
April.	Day	339	18	9	13
	Evening	206	15	5	9

Circulation of books.	Town.	Country.	Total.
No. of entries	174	69	243

Carriage paid . . . . £1 6*s*. 11*d*.

The following donations to the Library had been reported, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Grevillea, Record of Cryptogamic Botany and its Literature, 1872–80, Nos. 1-47.
From Mr. Caleb Weeks.

Medical Students' Register, List of Students Registered during 1879.
From the General Medical Council.

Mitchell Library, Glasgow, Report on the Library, 1874–9. From the Library.

Institute of Chemistry, Register of Fellows, etc., 1880. From the Institute.

Chemists and Druggists' Trade Association, Fourth Annual Report, 1879–80. From the Association.

University of London, Calendar, 1880.
From H. M. Government.

Scheibe, E., Darstellung und Beschreibung der Borcitronensäure und ihrer Salze, 1880.

Schwartz, V., Beiträge zum forensisch-chemischen Nachweise von Blut aus Flüssigkeiten, Harn, Zeug und Erden [1880].
From Professor Dragendorff.

The report was received and adopted.

HOUSE.

The report of this Committee was received and adopted.

THE PRESENCE OF REPORTERS.

The Council then went into Committee to consider the regulations with regard to the presence of reporters.

On resuming, the following resolution, moved by Mr. RICHARDSON, seconded by Mr. SYMES, was carried unanimously—

"That the Society's reporter be subject to the same regulations as regards being present or absent during the discussions of the Council in Committee as other reporters."

PHARMACEUTICAL EDUCATION AND PHARMACEUTICAL EXAMINATIONS.

The VICE-PRESIDENT then moved the following resolution of which he had given notice:—

"That a Special Committee be appointed to inquire into and consider the relation to each other of pharmaceutical education and the pharmaceutical examinations; and that they be empowered to invite the co-operation of any members of the two Boards of Examiners, of the professional staff, or other individuals whose opinions and advice they may deem it desirable to obtain; and that they be requested to frame a report to the Council on the subject at their earliest convenience."

In moving this resolution he said he had no hidden convictions in his own mind of what the appointment of the committee would lead to; he was not proposing it with any desire to carry any views of his own; indeed, he had none formulated. The fact of his introducing it arose from the circumstance that in his capacity as Vice-President during the last year, and through the courtesy and kindness of the President, they had been able to divide the duties which fell upon them in the examination rooms, and that gave him many chances of seeing what took place there. It was almost unnecessary to say he came to the conclusion that the standard and purpose of the examination was, as nearly as he could judge, perfect. The mark which the Examiners set as the gauge of efficiency of those who came up seemed to him to be correct, and he was very glad to have confirmed by further experience, by actually sitting by the side of each examiner in turn, his previously formed opinion that the individual examiners did their work in a wonderfully able manner, not only as regards their ability, but the kindliness of spirit which they manifested to those under their so-called "torture." But there was one part of the matter which he could not say gave him equal satisfaction and that was the condition of preparedness of the candidates. In many respects he was sorry to say they presented themselves hopelessly and surprisingly ignorant, sometimes in all the subjects, sometimes in a few of them. He could speak of some cases in which he was astonished at the audacity of the men coming up for examination with so much ignorance. A very few minutes sufficed to show an Examiner that such men were perfectly incapable of passing. Then there was another section of men who soon proved that they were well grounded students, and in that class again there was very little difficulty in coming to a positive conclusion. But there was a third and perhaps a larger proportion still to be spoken of. They were men who gave the examiners all great difficulty in deciding whether they did or did not know the subjects in which they were to be examined sufficiently well to justify them in being passed. These men presented two or three phenomena. Some of them were really poorly enough educated, but still fairly up to a certain point; others presented themselves with a poor amount of information but an amazing power of deception, showing a degree of artfulness and skill which they used to the very last degree to baffle the Examiner, and to make it appear they were more capable than they really were. He was sorry to say that section was rather large, men who must know they did not know enough to pass, but who resolved to try and persuade the examiners they knew a great deal more than they did. Contrivances such as would astonish many an adult were adopted by these youths as though they were trained deceivers. Such cases presented great difficulty to the examiners, every one of whom he believed to be a conscientious man, anxious to do his duty, and it had occurred to him, as well as to others, that it was possible their hands might be strengthened by processes which a committee might possibly think right to propose. It seemed to him that of all things the Council should aim to cultivate reality of knowledge and positiveness of study, that there should be nothing slurred in education, that students should be even guarded against themselves where they were apt to fall into the dilemma of making the superficial take the place of the real. If it were possible, by any regulations a committee could suggest, that these young men should really be led in youth to a better comprehension of their duties in adolescence, such regulations would not cause anything like injustice to them, or place them under unfair difficulties; but would really be doing them the greatest kindness. It was in this spirit he proposed a Committee of Inquiry, not with any preconceived ideas to be worked out, but that those facts which he had endeavoured feebly to sketch out should, if they were true, be brought more or less home to the minds of the Committee in the hope that some steps might be taken to remedy them, and, on the contrary, if he had misread the phenomena it was time it should be made clear that he was not a very careful observer. He only wished that the whole thing should be looked into carefully, that the conditions and opportunities for culture which these candidates possessed should be made clear, and that the result of those opportunities should be tolerably well brought to the test. If these were found to be faulty in any direction, then the Committee might investigate the probable processes by which a better state of things might be attained. He would only, in conclusion, repeat that he had no foregone conclusions in the matter.

Mr. SYMES, in seconding the motion, said the experience of Mr. Schacht, who had given great attention to the matter, had no doubt enabled him to arrive at the conclusion that the present method of examination, however well conducted, was not capable of testing thoroughly the actual merits of the candidates. He took that to be the idea which had prompted an inquiry into this subject. No doubt the great question of pharmaceutical education could be led by examination; arrangements could be so framed by the Council in conjunction with the examiners such as would more or less indicate the direction in which education should take place, that is education for examination, and he took it that the majority of men who came and passed fearlessly and satisfactorily were those who did not study for examination at all, but for the sake of the benefit they were to derive, first, from the knowledge itself, and, secondly, from the use they knew that knowledge would be to them in the later business of life. In looking round it was easy to point to these men and see that their knowledge had been of great advantage to them and added more or less to the advancement of pharmacy. If men would look at the thing in a proper light, that of itself would be sufficient to induce them to study thoroughly and honestly; but as they would not do so, and as the Council was told a large majority either came up hopelessly ignorant or devoted the time and attention which should be given to study to acquiring tricks and means by which to overcome what they regarded as the difficulties of the examination, it was most desirable that these subjects should be placed on a proper footing and an endeavour made to ascertain if there were any other means by which the examination could be rendered such as would test the merits of the candidates in a more perfect manner, or whether it was desirable to take action in some other direction. He thought it desirable to leave the question a broad one and not suggest any direction in which the Committee should work. Professor Attfield had issued a pamphlet which contained certain proposals on this subject, but he did not know that it was the business of the Council to discuss them at present. Still, he took it the Committee would have to consider that pamphlet. It was evident, however, certain schemes having been put forward, that at least something more was wanted, and it was on that broad basis he would support the motion.

Mr. Hampson regretted that this motion had been brought forward, that day especially, as the Council had received a communication on similar lines from Professor Attfield, recommending, it seemed to him, an active propaganda of certain notions. As far as he could see, the only object of this resolution was the bringing about of something like an enforced curriculum. That might not be the avowed aim of Mr. Schacht, but it was the only solution, because it was the only method adopted in connection with other examinations, so that this Committee, if formed, would have to consider whether affairs had arrived at such a condition that it was desirable to establish an enforced curriculum. That really was the issue. He would not express any opinion at this time whether the time for that was come or not, but he would remind the Council that it had had no complaints from the examiners; they had not told the Council that they found themselves incapable of testing the candidates, or that it was impossible to carry on their work satisfactorily. If they had found, as Mr. Schacht would lead the Council to suppose, that it was impossible for them to distinguish the capable from the incapable, they would no doubt have complained of such a want of power. But this proposition really was the result of a certain obtrusive pamphlet issued by one of the professors. He, with others, had had a copy of it, and had passed a general opinion on the subject; but he thought it was unfortunate that at this moment, when another Committee had just been appointed, which had to take into consideration the existence of the school,—not simply its method of teaching, but its very existence,—that this motion was even brought before the Council.

Mr. Gostling thought it would have been wiser to have allowed the motion to wait until after the report of the Committee just appointed had been given in to the Council. The whole business was a most difficult one, and one which would tax the energies and judgment of the members of the Committee to the utmost. All agreed, no doubt, as to the statement which had been made by Mr. Schacht with reference to the condition of the candidates for examination; there were, no doubt, in every examination men who were thoroughly qualified to pass, and another class of men who would avail themselves of the best opportunity they had of summarizing facts, and of collecting data so that they might be able to go into the examination room and appear to know that which they did not know; but there was no doubt that the examiners themselves in most of these cases could judge pretty well between the true and the false. It might be there were men who were able to answer certain questions very properly, but whose general manner and style of answering were such as to induce suspicion as to whether they really knew the subjects they professed. But still from the knowledge he had of some of the examiners he was inclined to think they could form a pretty correct opinion as to these young men. He felt there was a great responsibility resting upon the Council in the matter, and he should be obliged to vote against the appointment of this Committee until the report of the Special Committee for the purpose of taking into consideration the general condition of the school was given..

Mr. Atkins desired to recognize the clearness and impartiality with which the Vice-President had placed his twelve months' observation and experience before the Council, but he was inclined to agree with Mr. Gostling that it was desirable this matter should be deferred until the whole question had been dealt with and brought up to the Council. As he understood, the examiners did their work thoroughly well; in fact, as far as they were concerned, in the examination room there was nothing to be desired. Then was it any technical point affecting, not the examiners but the examinees in the examination room which could be improved? He took it it was not, but that what the Vice-President had in his mind was what Mr. Hampson referred to, namely, the education which preceded the examination altogether. He had read very carefully the pamphlet which had been referred to, and he did feel that if the Council was going in for an enforced curriculum it had a great deal to do besides talking of education. He valued education highly and was prepared to support any just and right scheme for its promotion; but there was another interest, and a pressing interest too, which was unavoidably connected with this question of education, and that was the value of the trade itself. If the Council was going to deal with the question of a costly compulsory training preliminary to the examination, it must consider whether the conditions of the trade really warranted it. He knew very well that with some select and profitable businesses, which really were but the minority, this question might not be a pressing one; but there were some thousands of businesses throughout the country which were a long way below the right standard of remuneration, and the Council must consider very carefully the course to be pursued as to enforcing a compulsory and costly curriculum of education.

Mr. Williams looked on this subject as one of very great importance. It had come under his notice when in the examination room that many men presented themselves in a very unfit state for passing, and it was more than possible that some did succeed in getting through who were really anything but qualified, but he still felt that there was a great difficulty in meeting the views of those who advocated a departure from the present system, and the requiring of a curriculum. He quite agreed that it would be a far better system to institute that every man who came up should not be permitted to undergo examination until he had proved that he had undergone proper education, but it was obvious that to some extent that was a question of expense. It was met to a certain extent at present by apprenticeship, but apprenticeship was frequently an inefficient mode of education. He did not exactly understand whether it was now suggested that apprenticeship should be done away with or simply that this system of a curriculum of education in a college should be supplementary to the original apprenticeship. He might remind the Council that the condition of things in North Britain varied considerably from the condition in the south, and the Council should be very cautious in any steps it took in this direction, for what might be suitable in London or in the south might probably be very much against the pecuniary interests of many in the north. He was sorry that Mr. Frazer had left, and that Mr. Mackay was not present, because their opinion on the subject would have been valuable. He must also remind the Council that to carry out anything like what was suggested by the motion, it would require an amended Act of Parliament, which many were hoping for, but the present Act did not give power to insist on a curriculum. The Act declared plainly that the Examiners were to examine all persons who should present themselves for examination. The Act was purposely framed in that way. He was not prepared to say it would not be a great improvement, as far as the education of the rising generation of pharmacists was concerned, to insist that the Act should be altered, and that the Examiners should be empowered to ask for certificates of the candidates having attended courses of lectures or some proper curriculum of education, but the question was, had the Society the power by a bye-law or any resolution of the Council to make such a regulation. It appeared to him it had not until it had a new Act of Parliament, and then the members of Council must ask themselves, as men of common sense, whether such a clause in the Act would be popular with the trade and with the public. It would, he believed, make the entering into the business more costly than at present, which would be objectionable to many. In a pamphlet he had seen it was suggested that it might be of benefit to the few who were prepared to take advantage of it; but he was not prepared to take that position. He thought it would be a great pity to restrict the entry into the business to those only who had good means, and that the poor man should be excluded. However desirable it was to improve the condition of education of those who presented themselves for examination, the Council must not take a rash step, and for the present he thought it would be wiser not to adopt this motion until at any rate it had the report of the Committee which had been appointed to consider the question of the Society's own school, because it would be some guide as to what should be recommended for a general system.

Mr. ANDREWS said this question had engaged his attention for many years, and he felt sure that sooner or later it must come up before the Council, to be dealt with. But he saw this objection to the appointment of the proposed Committee, that it would be working upon subjects, if not exactly the same, yet so nearly allied to those of the other Committee just appointed that it appeared to him that it would be a great waste of time. When the existing Committee had given in its report probably some of the very subjects here referred to would be dealt with. He would not go into the question of compulsory education, because he thought that was really discussing the question which should be first considered by the Committee.

Mr. SAVAGE said the subject was surrounded with difficulties. At the first blush there appeared no difficulty in approving the suggestion of the Vice-President, but at the same time he thought it would be well to wait the result of the Committee already appointed, because the two seemed to work very much on the same lines. Do what one would there would always be difficulty in this matter, for if one went to the College of Physicians or Surgeons, where a curriculum of education was insisted upon, there were found there two classes of individuals, workers and non-workers. Some men would apply themselves to their studies and others would not. It was originally necessary to have a seven years' apprenticeship before entering the Apothecaries' Company, but that was subsequently abolished, and it was decided that any one who presented himself with a sufficient amount of ability and possessed the requisite amount of information, no matter from what source obtained, should receive a diploma, and he believed there were many men in the profession now who had rendered very good service to the community who had not gone through the curriculum. Therefore, whilst the proposition seemed a reasonable one, he thought it would be well to postpone it until after the report from the other Committee.

Mr. SANDFORD said members of Council were all aware that it would be a very great advantage if all students could go through a regular course of study before coming up for examination. He was perfectly satisfied of that, although he did not agree exactly with the terms made use of in the pamphlet which had been referred to. That pamphlet spoke about subordinating examination to education, but that, he submitted, never could be done. You might educate up to an examination, but all examinations must be as to a man's fitness to perform a certain duty, not as to what he might have been taught in a certain school, although he quite admitted that the knowledge of his having been in a good school for a certain number of years would be a great satisfaction to the Examiners, and would be in the end good for the candidate himself. He feared, however, that the time had not yet arrived for such a course as seemed to be there shadowed forth. They knew when the Pharmacy Act of 1852 was passed, and again in 1868, an enforced curriculum was really in disfavour. Members of Council must have observed from a great deal of correspondence in the *Times* and other papers lately as to the insufficiency of examination to test a man's qualification that a different feeling was growing up in the minds of the public as to enforced curricula. There seemed to be a growing feeling that examination itself was not quite sufficient. It was a serious question, and he feared it would go beyond the power of the men generally brought into the business. He noticed in the pamphlet referred to, the point to which Mr. Williams had alluded, about a certain number of men being kept out of the trade; but it must not be looked at in that light. The Council wished to see only qualified men in the trade, but it was perfectly well known that the trade was one into which good men might come without very much capital, and he thought the time had not yet at any rate arrived to institute any bar of this kind against those men. He therefore thought it would be better if this resolution were postponed, at least until after the conclusion of the inquiry about the condition of the school.

Mr. BOTTLE said he did not himself see the particular relation between the Committee already appointed and the Committee which was now asked for; one seemed very little, if at all, to trench on the other. In the discussion which had taken place all the speakers had rather begged the question as to the intention of the Committee, and it seemed to be taken for granted that an enforced curriculum was what this proposed Committee would aim at, and that there were objections to such a course. There could be no doubt there were objections, and a curriculum could not be enforced without obtaining an alteration of the Act of Parliament; but it had been in the minds of some for a long time that it would be necessary to go to Parliament to get a new Bill, and surely it would be well before entering on that expensive amusement to consider whether the time had not arrived when the attention might be directed to the question of an enforced curriculum. His own observations in the examination room were perfectly in accord with those of the Vice-President. He had noticed that the Examiners had been at times extremely puzzled to find whether a man had been really honestly and fairly before them or whether he had been trying to shuffle through without the knowledge he should have possessed. If anything of this kind were to be done reasonable notice must be given, because a curriculum could hardly be enforced without three years' notice, after the Act of Parliament passed, and probably it might not be possible to get an Act for two years, so it would be five years before the regulation would really come into operation. The question then arose, was it too soon to contemplate such a progress in their profession? He did not think it was. Something had been said about the expensiveness of it, but it was known it had been done in the medical profession and even in veterinary practice, and the class of men entering the latter was not superior to those who came into the chemist and druggist's business. He for one was inclined to think the Council should begin to consider when a curriculum should be insisted upon.

Mr. SYMES wished to say, before the Vice-President replied, that in seconding the motion he did not intend to commit himself to any particular process of inquiry. The discussion had led rather into the work of the Committee. He was very much inclined to think with Mr. Bottle that the Council should go into the broad question and go into it early. If the other Committee would discuss the merits of the school or the very existence of it, surely this Committee might be appointed now, because the Council would be in a better position to inquire into the whole question than it would be hereafter if it had no school. If, as he hoped, an amended Pharmacy Act were obtained, even although it were a year or two hence, it would be far more satisfactory that this inquiry should be made now and that the report of the Committee should be in the possession of those who had to do with the framing of the Act rather than to leave that work until the time when the Act was ready. If, as had been stated, the Society did not possess the power of making such a regulation, it was only right that it should consider in good time whether it were desirable to seek for such power. He trusted the whole matter would be handed over to the Committee entirely unfettered.

Mr. RADLEY felt convinced that the general opinion of members in the country was that the examinations were already sufficiently strict and that any alteration in the education suggested would be scarcely received with favour. At the same time, it was a very important question, and one which might and ought to be discussed and brought forward before the trade generally.

The VICE-PRESIDENT said he had no reason to find fault with the direction the discussion had taken so long as it was clearly understood, as expressed by Mr. Symes, that the question was not one of enforcing the curriculum at all, but that that question with anything else was to be taken into consideration by the Committee. As it had been suggested that this motion was the natural outcome of a certain pamphlet, he must give it the most unqualified denial. That the pamphlet had come out simultaneously with the views which had been developing in the minds of other gentlemen might be the fact, but it was not true that this motion was the outcome of the pamphlet. He should also say that the two Boards of Examiners had expressed themselves very definitely and distinctly upon this matter, deprecating the existing order of things and suggesting inquiry.

Mr. HAMPSON: Not officially.

The VICE-PRESIDENT said he considered it was official, inasmuch as the Scotch Board had certainly passed a resolution to that effect, which he believed in due course would come before the Council. He was not pinning his faith any more than anyone else to the fact of an enforced curriculum, but he wanted the whole matter to be considered, and he was sorry it was thought desirable to postpone the matter. He could not see the reason for so doing. The report of the Committee on the condition of the Society's own school would not cover the ground to be covered by the Committee he proposed, which would have to consider the existing processes of pharmaceutical education and the existing order of pharmaceutical examinations. The latter matter possibly included the subject of the work of this school, but it certainly did not lie inside it. He was sorry there should be an opinion that this subject might wait. He thought it better the Committee should be constituted early, in order that it might go through the process of collecting information quietly, patiently and in the spirit which should actuate a legislative body. It could not get together the information it required under a long time and a great many sittings, and he certainly hoped that gentlemen would see that in agreeing to this motion they were committed only to a process of inquiry.

The motion was then put with the following result:—

For,—Messrs. Bottle, Churchill, Radley, Robbins, Schacht, Symes and Woolley.

Against,—Messrs. Andrews, Gostling, Hampson, Hills, Sandford and Williams.

The motion was therefore carried.

Mr. Savage was present and did not vote.

It was then agreed that the following gentlemen should constitute the Committee:—Messrs. Atkins, Hampson, Mackay, Sandford and Symes.

It was also agreed that a letter bearing upon the subject, from Professor Attfield, should be referred to this Committee.

BENEVOLENT FUND.

The SECRETARY reminded the Council of the vote of thirty guineas, made last November, for the purpose of obtaining the election of an orphan into an asylum, which money was not expended, as he found there was no chance of the child being elected. Another election would take place in the course of this month, and he presumed it would be his duty to attend and apply the money if he thought it desirable.

Mr. WILLIAMS said the vote had been already made, and he took it as a matter of course that the Secretary would act on it on the first opportunity.

THE SALE OF PATENT MEDICINES.

A letter was read from the Wigan Chemists and Druggists' Association, enclosing a resolution requesting the Council to take such steps as might be necessary to repeal that portion of the Act of 1868, which excludes patent medicines from its operation.

Parliamentary and Law Proceedings.

POISONING BY VERMIN KILLER.

An inquest has been held at Brixton by Mr. William Carter, Coroner for East Surrey, as to the death of Carl Meyer.

Selina Sennitt, servant at the house, stated that she took hot water to her master's room, and failing to gain a response to her knocks went to her mistress's bedroom to arouse her. They proceeded together to deceased's bedroom and found him lifeless and cold. Dr. Power at once attended and pronounced life extinct.

Mr. Paul Bock deposed that in consequence of certain information he searched a chest of drawers. He found a common glass tumbler containing about a teaspoonful of greyish-white fluid, which he handed to the officer of the court. The letter produced had been handed to witness by the wife of deceased. It was a letter to Mr. Frick, deceased's chief clerk, and commencing with the words, "When these lines reach you I shall be no more," went on to detail his business struggle, and asked the addressee to help in liquidating the estate. The letter was written in a desponding tone, and contained no further reference to death. Witness knew nothing of deceased's financial position. For some time past deceased had been greatly depressed, but no suspicion was entertained that he would make an attempt on his life.

William Smith, officer of the court, deposed that he received from Mr. Bock a glass which was soiled, and contained 10 or 12 drops of bluish-grey fluid. He did not taste it. He took possession and gave it to Dr. Lees for analysis, as also a jar sealed by Dr. Power.

Joseph Lees, M.D., said that he received a tumbler and jar (sealed) from last witness, and had carefully analysed their contents. He found the tumbler to contain Prussian blue, starch, and strychnia. In the contents of the stomach he found Prussian blue, but no starchy matter or strychnia. The latter was a vegetable poison, rapid in its action on the human body, and rapidly decomposing in the stomach. He had formed the opinion that deceased had taken the contents of the tumbler.

Robert Hardy, dispensing chemist, 42, Fenchurch Street, deposed that he knew deceased, and last saw him alive on the afternoon of Tuesday, 4th ult. He did not on that occasion supply anything, but on the previous had sold deceased a packet of Battle's Vermin Killer, the latter remarking that he wanted to destroy some mice. Witness would not have let him have it if he had been unknown, knowing that it was a dangerous article. It was a 6*d.* packet.

The Coroner having addressed the jury, the court was cleared, while the jury deliberated. On the readmission of the public, it was announced that a verdict had been returned of "Suicide by taking poison while in a temporary state of mental derangement."

Notes and Queries.

[656]. STARCH GLAZE.—I should be much obliged if through the medium of the Journal, anyone will furnish me a good formula for starch glaze, combining stiffness and gloss, so essential in laundry work.

PORTIA.

[657]. LIQ. AMMON. ACET. CONC.—Will some brother druggist kindly give formula for making liq. ammon. acet. conc., 1 to 7? COUNTRYMAN.

[658]. COMPOUND TINCTURE OF MYRRH.—Will some one kindly give a form for compound tincture of myrrh? I cannot find one in any of the usual books.

F. W. WOOD.

[659]. FREEZING CRYSTAL.—W. B. O. would thank anyone for a cheap form of freezing crystal.

[660]. PRESERVATION OF INFUSION OF MALT.—Can any of your readers inform me how a cold infusion of malt may be preserved for a week or two, without risk of destroying its diastase? A. D. B.

[661]. "ASBESTOS PAPER."—Required for wrapping deeds in. The writer has heard that such an article has been made; would feel obliged for information as to the maker and where it is to be obtained.

INQUIRER.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE VOTING AT THE ELECTION OF COUNCIL.

Sir,—I feel I am under the necessity of addressing you in order to remove some misapprehension on the part of our much respected President (Mr. G. W. Sandford), on the occasion of his acting as Chairman at our Annual Meeting on May 19, and the adjourned meeting on May 21.

I think from his position as chairman he scarcely acted with that impartiality which constitutes the nature of his office and is the usual characteristic of his own noble nature; the strictures he passed upon me for my action and subsequent conduct as a scrutineer and a private member, might have become him very well as an individual member entitled to his opinion, but they lost all grace and failed to carry conviction, when they issued from his lips as the summing up of a chairman. I am sorry to find Mr. Sandford repeated, in my absence on May 21, his regret at "the manner in which the subject had been brought forward on Wednesday." I can only say I acted conscientiously, and am quite satisfied to leave the subject in the hands of my fellow members. Those who may wish to know why I brought the subject forward, will please refer to my letter, addressed to you, Mr. Editor, and appearing in the number of the Journal for June 7, 1879, third series, No. 467.

Dr. Symes, as the person hinted at,—for let me say *en passant*, Mr. Shaw, also of Liverpool, whose admirers were not guilty of the same presumption, shall I call it, as Dr. Symes's, knew full well there was no necessity to resort to the, to me, perfectly unnecessary method of plumping, for our candidates have no need of the artifices and methods customary at Parliamentary elections, in order to secure their seats,—Dr. Symes had the manliness to stand up and defend himself and his fellow electors from any design of trying to gain an advantage over the general body of the electors, who voted for him in the innocence of their hearts and the belief they were acting wisely in giving him one of their fourteen votes.

Dr. Symes lays claim to be the representative "of the whole country." I was glad to hear him say it; let his acts prove his profession, and let us hear no more of Liverpool, or, indeed, other towns plumping for their pet local nominee.

During this discussion we have had it reiterated that the Council must be truly national and representative. How can it be so, if the electors are bent upon excluding metropolitan members from the Council?

	Council 1879. Country Members.	Council 1879. Town Members.	Council 1880. Country Members.	Council 1880. Town Members.
Elected . .	10	4	8	6
Non-elected	3	4	5	2
Total . .	13	8	13	8
Candidates rejected.	0	6	1	3

	Attendances. County.	Attendances. Town.	Total of meetings.
Council . . .	10·0	9·125*	12
Committees .	30 692	51·125*	67

The above table clearly shows that the heavy burden of the Society's work falls chiefly upon the town members. Can we not increase their numbers and at the same time endeavour to lighten their work?

As regards the last election, although the constitution of the Council remains as last year (country members, 13; town members, 8), I think I may congratulate the electoral body when we find we have secured the *bonâ fide* election of six town members.

Thus in 1879, 11,397 votes secured the election of 10 country members of Council, while 3946 votes secured the election of 4 town members of Council. A total of 8115 votes having been recorded among eleven (11) town candidates, leaving a balance of 2972 votes unused, and as I observed in my letter of last year, Liverpool and district, may be held accountable for certainly more than half this number, by making use of the system of plumping.

The figures this year are much more encouraging: 11,653 secured the election of 8 country members, while 8523 votes were bestowed on the 6 successful town members, besides 2421 votes given to the 3 unsuccessful town candidates, making a gross total of 10,944 votes given to town candi-

* Mr. Slipper, as a town member of the Council, has adversely affected these figures, his attendance at only one meeting out of a total of thirty-four he was appointed to attend, considerably lowers the average of his town colleagues.

dates. There remain 2062 votes unprofitably wasted, which again is matter for congratulation as compared with last year's 2972 votes.

I am very glad to notice this improvement, as it proves the remonstrances in my former letter have not been without beneficial effect. Permit me to say as I write, I have no wish to restrict voters in the legitimate exercise of their right of private judgment as to the fitness of individual candidates; but I most strongly condemn the dog-in-the-manger principle of plumping for merely local candidates. If our elections are to be conducted on this principle, the sooner we adopt the system of equal electoral districts for the return of representatives on the Council the better we shall assimilate our representation to the requirements of particular districts. I must point out how really very satisfactory the votes on the last election come out. In a grand total of 1810 voters possessing 25,340 votes, against 1606 voters with 22,484 votes, we have an increase of 796 voters with an increase of 11,144 votes, a number of votes nearly equal to the total which secured the election of the 10 country members of Council in the 1879 election. Out of the large number of 25,340 votes, I find only 2062 votes were unused or wastefully lost. This is a very decided improvement upon last year, where I find 22,484 votes were available, while 2972 were unused or lost by the system of plumping, or the equally objectionable system of restricted or partial voting.

In conclusion, let me address those voters who act on the principle of desiring none but country members on the Council, and who invariably vote on the system of excluding all London candidates. I most unhesitatingly condemn the system as an impracticable, impolitic and unwise use of voting power. What we should desire and aim to have is a true and correct representation of the whole national electorate. How can this be, if voters act on the policy of town *v.* country. I was grieved to see Mr. Butt's name withdrawn from the list of town candidates. I consider Mr. Butt an admirable candidate for a seat on the Council. To my idea he is the embodiment of what we want in a candidate, a long country experience, mellowed and ripened into a keen judgment of town necessities and requirements. Some other names occur to me as equally desirable, but who I daresay, are not willing to see their names figure at the lower extremity of the poll, owing to a want of appreciation of their abilities and qualifications on the part of the greater bulk of country voters. I say we have men able and willing to serve us loyally and well, who combine all we require, as regards experience of mixed country business, who are settled in London, and are fully aware of all the burning questions which trouble the repose or agitate the bosoms of town and country practitioners of the art of pharmacy.

88, *Silchester Road, Notting Hill, W.* T. HOWARD HALL.

P.S.—Note the increase of travelling expenses; in 1879 they are £343 13*s.* 3*d.*, as against £242 14*s.* 3*d.* in 1878.

THE WEIGHTS AND MEASURES ACT.

Sir,—The Weights and Measures Act seems to be exercising the minds of many of our brethren anxious to be within the pale of the law, but in some doubt as to what it exactly requires of them.

It seems to me that the Pharmaceutical Society has not had its proper influence in the modifying of this measure as it affects our peculiar interests. Impelled as we are by our own convenience and reputation to use the means best adapted for the end, and in which there can be no question of defrauding the public, it appears as though we were specially selected for the endurance of official worrying.

I am told by a firm which is taking a leading interest in supplying Government stamped weights and measures, that the grain weights in use are no longer to be recognized; but instead of the indentations denoting the number of grains, they must now be represented by figures. Gentlemen who have used both will readily understand how much more distinct and easy of recognition the old dotted weight is; the one you can pick up from the scale box with confidence and without stooping, the other requires a close scrutiny. Again, many pharmacists use delicately adjusted beam-balance scales for small quantities of potent drugs, and most of us have sets of metrical weights. Surely in such matters as these, if our leaders led, something of freedom might be left us in the professional branch of our calling.

We all want to obey the law, and should be glad of any explicit information we can get through the medium of the Journal, and should appreciate any influence that the Council might exert to guard our privileges.

W. WARREN.

24, *Russell Street, Covent Garden, W.C.*

Sir,—Wishing to be legally safe with my dispensing weights, I purchased of one of the first scale makers a set of ½ grain to 2 drachm weights, each of which bears the official stamp of verification. As I possess a tolerably sensitive balance, it occurred to me to test their correctness so far as might be done by comparing them amongst themselves, and to my great disappointment I find they are all abroad. Assuming the ʒij weight to be correct, its numerical equivalent in smaller weights shows an excess of nearly ½ grain. The 2 and 4 grain weights compared with the 6 grain are fully one-third of a grain light, and so on. Under such conditions, is any pharmaceutical chemist safe?

Penton Street, N. J. BLAND.

CLAY'S CHIAN TURPENTINE MIXTURE.

Sir,—Experimentally trying Mr. C. Eve's mode of making the above (p. 972), I find, as the anæsthetic ether is so volatile and the turpentine so tenacious, that with all dexterity possible, much of the former is evaporated and about half the latter adheres to the mortar and pestle and never becomes emulsified; the sulphur, therefore, has no chance of aggregating this part of "the resin in masses." Nor will the patient get the full dose of it, as it is never put into the bottle. I consider Mr. Eve's process of rubbing an ethereal solution in an open mortar a very unskilful one.

His principle in making the mixture is that I suggested for making mucil. tragacanth. (*Pharm. Journ.*, 1870, p. 520). I had previously tried it for dispensing the Chian turpentine emulsion by pouring the ethereal solution upon the tragacanth powder placed in a bottle, adding the water gradually, and lastly the sulphur and syrup rubbed together, without good results. I leave the subject to your readers for corroboration.

I may add that Mr. Eve's mixture (not containing the full quantity of resin even) is not nearly so good an emulsion as one made with acacia.

WM. MARTINDALE.

THE SEASON.

Sir,—I noticed a point in your article of "The Month" with surprise, viz., that the vegetable kingdom was a fortnight in advance of last year. My experience is very different; on the 2nd inst. I could not find a specimen of *Convallaria majalis* in flower, though several acres were abundantly covered.

THOMAS ROMANS.

"*Sior.*"—Probably charlock; send a better specimen.

"*Vance*" *and* "*Dentist.*"—The presence of your names on the Register would have been sufficient evidence of that part of your claim. In the absence of such proof each case will, we presume, have to be decided according to the evidence that can be produced.

"*Assistant.*"—Try salicylic acid. See vol. vii., p. 595, of the present series.

"*Country Major.*"—At present it is impossible to say.

"*Inquirer.*"—Rubini's essence of camphor is a solution of camphor in an equal weight of rectified spirit.

J. H. W.—We should think not, as coming under the exemption in favour of artificial mineral waters, but the question had better be addressed to the Inland Revenue authorities.

"*Inquirer.*"—The commencement of a report describing more fully some of the articles shown at the recent exhibition will be found on p. 975.

COMMUNICATIONS, LETTERS, etc., have been received from Dr. Vogl, Professor Dyer, Messrs. Parkinson, Roberts, Calvert, Cocking, Dodd, A. P. S., J. W. H., R. F., Associate.

NOTES ON INDIAN DRUGS.

BY W. DYMOCK.

(*Continued from page* 831.)

EULOPHIA, several species, ORCHIDACEÆ. SALEP. *Vernacular*: SAALAB-MISRI (Hind.); SHÁLÁ-MISHIRI (Tam.): SÁLAM-MISRI (Bomb.); CHÁLÉ-MICHHRI (Beng.).

History, Uses, etc.—*Eulophia campestris*, Lindl., and *Eulophia herbacea*, Lindl., are generally named as species which produce at any rate a portion of oriental salep, but we have no complete information upon the subject. *E. herbacea* and several other species of *Eulophia* are natives of the Bombay Presidency, but although some of their tubers are sold by the herbalists as salam-misri, they do not yield any of the saleps of Bombay commerce; these are all imported from Persia, Cabul and northern India. Salep does not appear to be mentioned in the older Sanskrit works on medicine. Mahometan writers usually describe it under the Arabic name of Khusyu-uth-thaalab (foxes' testicles); they identify it with the sáturiyun and turphullon of the Greeks and mention several kinds. The odour of the fresh root is said to resemble that of *semen hominis* and to have an aphrodisiac effect if clasped in the hand. The dry tuber has a great reputation in the East as a nervine restorative and fattener. It is also much prescribed in paralytic affections. The palmate tubers are most esteemed. The nature of oriental salep appears to have been unknown in Europe until Geoffroy in 1740 discovered its source and showed how it might be prepared from the tubers of orchids indigenous to France.

Description.—Three kinds of salep are generally to be met with in the Bombay market, viz., palmate, large ovoid and small ovoid (threaded). All of them are more or less translucid and gum-like, and have been decorticated before being dried. Salep has hardly any odour or taste, with water it forms a bulky jelly having a faint peculiar flavour. In the East it is mixed with milk and flavoured with spices and sugar.

Microscopic Structure.—The bulk of the tuber consists of a parenchyme, the cells of which contain either mucilage or starch altered by heat. It is traversed by small fibro-vascular bundles.

Commerce.—The following kinds of salep are met with in the Bombay Market:—

Abushaheri or Lasaniya, Rs. 15—35 per maund of 41 pounds.

Punjahi-salep, Rs. 10 per pound (palmate tubers).

Punjabi, Rs. 2½—7 per pound.

Besides these imitation salep is largely prepared; it is said to be made of pounded potatoes and gum.

VANDA ROXBURGHII, *R. Br.*, ORCHIDACEÆ. *The roots. Vernacular*: RASNA (Hind., Beng., Bomb.).

History, Uses, etc.—Dutt informs us that the roots of *Vanda Roxburghii* and *Acampe papillosa* are indiscriminately used as rásna by native physicians in Bengal. The drug is mentioned by Sanskrit writers under the names of rásná and gandhanákuli, and is said to be bitter and aromatic and useful in rheumatism; it is given internally and applied externally. The following form for internal administration is found in most Sanskrit works on medicine:—"Rásnápanchaka. Take of rásná, *Tinospora cordifolia*, wood of *Pinus longifolia*, ginger, root of *Ricinus communis*, of each equal parts, and prepare a decoction in the usual manner" (Confer. Dutt's 'Hindu Materia Medica,' p. 259). In the Concans the roots of *Saccolabium papillosum*, Lindl., are used; this I suppose to be the same plant as the *Acampe papillosa* mentioned by Dutt.

Description.—*Vanda Roxburghii* has a creeping stem, sending forth long, thick, round, ramous, fleshy, whitish roots, which fasten firmly to the trunk or branches of the tree they grow on. The plants are seldom more than two or three feet in length; leaves sheathing, bifarious, approximate, recurved, linear, keeled, præmorse, five or six inches long; scape generally axillary, solitary, naked, supporting from six to twelve large beautiful flowers; petals five, nearly equal, expanding, oblong; margins waved and here and there a little inflected; upper surface checkered with yellow and dusky ferruginous purple, underneath white; lip shorter than the petals; horn conical, protruding towards the germ, between the two lower petals; lamina oblong, turgid; apex two-lobed; sides reflex, so as to be convex above and deeply concave underneath; colour bluish-purple or violet towards the apex; the upper lip, or portion which forms the attachment of the lip and horn to the base of the column of the fructification, has two lateral lobes, obliquely broad lanceolate, with their acute points incurved towards the apex of the column. Column of the fructification thick, short and obtuse, open in the interior margin near the apex. This mouth or opening tapers down through the column into a point which ends in the belly of the germ; operculum suborbicular, with two pits for the two round polliniferous balls. When the lid is removed gently the two anthers rise with a jerk in their broad cordate filaments; the lid is inserted on the interior parts of the top of the column by a large infundibuliform base. If removed with less care and before the anthers are ripe they remain in their cells and the funnel-shaped base of the filament rises erect. Stigma, or channel for conveying the subtile male essence to the germ, a clammy opening in the fore part of the column near its top. Pericarpium clavate, with six sharp ridges running the whole length. (Roxburgh.)

Saccolabium papillosum.—Leaves strap-shaped, unequally two lobed at the apex; peduncles much shorter than the leaves; sepals and leaves subspathulate; sepals equal, larger than the petals; lip three lobed; lateral lobes short obtuse, middle one suborbicular, saccate at the base; flowers yellow, transversely streaked with purple; lip white, transversely streaked with rose colour; flowers very stiff and fleshy ('Bombay Flora').

Commerce.—The bazar rásna comes from Kattiawar. Value Rs 2 per maund of 41 lbs. A small kind of rásna is also sold at a very high price, viz., R. ¼ per tola (180 grs.); it does not appear to be the root of an orchidaceous plant.

IRIS GERMANICA, *Linn.*, IRIDACEÆ. *The rhizome. Vernacular*: BIKH-I-BANAFSHAH (Pers.), IRSA.

History, Uses, etc.—Orris root is not mentioned by the older Hindu physicians. It is known in India by its vulgar Persian name bikh-i-banafshah (violet root). Mahometan writers mention several kinds of iris under the names irsa and súsan; but their descriptions are not sufficiently accurate to enable us to identify them with any certainty. From Meer Muhammad Husain's account (Confer. 'Makhzan,' article Súsán) I conclude that both the *Iris* *fœtidissima*, L., and *Iris pseudo-acorus*, L., are used medicinally in Persia. The correct Persian for *I. Germanica* appears to be súsan-i-ásmánjuni. The word súsan is said to be derived from the Syrian. Susáni-irsa is evidently a corruption of the Greek iris. Iris root is considered by Mahometan hakeems to be deobstruent, aperient and diuretic, especially useful in removing bilious obstructions. It is also used externally as an application to small sores and pimples. From the large number of diseases in which this drug is recommended it would appear to be regarded as a panacea for most diseases (Confer. 'Makhzan,' article Arsa). According to Hooker, *Iris Germanica* is cultivated in Kashmir.

Description.—Indian orris root differs from the European drug inasmuch as the bark of the rhizome has not been removed.

Microscopic Structure.—The rhizomes of different species of iris hardly differ in structure. They consist of a brown epidermis, composed of compressed and nearly empty cells, covering a white cortical cellular tissue, containing starch; this is separated by a layer of brownish compressed empty cells from the central woody yellowish tissue of the rhizome. The latter is built up of large, thick-walled, spherical, porous cells, loaded with starch; here and there between the cells may be seen a prism of oxalate of lime. The vascular bundles are numerous, in each irregular rings of spiral vessels surround a central bundle of jointed vessels.

Commerce.—Bombay is supplied with orris root from Persia and Kashmir. Value As. 2 per lb.

Iris Sp.?

Lakri-pashanbed or pakhanbed is a rhizome found in all the bazars; the prefix "lakri" being added to distinguish it from the mineral known as pakhánbed.

The drug occurs in pieces one to two inches long and about half an inch in diameter. The external surface is scaly with numerous circular constrictions, of a reddish-brown colour, marked with small scars to a few of which rootlets remain attached; substance hard, compact, of a dull red colour. When soaked in glycerine it stains it of a rich reddish-brown. The taste is acid and astringent; the odour musky and aromatic. The minute structure of the rhizome has a general resemblance to that of orris root; but numerous stellate raphides are present. The drug is chiefly used as a diuretic. It is said to come from Marwar. Value Rs $3\frac{1}{2}$ per maund of 41 lbs.

(*To be continued.*)

THE EXHIBITION OF PHARMACEUTICAL APPARATUS, ETC.

(*Continued from page* 977.)

Not the least interesting to the visitors to the Exhibition was the collection of gas-heating apparatus, which had been previously exhibited in the rooms of the Society of Arts, by Mr. T. Fletcher, of Warrington, and described in the Journal of that Society for April 30. Owing to the danger from fire likely to arise from having them in operation in an ordinary room, this portion of the Exhibition was placed in the Octagon Room at the top of the Society's house, in which the benches being entirely of slate, the apparatus could be put in action with perfect safety.

Most things worth seeing or having necessitate a certain amount of trouble, but the labour of ascending to the top of the Society's house to see this apparatus was grudged by few who examined the contents of this room.

One of the most useful pieces of apparatus here shown was the "Solid Flame Burner" (fig. 1), by which an explosive mixture of gas and air is burnt perfectly so as to produce a solid flame that is consequently

Fig. 1.—Fletcher's Solid Flame Burner.

perfectly free from smell. Over one of these burners not more than 5 inches in height, an egg may be boiled in a tin saucepan, or $\frac{1}{2}$ cwt. of lead melted in an iron pot.

Another, which was stated by some of the visitors who had tried it to answer perfectly, was the "Hot-Air Bath" (fig. 2) for pharmaceutical purposes. The

Fig. 2.—Fletcher's Hot-Air Bath.

chief feature in this is the use of an "Evaporating Burner" (fig. 3), which differs from other burners in

Fig. 3.—Fletcher's New Evaporating Burner.

consisting of a number of small flames raised by means of little conical projections above the surface of the copper disc from which they issue. This burner is enclosed in a perforated cylinder with a wire netting at the top. The currents of cold air, so fatal to glass and porcelain vessels, which are liable to occur when an ordinary coil burner is used, are rendered impossible by the use of this apparatus. The flame also is blue and smokeless.

But perhaps the most remarkable, and at the same time, the least pretentious-looking of the whole apparatus, was the "Perfected Injector Gas Furnace" (fig. 4), by means of which, with $\frac{1}{2}$-inch gas pipe and the smallest foot blower, a crucible full of cast iron scrap can be melted in ten minutes and steel in fifteen minutes, starting with all cold. This furnace consists of a hollow cylinder of porous fire clay, with a hole in one side of it, a solid base and a movable cover, furnished with a stopper (D) to permit of viewing the contents of the crucible. In the hole at the side is placed the nozzle of the gas burner. The burner consists of a tube, through which a jet of air under pressure is driven by a foot blower. Into this tube gas enters at the side, the tube being open behind the place where the gas enters, so that the fine stream of air under high pressure entering the

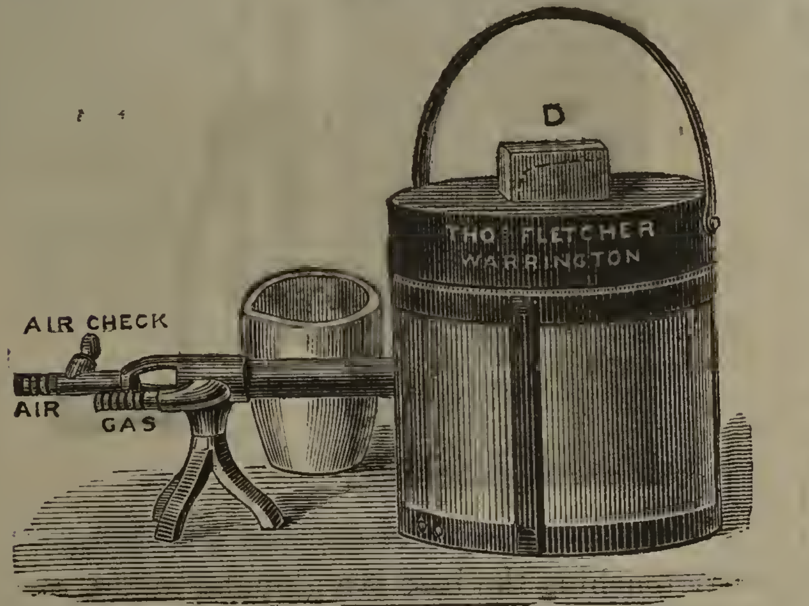


Fig. 4.—Fletcher's Perfected Injector Gas Furnace.

portion of the tube close to the furnace acts as an injector and by suction draws in the larger quantity of air required for complete combustion of the gas. By this exceedingly simple and ingenious plan, an amount of pressure and a quantity of air is obtained which could otherwise only be got by large and costly blowing apparatus. A perfectly explosive mixture is thus made rapidly in very small quantities and burnt in a close non-conducting chamber, so perfectly and so instantaneously that not a trace of flame is visible in the furnace. By this simple arrangement it is claimed that cast iron may be rendered almost as fluid as water, and a dazzling blue heat obtained in ten minutes or a quarter of an hour. The gas consumed in order to melt 2 lbs. of iron is said to be only 7 cubic feet. No crucibles known will stand a greater heat than this furnace gives with ease, and no furnace could be better adapted for melting small quantities of the rarer metals, manganese and nickel being easily melted in it. For enamels, etc.,

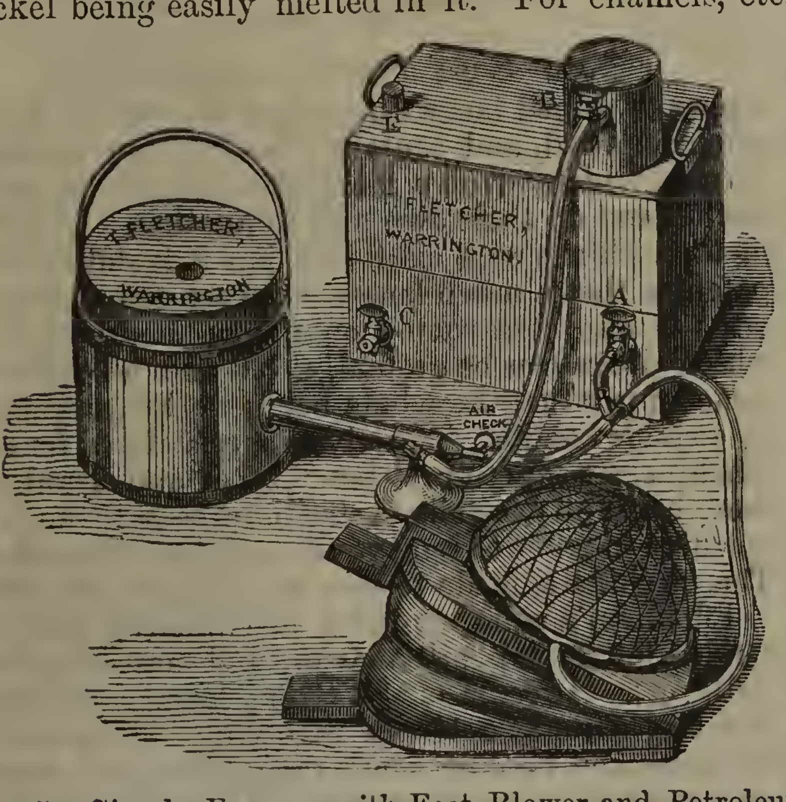


Fig. 5.—Simple Furnace with Foot Blower and Petroleum Apparatus.

to which the presence of the sulphur in coal gas would be injurious, the air gas made from benzoline by a special apparatus devised by Mr. Fletcher can be used (fig. 5). Half a pound of iron was melted during the time of the Exhibition in this furnace, and became so fluid that it ran like water through a small unnoticed hole in a sand mould prepared for it.

Another interesting piece of apparatus was a blowpipe with an air jet coiled round the gas pipe and with a Bunsen burner underneath (fig. 6), so that both the air and gas could be heated at the same

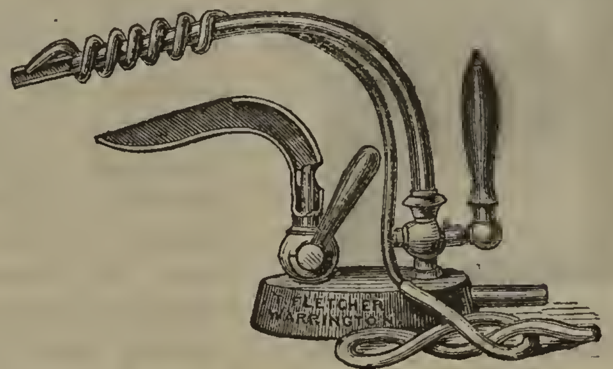


Fig. 6.—Fletcher's Patent Hot Blast Blowpipe.

time; by this blowpipe a heat is obtained far above that required to melt platinum.

A crucible furnace capable of being used as a reverberatory furnace, a muffle furnace, a ladle furnace and several other pieces of apparatus in this exhibit also attracted considerable attention. The peculiar porous clay of which the furnaces are constructed conduces in great measure to their success. This is made by mixing one part of refractory fire-clay with three parts by bulk of sawdust and adding rice-flour paste until slightly cohesive; the mixture is then moulded and burnt in an open kiln until the sawdust is burnt away. A porous material is thus obtained which conducts the heat so slowly that a furnace where the walls are only one inch thick and in which a crucible full of cast iron has just been melted can be taken and carried about with the bare hands. This process has been patented.

The whole of Mr. Fletcher's apparatus exhibited at the Society of Arts was purchased by Messrs. Townson and Mercer, and was exhibited by that firm.

The drying closet devised by Mr. T. E. Greenish, and figured and described before in this Journal, vol. ix., p. 81, was also exhibited in action in this room. In this room also was a small gas burner for shop use, exhibited by Mr. Symes, by means of which a decoction, etc., could be boiled and then kept hot at a lower temperature by turning off four jets of flame and leaving only one burning. A powerful electromotor machine was also exhibited in this room by Mr. Melhado. This machine is sufficiently powerful to drive a sewing machine, but is capable of application to pharmaceutical purposes.

The pharmaceutical apparatus was arranged almost entirely in the larger Examination Room, a few tincture presses, on account of their great weight, being placed in the Entrance Hall, and in the Materia Medica Museum on the ground floor. Mixing machines, tincture presses, and pill-coating machines formed the principal objects in this collection.

Bracher's patent "Desideratum" mixer (fig. 7) consists of a block-tin vessel, in two parts, the upper of which is a sieve, through which the powders are driven by revolving blades, turned by a handle at the top; the lower part also contains revolving blades, which mix the powders after they are sifted by constantly bringing the lowest layers to the surface, and *vice versâ*. In the larger machines the contents are discharged by withdrawing a slide. These machines are stated to be capable of mixing from 50 to over 500 lbs. of powder per hour. The whole apparatus can be easily cleaned.

Fig. 7.—Bracher's Patent "Desideratum" Mixer.

Messrs. J. Baker and Son's mixing machines, although not received until the second day, attracted considerable attention. These machines, or rather two forms of them, were exhibited last year at an evening meeting of the Society. The size stated to be most convenient for retail chemists (fig. 8), which is capable of mixing from a few ounces to 5 lbs. consists of two block-

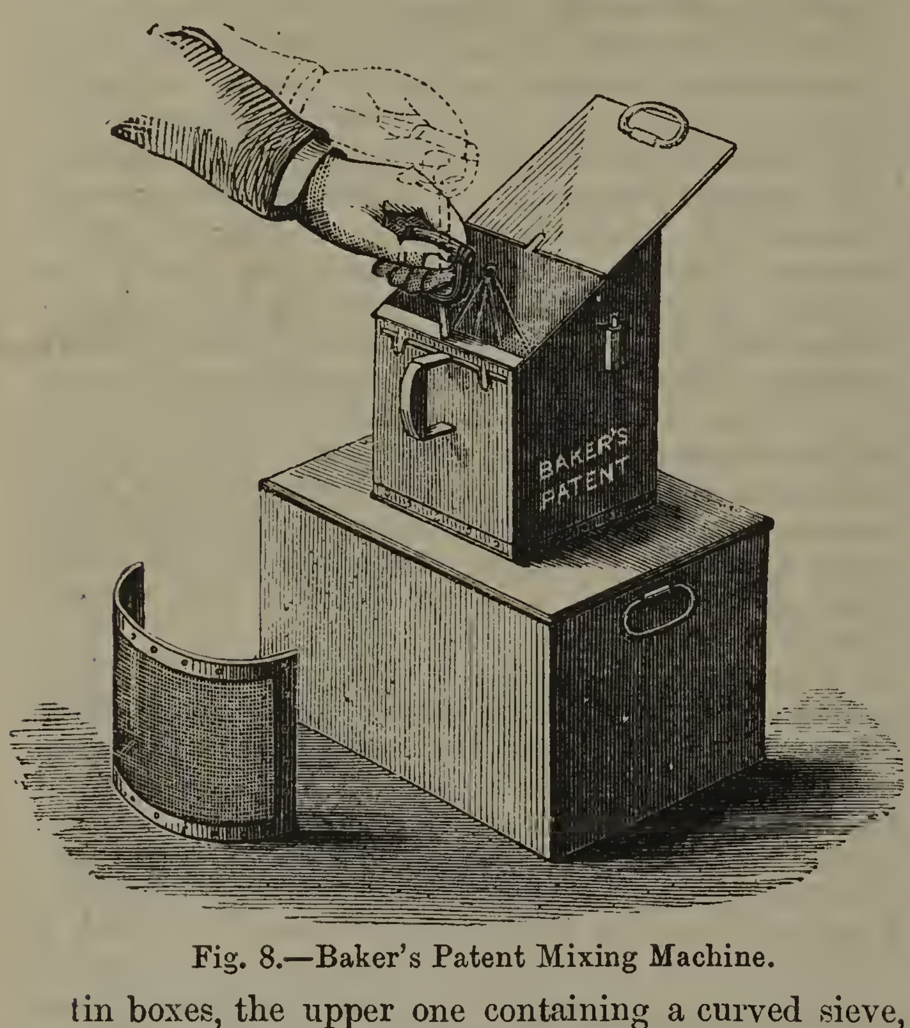


Fig. 8.—Baker's Patent Mixing Machine.

tin boxes, the upper one containing a curved sieve, with a mixer, worked backwards and forwards over its surface by means of a handle.

A much larger machine, of which only a model was exhibited, has a more complex structure, and is adapted for use by either hand or steam power, and is intended for wholesale dealers. This consists of a hopper, in which two mixers revolve horizontally in opposite directions, and thoroughly mix the powder before it passes through into the curved sieve contained in the box below it, the passage of the powder being regulated by a movable slide. Over the sieve two mixers work in opposite directions by an ingenious arrangement connected with the axle, worked by the handle; the powder passes through the sieve into the drawer, and the gritty matter remaining in the sieve can be thrown into another drawer by merely tilting the machine. The sieves can be removed, and finer or coarser ones substituted at will.

Morton's patent liquid mixer (fig 9), intended for emulsions, cold cream, pomades, etc., consists of a cylinder, with a concave base, resting in a water-bath;

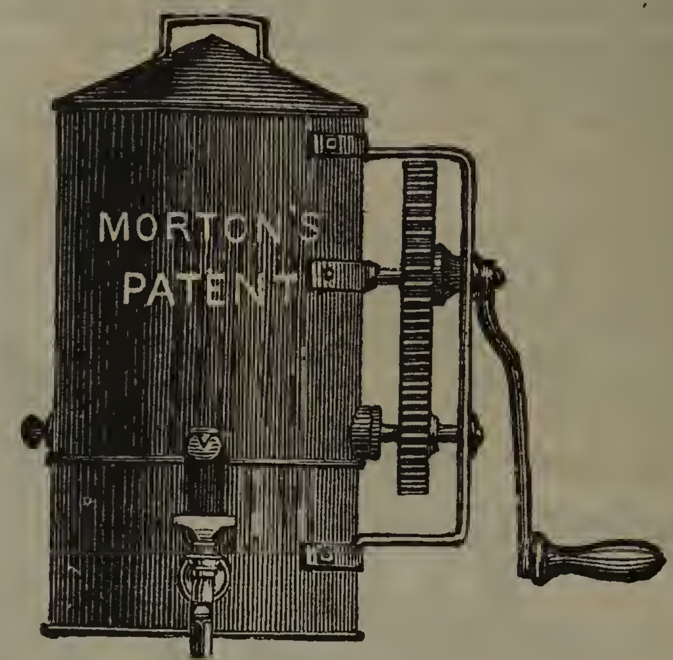


Fig. 9.—Morton's Patent Mixing Machine.

nearly touching the base is a globular mixer, consisting of three row of wires, the inner row of which remains stationary, while the other two work around it, so that the whole of the fluid at the bottom of the vessel is continually kept in motion, instead of merely the central portion, as is generally the case when a fluid is stirred vertically. Both these machines can be taken to pieces and thoroughly cleaned when required.

Faija's patent "Perfect" mixer (fig 10) consists of a

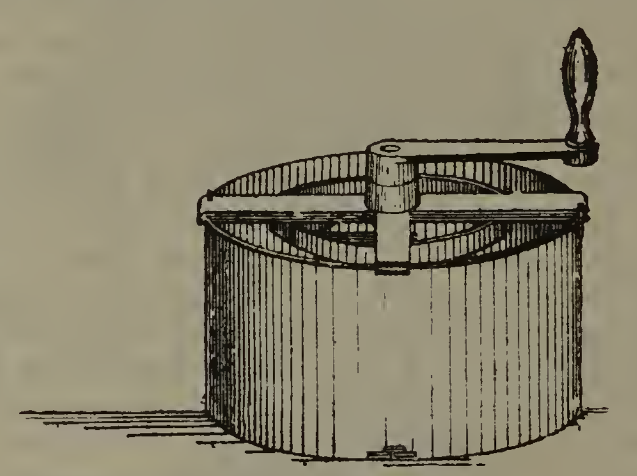


Fig. 10.—Faijas' Patent "Perfect" Mixer.

copper or tinned box with a heavy wooden lid, for use when required, and contains one or more mixers or stirrers, which revolve round the interior in one direction and on their own axis in another. Only two small machines were exhibited, but it is stated by the patentee that a much larger and more complete apparatus is also constructed on the same principle, by which drugs can be ground, sifted and mixed in the same apparatus, the whole being worked effectually by a single handle. The advantages claimed for these machines are superior efficiency, speed and cleanliness, there being no necessity to stop the process in the larger machine in order to remove the powders after mixing. The machine is made to mix up to 2 cwt. at a time.

Pfleiderer's patent mixing machine (fig 11) is intended for mixing pill masses, and masses for horse balls, etc. It consists of a strong metal box, open at the top, with two blades revolving in opposite directions, and bearing some resemblance in shape to the screw of a steam vessel. These blades are revolved by means of two cogwheels turned by a

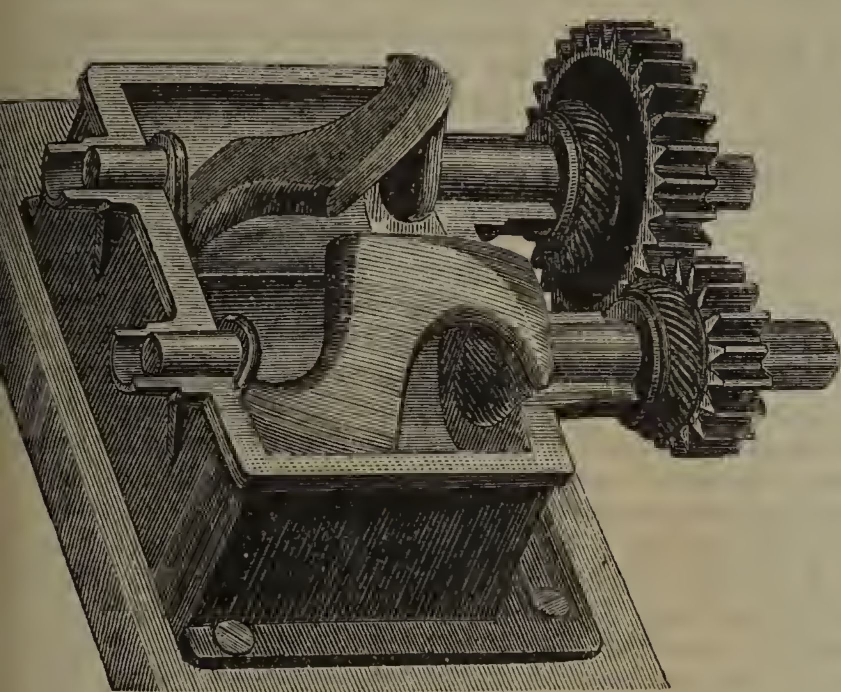


Fig. 11.—Pfleiderer's Patent Mixing Machine.

handle at the side. The whole apparatus can be easily taken to pieces and cleaned.

Messrs. J. Ladd and Co. also exhibited a small tincture press, differing from the ordinary kind in having a shallow inverted conical base (which allows the fluid to drain more readily from the pressed cake), in being enamelled inside, and in having an extra pressing plate for use when the cylindrical strainer is not required. In another one exhibited by the same firm the central screw was driven by turning a handle at the side and the upper part of the press could be pushed on one side so that the cylinder could be emptied without removing it.

Messrs. Lynch and Co.'s tincture press is already well known. In this machine after direct pressure has ceased, extra pressure is put on by a cogwheel turned by a handle at the side. In the Entrance Hall Oberdorffer's and Hayward Tyler and Co.'s tincture presses occupied a prominent position. The latter has already been described and figured in the *Pharmaceutical Journal*, 3rd series, vol. ii., p. 286. The former is constructed on the elbow lever principle, the pressure being applied by straightening two compound or elbow levers, and extra pressure afterwards applied by a vertical lever. This press has an arrangement for heating by steam the plate on which the cake is pressed, a simple lever for tilting the apparatus to admit of draining off the expressed fluid, and a shelf for the receiver to stand upon.

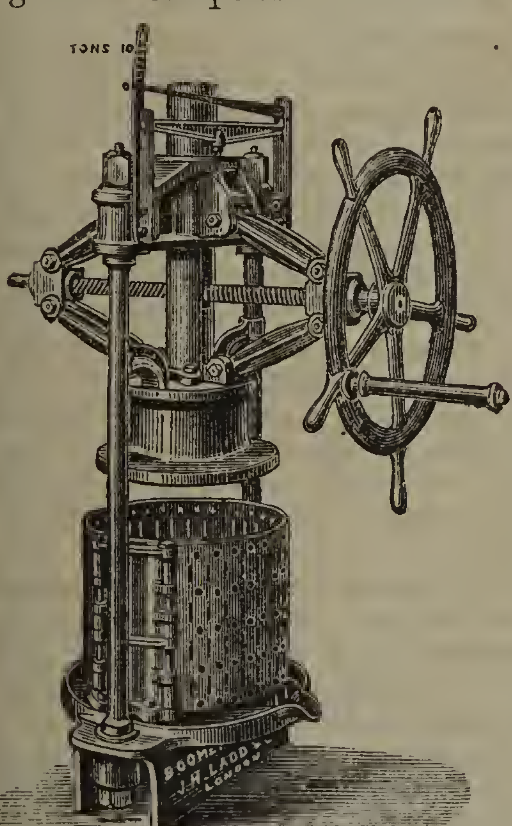


Fig. 12.—The "Boomer and Boschert" Tincture Press.

The "Boomer" press (fig. 12), exhibited by Messrs. J. Ladd and Co., differs from that of Oberdorffer in the fact that the pressure when the elbow lever is straightened is transmitted direct from the base to the apex, while in the other a great deal of the pressure falls upon the pins in the angle of the lever, on account of the connecting block not being, as in the Boomer press, equal in width to the arms of the lever. The pressure exerted by straightening the lever causes a slight deflection in the solid cross bar at the top of the press, a fact which is ingeniously turned to account in the Boomer press to gauge the amount of pressure exerted. A press of 6 gallons capacity is said to exert a pressure of 10 tons when worked by hand.

The small tincture press made by the Enterprise Manufacturing Co., of Philadelphia, and exhibited by Messrs. J. Ladd and Co., attracted considerable attention. In external appearance it somewhat resembles a sausage-making machine. Its structure can be seen from fig. 13. The advantages claimed

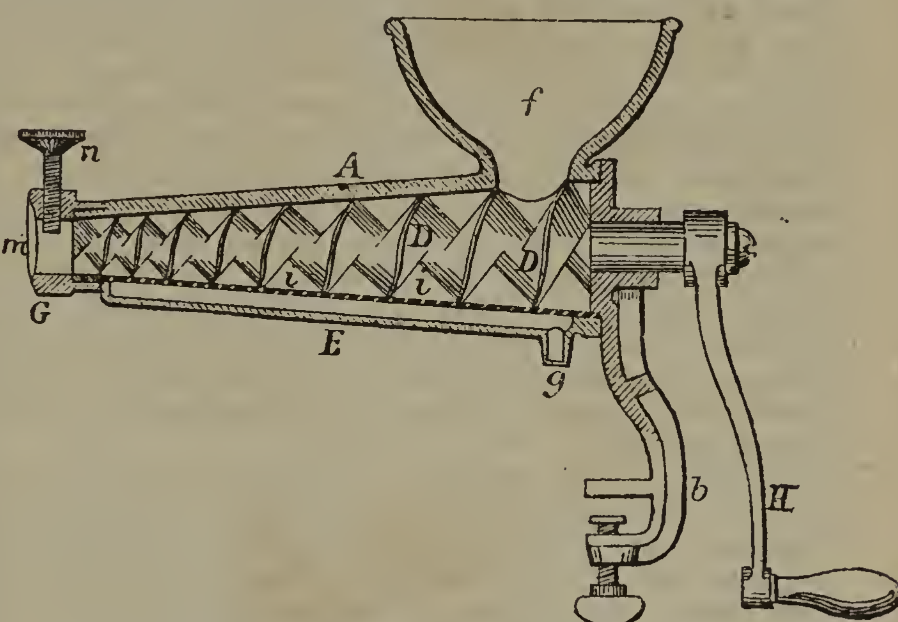


Fig. 13.—The Enterprise Manufacturing Co.'s Screw Tincture Press.

for this press are its adaptability to small quantities of material, the fact that the use of press cloths can be dispensed with, and that the residual cake is delivered uniformly dry, instead of being dry on the surface and moist in the centre. It is said by Professor Remington to be particularly useful for such bulky drugs as arnica flowers, hops, etc., but not so suitable for drugs in fine powder or of a sticky or tenacious character. The spiral screw (D) can easily be taken out and cleaned. The material is prevented from passing through with the liquid by a finely perforated plate (i), lying in a groove at the bottom of the cylinder, and this plate is kept clean by the action of the screw over its surface.

THE DIGESTIVE FERMENTS, AND THE PREPARATION AND USE OF ARTIFICIALLY DIGESTED FOOD.*

BY WILLIAM ROBERTS, M.D., F.R.C.P., F.R.S.

(*Continued from p.* 980.)

Lecture III.

The suggestion to administer to invalids artificially digested food appears at first sight a somewhat startling proposal. So great an interference with the order of nature would seem to go beyond the legitimate province of art. But when we reflect how largely art already interferes in the preparation of our food, the taking of this further step will appear less surprising. The practice of cooking is in reality as complete a departure from the ways of untutored nature as artificial digestion would be.

* The Lumleian Lectures, delivered before the Royal College of Physicians.

Among the almost countless species of animals, not one of them, except man alone, cooks his food; insomuch that man has, not inaptly, been defined as the cooking animal.

Effects of Cooking.—The process of cooking fulfils far more important ends than that of improving the savour of food—far more important even than the mechanical disintegration which generally attends the process. It produces certain chemical changes in several of the most important alimentary principles, which render them incomparably more susceptible to the action of the digestive ferments than in the uncooked state. The discovery of the use of fire-heat in the preparation of his food must, indeed, have constituted one of the earliest and most important steps in the process by which man has emerged from the ranks of the dumb creation. The stores of proteid and farinaceous nutriment contained in the seeds of cereals and leguminous plants, and in the bulbs, tubers, roots, and succulent stems of certain vegetables are, in the raw state, nearly altogether beyond his powers of digestion. By the discovery of the art of cooking, these immeasurable stores were at one stroke laid open to him. It is, moreover, chiefly by the same art that he has been enabled to take his food at intervals, in separate meals; and has thereby been for ever relieved of the necessity which is imposed on all animals in the wild state of having to spend almost the entire of their waking hours either in seeking after their food, like the carnivora, or in consuming their food like the vegetable feeders. This immunity secured to him the untold advantage of possessing the leisure requisite for the cultivation of his higher faculties.

The practice of cooking is not equally necessary in regard to all articles of food. There are important differences in this respect, and it is interesting to note how correctly the experience of mankind has guided them in this matter. The articles of food which we still use in the uncooked state are comparatively few; and it is not difficult in each case to indicate the reason of the exemption. Fruits, which we consume largely in the raw state, owe their dietetic value chiefly to the sugar which they contain; but sugar is not altered by cooking. Salads may be regarded more as a relish for other food, and as having a *quasi* medicinal purpose, rather than as a substantial source of nutriment. Milk is consumed by us both cooked and uncooked, indifferently, and experiment justifies this indifference; for I found on trial that the digestion of milk by pancreatic extract was not appreciably hastened by previously boiling the milk.

Our practice in regard to the oyster is quite exceptional and furnishes a striking example of the general correctness of the popular judgment on dietetic questions. The oyster is almost the only animal substance which we eat habitually, and by preference, in the raw or uncooked state; and it is interesting to know that there is a sound physiological reason at the bottom of this preference. The fawn-coloured mass which constitutes the dainty of the oyster is its liver, and this is little else than a heap of glycogen. Associated with the glycogen, but withheld from actual contact with it during life, is its appropriate digestive ferment—the hepatic diastase. The mere crushing of the dainty between the teeth brings these two bodies together, and the glycogen is at once digested without other help by its own diastase. The oyster in the uncooked state, or merely warmed, is, in fact, self-digestive. But the advantage of this provision is wholly lost by cooking; for the heat employed immediately destroys the associated ferment, and a cooked oyster has to be digested, like any other food, by the eater's own digestive powers.

With regard, however, to the staple articles of our food, the practice of cooking it beforehand is universal. In the case of farinaceous articles, cooking is actually indispensable. When men, under the stress of circumstances, have been compelled to subsist on the uncooked grain of the cereals, they have soon fallen into a state of inanition and disease. By the process of cooking, starch is not merely liberated from its protecting envelopes, but it suffers a chemical change, by which it is transformed into the gelatinous condition, and this enormously facilitates the attack of the diastatic ferments. A change of equal importance seems to be induced in the proteid matter of the grain. I found that the gluten of wheat was incomparably more digestible, by both artificial gastric juice and by pancreatic extract, in the cooked than in the uncooked state. In regard to flesh meat, the advantage of cooking consists chiefly in its effects on the connective tissue and the tendinous and aponeurotic structures associated with muscular fibre. These are not merely softened and disintegrated by cooking, but are chemically converted into the soluble and easily digested form of gelatine. I made some instructive observations on the effects of cooking on the contents of the egg. The change induced by cooking on egg-albumen is very striking. For the purpose of testing this point, I employed the solution of egg-albumen before spoken of, made by mixing white of egg with nine times its volume of water. This solution, when boiled in the water-bath, does not coagulate nor sensibly change its appearance; but its behaviour with the digestive ferments is completely altered. In the raw state, this solution is attacked very slowly by pepsin and acid, and pancreatic extract has almost no effect on it; but, after being cooked in the water-bath, the albumen is rapidly and entirely digested by artificial gastric juice, and a moiety of it is rapidly digested by pancreatic extract.

My object in making these remarks is to show that the changes impressed on food by cooking form an integral part of the work of digestion—a part which we of the human race get done for us by the agency of fire-heat, but a part which the lower animals are compelled to perform by the labour of their own digestive organs. It must also be borne in mind that the digestive process carried on in the alimentary canal is, strictly speaking, executed on a doubling of the exterior surface, and not in the true interior of the body. If we take all these considerations into account, it will appear, I think, not unnatural that we should try to help our invalids by administering their food in an already digested, or partially digested condition. We should thereby only be adding one more to the numberless artificial contrivances with which our civilized life is surrounded.

Preparation of Artificially Digested Food.

Dr. Pavy* was, I believe, the first to carry into actual practice the idea of preparing an artificially digested food. At his suggestion, Messrs. Darby and Gosden introduced a preparation which consisted of meat reduced to a fluid state by artificial digestion. The formula for this preparation has not, so far as I know, been made public. It is still in the market, and is sent out and advertised by Savory and Moore under the title of "Darby's Peptonized Fluid Meat." A specimen of this preparation is on the table before me. It has the appearance of a light brown very thick treacle. It has a strong salt taste and an agreeable meaty flavour, without any bitterness. It is mostly soluble in water. The solution does not precipitate on boiling, nor with nitric acid, and it gives a strong reaction of peptone, with Fehling's solution, and with tannin.

I have also before me a specimen of artificially digested meat prepared by Mr. Benger. It is a greyish-looking extract, with a pleasant meaty flavour, and is quite devoid of bitterness. It dissolves mostly in water, and the solution gives the usual reactions of peptone in great intensity. Mr. Benger informs me that it is made by operating, at a temperature of about 140° F., on finely triturated raw beef with pancreatic extract and a little carbonate of soda. The solution thus obtained is neutralized with hydrochloric acid, and then evaporated at

* 'A Treatise on Food and Dietetics.' Second edition, p. 559.

212° F. to the consistency of a solid extract. Both of these preparations appear to me to be much superior in value to any of the meat extracts hitherto introduced.

But, however useful preparations of this class may prove to be, in a limited range of circumstances, it is pretty evident that, if artificially digested food is to be employed on the large scale, and among all classes, means must be found to bring the preparation of it within the range of culinary operations and the apparatus of the kitchen and sick-room.

The difficulty hitherto encountered in the production of an artificially digested or peptonized* food, suitable for invalids, is mainly owing to the use of the gastric method in its preparation. If you subject any native article of food—say milk, bread, egg or meat—to artificial digestion with pepsin and hydrochloric acid, you destroy more or less completely the grateful odour and taste, and the inviting appearance, which made it desirable as food, and convert it into an unsavoury mess, from which the human palate turns away with disgust. The unsavouriness of artificially digested food is, however, not due to any ill taste or smell inherent in the products of digestion—which, when purified, are both odourless and free from any unpleasant flavour—but to a number of by-products of various kinds, which accumulate as digestion proceeds. One of these by-products is a substance with a pure bitter flavour, which seems to be a constant accompaniment of gastric digestion. It is also developed in some cases in the later stages of pancreatic digestion. I have not observed this bitter substance, except in the digestion of proteids. It is evidently a normal educt of the process, and its presence probably accounts, in most cases, for the bitter flavour of the eructations, of which dyspeptics complain, and which is generally attributed to the regurgitation of bile. If would be interesting to know more about this substance.

My own efforts to produce a palatable peptonized food have been chiefly directed to the pancreatic method. The pancreas excels the stomach as a digestive organ, in that it has power to digest the two great alimentary principles, starch and proteids; and an extract of the gland is possessed of similar endowments. This double power is a manifest advantage in dealing with vegetable aliments, which contain both starch and proteids.

Any extract of pancreas may be used for the preparation of artificially digested food; but the most suitable are those prepared with dilute spirit or chloroform-water. The extract sent out by Mr. Benger, under the name of "Liquor Pancreaticus," is an almost faultless pharmaceutical preparation. It is made by extracting perfectly fresh and finely chopped pancreas, with four times its weight of dilute spirit. By some ingenious devices, Mr. Benger has succeeded in overcoming the mechanical difficulties of the manufacture, and has produced an extract which possesses the diastatic and proteolytic properties of the pancreas in a highly concentrated degree. It is a nearly colourless solution, with very little taste or smell beyond that of the spirit used to preserve it. It is of this preparation that I must be understood to speak in what I have now to say on the production of artificially digested food by pancreatic extracts.

My attention was first turned to the artificial digestion of milk; and I soon found that it was possible, by means of pancreatic extract, to digest this important article of food with comparatively little disturbance of its taste and appearance. Milk contains all the elements of a perfect food, adjusted in their due proportion for the nutrition of the body. Two out of its three organic constituents—namely, the sugar and the fat—exist already in the most favourable condition for absorption, and require little, if any, further assistance from the digestive ferments. It is, therefore, obvious that, if we could change the casein of milk into peptone without materially altering the flavour and appearance of the milk, such a result would go far towards solving the problem of supplying an artificially digested food for the use of the sick.

* I may be permitted to use the word "peptonized" as a convenient abbreviation for the phrase "artificially digested."

Pancreatic Digestion of Milk.

When milk is subjected to the action of pancreatic extract at a temperature of 100° F. (38° C.), in an open glass vessel, a series of changes takes place in it, which are highly interesting to watch. The first thing that arrests the observer's notice is that the tough wrinkled skin, which quickly forms on the surface of warm milk when exposed to the air, is either not produced not all, or is only produced in a very imperfect degree. In its stead, there forms a slight brittle and perfectly smooth pellicle of quite a different appearance. The next thing noticed is that the milk becomes more or less softly curdled. By and by, the curds begin to redissolve, and the milk gradually reassumes its originally diffluent condition. A portion of the curd is, however, very resistent, and remains undissolved for many hours. If the milk be diluted beforehand with one-third or one-fourth of its bulk of water this curdling phase is altogether omitted, or is only observed as a slight and transient thickening. Next follows a very curious change of aspect. The milk loses its glossy white appearance, and gradually assumes a dull yellowish-grey shade which is characteristic, and the degree of which enables the practised eye to judge with considerable precision how far the peptonizing process has advanced. This change of aspect is, however, by no means conspicuous, and would scarcely be remarked in a cursory observation, except by comparison with unaltered milk. While these changes are proceeding, the milk gradually loses its proper flavour, and at length develops a pure bitter taste, which is to many palates not disagreeable. No really unpleasant flavour is produced, unless the process is allowed to go on to incipient decomposition.

The progressive transformation of the casein into peptone, of which these outward signs are the indications and accompaniments, may be followed by testing the milk from time to time with acetic acid. At first, the addition of the acid causes an abundant precipitation of curdy matter, but this reaction progressively diminishes in intensity until at length it ceases altogether. When this point is reached, the transformation may be regarded as complete. All the casein has been changed into peptone—even nitric acid no longer causes a precipitate. The time occupied in the transformation (supposing the temperature and the activity of the preparation to be constant) depends on the quantity of pancreatic extract added, and may be made to vary from a few minutes to several hours. In the ordinary operation of preparing peptonized milk for invalids, two or three teaspoonfuls of the liquor pancreaticus are added to one pint of milk, diluted with a fourth of its bulk of water. With these proportions, the process is usually completed in from two and a half to three hours.

Modified Casein or Metacasein.—The conversion of casein into peptone does not take place by a direct transformation of the one body into the other. You all know that milk does not curdle or coagulate in the least degree on being boiled, but when milk is subjected to the action of pancreatic extract (provided no alkali is added), it speedily loses this negative property and curdles abundantly on boiling. This coagulation on boiling is most intense a few minutes after the addition of the extract, and it very gradually diminishes in intensity as the action goes on, and ceases altogether at the same time that acetic acid ceases to cause a precipitate. It was, moreover, found that if the milk were boiled at the period of the greatest intensity of this reaction and thrown on a filter the whole of the albuminoid matter of the milk was caught on the filter in the form of curds, and the filtrate showed not the slightest reaction of casein. These reactions revealed the interesting fact that in the transformation of casein into peptone by pancreatic extract the first step in the process is the conversion of casein into an intermediate body, and that it is this intermediate body which is subsequently gradually changed into peptone. This body may provisionally be called *metacasein*, signifying thereby that it is still casein, but in a modified condition. Metacasein is characterized by two reactions, which, taken together, serve to distinguish it from other proteid bodies; it is coagulated by boiling in neutral media and it is precipitated in the cold by acetic acid. The conversion of casein into metacasein in pancreatic digestion takes place almost suddenly, as is shown by the following experiment:—5 cubic centimetres of pancreatic extract were added to 100 cubic centimetres of milk, diluted with one-fourth of its bulk of water and maintained at blood heat. The first slight, almost doubtful, evidence of coagulation on boiling was perceived in three minutes; in five minutes coagulation on boiling was pronounced; and in nine minutes it had reached its maximum. From this point coagulation on boiling and precipitation on the addition of acetic acid diminished in intensity *pari passu* very gradually for a period of two hours, when both reactions finally ceased.

Taking these observations and reactions together, it is evident that the conversion of casein into metacasein constitutes a first and distinct step in the transformation of casein by trypsin and that this step is antecedent to the further and slower changes by which metacasein is transmuted into peptone. It is impossible not to see in this a striking analogy with the sudden transformation of gelatinous starch into soluble starch under the action of diastase, as described in a previous lecture.

When milk is rendered slightly alkaline by the previous addition of a little bicarbonate of soda no precipitation on boiling occurs during its digestion by pancreatic extract. But the metacasein is nevertheless produced, and its presence may be detected by carefully saturating the alkali and then boiling. For although metacasein is precipitated on boiling when the solution is neutral it is not precipitated when the solution is even slightly alkaline. This is the reason why in preparing peptonized milk for the sick it is desirable to add to it a small quantity of bicarbonate of soda.

The foregoing account of the behaviour of milk with pancreatic extract will greatly facilitate the comprehension of the practical rules which must be followed in preparing peptonized dishes for invalids. I confine myself at present to articles of which the basis is milk, or farinaceous gruel, or both together.

Peptonized Milk.—A pint of milk is diluted with a quarter of a pint of water and heated to a temperature of about 140° F. (60° C.) Two or three teaspoonfuls of liquor pancreaticus, together with 10 or 20 grains of bicarbonate of soda, are then mixed therewith. The mixture is then poured into a covered jug and the jug is placed in a warm situation under a "cosey" in order to keep up the heat. At the end of an hour or an hour and a half the product is boiled for two or three minutes. It can then be used like ordinary milk. The object of diluting the milk is to prevent the curdling which would otherwise occur and greatly delay the peptonizing process. The addition of bicarbonate of soda prevents coagulation during the final boiling and also hastens the process. The purpose of the final boiling is to put a stop to the ferment action when this has reached the desired degree and thereby to prevent certain ulterior changes which would render the product less palatable. The degree to which the peptonizing change has advanced is best judged of by the development of the bitter flavour. The point aimed at is to carry the change so far that the bitter taste is distinctly perceived, but is not unpleasantly pronounced. As it is impossible to obtain pancreatic extract of absolutely constant strength, the directions as to the quantity to be added must be understood with a certain latitude. The extent of the peptonizing action can be regulated either by increasing or diminishing the dose of the liquor pancreaticus or by increasing or diminishing the time during which it is allowed to operate. By skimming the milk beforehand and restoring the cream after the final boiling the product is rendered more palatable and more milk-like in appearance.

(*To be continued.*)

A VISIT TO THE NATIVE CINCHONA FORESTS OF SOUTH AMERICA.*

BY HENRY S. WELLCOME.

(*Continued from page* 982.)

The older cinchona trees, as found in their virgin forests, are really very grand and handsome.

The cinchonas appear to seek the most secluded and inaccessible depths of the forests for their habitation. They are rarely grouped in large numbers or close together, but are distributed in more or less irregular, scattering patches; sometimes single trees are found widely separated from any others of its family; variety and diversity are notable features of tropical forests.†

The *Cinchona succirubra* ranges from forty to eighty feet in height, trunk straight and branches regular; leaves opposite, evergreen, broadly oval, six to ten inches in length, of a rich dark green colour, sometimes tinged with crimson,‡ the upper surface of an almost waxy lustre, pubescent beneath, finely veined, midrib decided and strong.

The flowers§ have a five-toothed, superior calyx and tubular corolla, are arranged in terminal panicles of bright rose tint and diffuse a pleasing fragrance.

The capsules are ovoid and contain thirty to forty flattened seeds, winged all around by a broad membrane, irregularly toothed and lacerated at the margin.

The bark of the large trees is usually completely covered and fringed with mosses of the most delicate, lace-like texture, interspersed with lustrous variegated lichens and prettily marked diminutive trailing ferns.

Air plants and vines in profusion entwine themselves among the branches and hang in graceful festoons, forming hammocks, in which cluster an abundance of parasitic growths, particularly of the orchid family; these plants cling to every limb and vine, flourishing in their fullest splendour, exhibiting many remarkable phenomena in their curious mimicry of insect and animal forms.|| Vegetable growths develop with wonderful luxuriance beneath the almost dismal shades of the closely interlacing branches, which permit but the faintest rays of sunlight to ever filter through their rich, leafy drapery; everything saturated and dripping with moisture, the very air we breathed seemed a clammy vapour. In these forests the atmospheric changes are continuous and very abrupt; drifting banks of gloomy clouds are followed by glaring sunshine and then tempestuous showers, all in rapid succession.

The temperature is more even, averaging about 65° F., seldom exceeds 80° F., and very rarely falls below 45° F.¶ As stated above, the reflection of the shining leaves and the bright, showy colour of the flowers afford the means of discovering the cinchona trees. When the cascarilleros

* From the 'Proceedings of the American Pharmaceutical Association,' 1879.

† Agassiz once in Brazil counted over one hundred different varieties of trees within an area of half a mile.

‡ The leaves of *Cinchona succirubra* show more red than any other variety. It is due to the larger amount of cinchotannic acid present.

§ At the time of my visit (month of June) none of the cinchonas were yet in blossom.

|| The Indians hold some varieties of the orchids in superstitious regard, on account of the peculiar forms they assume, notably among which is the flower of the Holy Spirit, which appears the very prototype of a dove.

¶ Altitude about 6000 feet.

enter the forests to prospect* for cinchona patches they ascend to such high spurs as command a good view of the surrounding valleys and mountain slopes. Skilled cascarilleros can determine very accurately a paying forest at a great distance, and are usually able to distinguish the varieties by the colour of the flowers and general appearance of the tree. After discovering a forest that indicates sufficient value to render it profitable to work, a certain limit† of forest land is condemned and a claim made to the Government; upon the payment of a certain fee a title‡ is granted. These claims are christened usually with some sacred name, such as Bosque de San Miguel, or Bosque de Sacramento.§ As a rule the bark gatherers are of that happy-go-lucky sort,—very much like our Western miners,||—inveterate gamblers, and while they have money dispense it freely, consequently are "dead-broke" every year long before the bark harvest begins.

After discovering a new forest and securing it with a Government title, the cascarillero applies to a bark dealer for funds with which to work his claim; if he can present satisfactory evidence that his forest is a profitable one, sufficient money is usually advanced to work it, the title being held by the merchant as security and with it an agreement that the bark shall be delivered and sold to him exclusively.¶ Sometimes the dealers purchase claims outright and employ men to work them.

The season for bark gathering begins about the 1st of August and lasts until October or November;** during these months the bark cleaves most readily and the forests are more easily accessible.†† A master cascarillero with his gang of peons‡‡ enters the forest and first establishes a main camp, with bamboo huts for habitation and for sheltering the bark. These camps are located near a spring or river and on an elevated point where there is an opening in the forest, so as to allow the bark as much exposure as possible. Sufficient supply of provisions is taken into the forest to last during the season.§§

The peons are formed into squads, each division being placed in charge of a jefe,|||| who is held responsible for his subordinates. These squads scatter through the forest and establish small camps; when they get fairly settled the bark-gathering begins; one or two from each division seek out the trees, while others cut down¶¶ and peel them. The trees are first decorticated from the ground up as far as can be reached, and then, after felling and removing the clinging vines and mosses, the rough outer bark is beaten off with a club or mallet. The bark is then cut around the trunk in sections of two to three feet and longitudinally in strips of six to eight inches in width, then removed with the blade of a machete. The root-bark is obtained by digging away the earth and cleaving with a machete (the pieces are very rough and irregular).

When first taken from the tree the inner surface of cinchona bark shows a handsome cream tint (with juice of the same colour), but on exposure to the atmosphere rapidly darkens to a dirty red. The blade of a new sheath knife with which I cleaved some bark of *Cinchona succirubra* was stained a beautiful purple colour wherever it was touched by the juice.*

The barks are usually taken to the main camp for drying and storage.

The thick bark of the trunk requires great care in drying because of the excessive dampness of the atmosphere, which sometimes necessitates the use of artificial heat to prevent moulding; it is piled up in tiers with sticks between the layers to allow free circulation of air and weights are placed on top to flatten it.† The thin bark from the young trees and small limbs dries more readily and rolls itself up into quills.‡

One of the greatest difficulties connected with the gathering of cinchona bark is that of transporting it to the coast at the end of the season. It is roughly sorted, according to the part of the tree from which it is obtained, and packed in bales of about one hundred and fifty pounds each; the Indians carry these bales on their backs a distance of sometimes several hundred miles to a transfer warehouse, from whence it can be transported by mules to the nearest seaport.§

The Indians bear the main weight of the burden upon their heads, by placing over the forehead a strip of raw hide to which are attached cords of the same material lashed to the bale. They stoop forward to maintain their equilibrium and use long Alpine staffs to steady and aid them in ascending the dangerous cliffs. The skeletons of hundreds of wretched peons now lie bleaching beneath the tropical sun, their earthly toils having been ended by a mis-step on the verge of a precipice, or by falling victims to the deadly fevers while bearing upon their backs the very specific intended for the relief of the sick in distant lands.

An old Indian, while relating to me the dangers encountered in collecting cinchona bark, said that at the time of the Spanish conquest his people were robbed of their possessions, had since then served as slaves, and are now made human sacrifices to furnish health to the white foreigners.

The malaria in some of the forest valleys is simply fearful, and owing to great exposure and want of nutritious food the Indians yield very quickly to its influence.

I was told by a bark merchant that during a severe malarial season, several years since, as many as 25 per cent. of the Indians employed in one district died from fevers before the harvest was completed.

Malarial fevers are regarded with great terror by the Indians, and it is only by extreme poverty, or obligation as peons, that they are induced to enter the bark forests to encounter the dangers for the meagre pittance of ten to twenty-five cents per day.

* The term prospect is used in the same sense as in the search for mines.

† The boundary is usually indicated by certain mountains, valleys or streams.

‡ These titles are granted on very much the same plan as those upon mining claims in the United States.

§ These claims are each called bosques (forests).

|| Only they lack the energy of our miners.

¶ For many years the bark trade of Bolivia was monopolized by the Government; the cascarilleros were obliged to sell their bark to a bank established for that purpose, and receive for it whatever price the officials chose to pay. This system was conducted with such flagrant injustice and dishonesty that it was finally broken up. Now each of the republics levies a duty on all barks exported.

** In some forests the season begins as early as June.

†† Because of less rainfall during the summer; it is almost impossible to enter the forests during the wet season.

‡‡ Sometimes as many as three or four hundred.

§§ In the older forests potatoes and plantains are grown near the main camp.

|||| Jefe,—pronounced *hefa*,—meaning chief, and sometimes called major-domo. Each squad is allowed to elect its own jefe; the qualifications required for gaining such distinction among their fellows are bravery and superior muscular power.

¶¶ The axes used for cutting down the trees are something of the broad-axe pattern, and are of American manufacture. American edged tools of all kinds receive preference in those countries.

* Caused by the action of cinchotannic acid upon the steel.

† This forms what is known as flat barks—called by the natives *tabla* (which signifies flat).

‡ Called by the natives *canulon*, which means a tube or pipe.

§ The worn appearance of most cinchona barks seen in the market is produced by the rough handling it gets during transportation to the coast.

The final sorting and classifying of barks is done at the main bodegas* at the coast,† where it is packed in ceroons of cowhide‡ or bales of heavy sacking; there it is that most of the adulteration and sophistication is done. The admixture of inferior barks with higher grades is not so much the result of ignorance as has been supposed by many, for the bark dealers are very expert in determining the different varieties and estimating the values of barks; but, strange to say, very few bark merchants ever become wealthy.

(*To be continued.*)

PERSIAN OPIUM.

The following memorandum on the opium of Persia is taken from a report on the trade of the Persian Gulf, by Consul-General Ross:—

For the last two years the Persians have shown unprecedentedly great activity in extending and improving the cultivation and growth of opium in the country. The heavy losses which they suffered on more than one occasion from their badly prepared and adulterated stuff, and the tempting profits which they found were obtainable from better produce, have apparently impelled them to the course now taken. While a few years ago a case of Persian opium weighing 18 tabreez mans (or 140 lbs.) would not fetch in China more than 280 to 350 dollars, it has recently realized from 500 to 615 dollars. This change cannot, of course, be attributed altogether to the improvement in the quality of the Persian drug, as prices are regulated mainly by the state of the Indian produce and by the demand in the China markets. The Bengal and Malwa crops failed in the last two years owing to drought and other circumstances, and the limited out-turn, coupled with heavy speculation, tended towards the increase of prices. The prospect of the crops of the current year is said to be favourable, but the trade in opium is not expected to be very remunerative.

To return to the Persian opium. From the time the attention of the native merchants was attracted to the trade in this article, about twenty-five years ago, there has been, with two or three exceptions, a gradual annual increase in the production of the drug. But this increase has never before been so very considerable as to become prominently noticeable.

It was reported in 1859 that about 3000 "shah mans." or 300 cases of opium, were produced in Persia; and in 1861 that about 10,000 "shah mans," or 1000 cases, were expected to yield from the crops of the year, a quantity which was then noticed to be double the out-turn of the previous year.

In the trade report of this Residency for the year 1874–75 the fluctuations of the annual estimated produce of opium in Persia from the year 1868–69 to 1874–75 were shown in a tabular statement attached to a special report on the subject. The largest produce for any one year did not exceed 2600 cases (a quantity inappreciably small in regard to the demands in China), and in 1874-75 it had fallen to some 2000 cases. In the following year there was a further decline, the exports amounting to about 1890 cases. Since 1876-77, however, a reaction appears to have taken place, as in that year 2570 cases were exported from Bushire and Bunder Abbass alone.

In the early part of 1877-78 the probable yield of the crops was estimated at 3500, but the actual number exported from Bushire and Bunder Abbass amounted to 4730 cases.

* Storehouse.

† In Bolivia the sorting and packing is usually done before transporting to the coast.

‡ The ceroon consists of a closely packed bale sewed up in cowhide (hair side out). The hide having first been rendered soft and elastic by soaking in water, on drying it shrinks and forms a very strong and firm package.

Last year (1878–79) the out-turn was stated to have been 6700 cases, while 5900 were exported from these ports.

The probable yield of the crops of the current year, 1879–80, is at present estimated to be as follows:—

	Shah Mans.	Cases.
In Khonsar, about	14,000	950
Kerman	4,500	300
Yezd	15,000	1,000
Ispahan	37,000	2,400
Nereez	6,000	400
Shiraz	20,000	1,300
Kazran	1,500	100
Shuster	1,500	100
Total	99,500	6,550

In addition to the above 6550 cases of opium, about 3000 "shah mans," or say 550 cases, are expected to come to Yezd from Herat, making the whole stock about 7100 cases. The Shuster opium is sent through Mohammerah direct, and sometimes *viâ* Bushire to Mussat, for transmission to Zanzibar; but a part of it is supposed to be smuggled into the Indian frontier provinces, *viâ* Mekran and Beloochistan. Thus 7000 cases are expected to be available during the current year for export through Bushire and Bunder Abbass to China and England.

Small quantities of opium are said to be grown in Tehran, Tabreez and Kermanshah, but these mostly find their way to Europe *viâ* Turkey, Smyrna being, it is alleged, the port where it is mainly taken to and where it is mixed with the local drug and forwarded to the continental markets.

Opium is made up into cakes, varying in weight from $\frac{3}{4}$ lb. to $1\frac{1}{2}$ lb., and in number from 96 to 192 or more; and these are packed in fig or vine leaves, and sometimes in poppy seeds or stalks, into cases containing each from $10\frac{1}{2}$ to 11 "shah mans"—a "shah man" being equal to about $13\frac{1}{4}$ lbs. English.

The object in so packing in cases as regards the weight is that the contents, after the deficiency caused by drying up in course of transit, which is calculated at from 5 to 10 per cent., may realize at destination (China) one "picul," which is about 135 lbs. Another reason is that the weight is arranged for convenience of carriage by pack animals (generally mules) employed in these regions.

About five-sixths of the produce of opium in Persia is intended for China. The drug suitable for that market being required to be fine, and prepared with oil, and not rich in morphia, permits its being swelled up with foreign substance, and thus being, as far as practicable, adulterated to the extent to preclude discovery by the mode of testing or "touching" used in China.

It is said that pure and superior opium, though not so finely manipulated, has been rejected in China, while the fine opium containing admixtures has found favour and fair market.

The preparations made for the China marts—being, say, of a quality of 80 "touch" (containing 80 per cent. pure juice and 20 per cent. foreign substance)—yield from 9 per cent. to 10 per cent. morphia.

The preparations for England, which have recently been specially made pure and which have come into favour in Europe and America, have, it is said, yielded morphia averaging about 12 per cent.

The average price for fair quality of opium suited for the China market has been for the last two years about 950 rupees per chest, and for the special preparations for England about 100 rupees more.

To these are added the charges of transit and other contingent expenses from the place of product to the port of shipment, amounting to about 30 rupees, and, further, a custom and octroi or other duty of about 20 rupees, payable by a Persian, or 5 per cent. *ad valorem* by a British or other foreign merchant.

The Pharmaceutical Journal.

SATURDAY, JUNE 12, 1880.

THE LAW AS TO THE MANUFACTURE AND SALE OF METHYLATED SPIRIT.

AMONGST the Parliamentary papers issued during the present week is a "Bill to consolidate and Amend the Law Relating to the Manufacture and Sale of Spirits," prepared and brought in on behalf of the Government by Lord FREDERICK CAVENDISH, Mr. Attorney-General and Mr. Solicitor-General. As indicated by its title, the principal object of this Bill appears to be to gather together into one enactment the legislation on the manufacture and sale of spirit, which is now scattered through upwards of twenty different Acts of Parliament, and incidentally many points of considerable interest to chemists and druggists are dealt with.

The Bill is divided into three parts. Part I. is devoted to spirit other than methylated, and specifies the conditions and restrictions under which the businesses of distilling, rectifying and brewing can be carried on, and also the regulations for warehousing. It further re-enacts the existing provisions as to dealers and retailers of spirits and the permits and certificates and stock books necessary for the dealing in and removal of spirit from one place to another.

Part II. relates to methylated spirit, and as this is a subject concerning which inquiries are frequently made it may be useful to describe the scope of this part of the Bill in greater detail.

Methylated spirit, subject to the provisions of the Act, is still to be exempt from duty. The only persons allowed to methylate spirit, however, are such distillers and rectifiers as are specially authorized by the Commissioners of Inland Revenue, persons licensed to methylate, and persons called "authorized methylators." The only persons permitted to supply methylated spirit are "authorized methylators" and licensed "retailers of methylated spirit." An "authorized methylator" must not supply methylated spirit except in vessels containing not less than five gallons, distinctly labelled with the words "methylated spirits," and accompanied by a permit, and the sale, delivery and removal of the spirit have to be carried out in accordance with forms prescribed by the Excise authorities. Neither may he supply methylated spirit to any persons other than "retailers," those who are themselves authorized to methylate, and persons specially authorized by the Commissioners, upon application and giving security, to receive methylated spirit for use in some art or manufacture carried on by them. On the other hand, "a retailer" of methylated spirit must not sell to or for the use of any one person more than one gallon of methylated spirit at a time. Neither must he receive or have in his possession at one time a greater quantity than fifty gallons. He may receive this quantity from an "authorized methylator," but from another "retailer" he must not receive it in quantities exceeding a gallon at a time. "Authorized methylators" have to carry on the methylation and store the spirit in rooms approved by the Commissioners, and "retailers" have to keep the Commissioners informed as to the places where they keep and sell the spirit, and both have to keep a strict account of stock and sales. Any person, not being an "authorized methylator," having in his possession any methylated spirit not obtained from a person authorized to supply it, will be liable to a fine of £100. The removal of methylated spirit in contravention of the Act, and the supply of it by "authorized methylators" to improper persons are offences also liable to heavy penalties. Indeed, it need hardly be said that all the provisions are similarly guarded.

The only forms in which spirit may be used for methylating are as plain spirit of strength not less than 50 per cent. above proof, and rum of strength not less than 20 per cent. above proof, and the quantity of spirit used for methylation at one time is in the case of British spirit to be not less than 450 gallons, and of foreign spirit in an excise warehouse the contents of the cask in which it is imported. The substance mixed with spirit for the purpose of methylation must be wood naphtha, or methylic alcohol in the proportion of not less than one-ninth of the bulk of the spirit, or some other substance approved for the purpose by the Commissioners of Inland Revenue. But, before methylating, the substance intended to be used must be examined and approved by an officer appointed for the purpose, and the whole of the operation is carried on under stringent regulations.

The precautions against the improper use of methylated spirit are contained in the latter clauses of Part II. It is provided that any person who prepares or attempts to prepare methylated spirit for use as a beverage, or as a mixture with a beverage; or who sells any methylated spirit, whether so prepared or not, as or for or mixed with a beverage; or uses any methylated spirit or any derivative thereof in the preparation of any article capable of being used wholly or partially as a beverage, or internally as a medicine; "or sells or has in his possession any article in "the preparation of which methylated spirit or any "derivative thereof has been used," will be liable to a penalty of £100 and forfeiture. But nothing in this section is to apply to the use of methylated spirit or a derivative in the preparation of sulphuric ether or chloroform, for use as a medicine or in any art or manufacture, or prevent the sale or possession of sulphuric ether or chloroform for such use.

When gum resin has been mixed with methylated spirit it will be penal to separate it or to alter the article in any way except by the addition of more resin or a simple colouring matter. Any liquid containing methylic alcohol so purified, by filtration or otherwise, as to be free wholly or partially from any flavour or odour that would otherwise pertain to it, is to be deemed low wine prepared for the purpose of distilling spirit from it, and to be chargeable with duty accordingly. This provision may, however, be modified or dispensed with at the discretion of the Commissioners.

Part III. is supplemental, and contains nothing calling for remark here except that SYKES's hydrometer is still to be used for deciding the spirit strength of liquors according to a table forming one of the Schedules of the Bill.

THE POSITION OF CHEMISTS AND DRUGGISTS IN REGARD TO THE WEIGHTS AND MEASURES ACT.

WE have much pleasure in directing attention to Mr. HAYDON's letter on this subject, in which he joins his efforts with our own in seeking to impress upon chemists and druggists the desirability of bringing themselves into conformity with the provisions of the new Weights and Measures Act.

There is, however, one point in which we think somewhat differently from Mr. HAYDON as to the proper course to be taken, and that has reference to communications with the local inspectors in various districts. As a rule, we should be rather disposed to recommend avoidance of any communication with those officials, not out of any disrespect for them in their proper capacity, but because in many cases they have no authority to deal with apothecaries' weights and the measures used by chemists and druggists, and, as has been found in most cases, they are only able to say they have no instructions, or that they expect in a short time to receive them. By applying to the inspectors on this subject they are really put in a false position, and in regard to the object in view it appears to be the very last thing that should be done.

To put into words the object which we think desirable for chemists and druggists to secure in regard to the Weights and Measures Act, it is that they should be in a position to receive the visits of the local inspector without fear of being subjected to inconvenience by reason of having in their possession apothecaries' weights and glass graduated measures that are not correct or are not stamped as the Act requires.

One way of securing this object is to purchase new sets of weights and measures that have been verified and stamped for the sellers. This has we know been done in many cases, and it is a very effectual plan so far as inspection is concerned, for the Act provides that a weight or a measure stamped in accordance with the requirements of the Act is to be regarded as a legal weight or measure throughout the United Kingdom.

Still some persons may be disinclined to go to the expense of discarding all their apothecaries' weights and graduated measures, and replacing them by new ones already verified and stamped. We can imagine such objections being made with good reason; but we do not think that under such circumstances there need be any fear of becoming liable under the Act, and to obviate such a contingency we would suggest that the chemists and druggists of any one of the towns or districts specified in the Weights and Measures Act should address themselves collectively or individually to the corresponding local authority, stating that they are desirous of placing themselves in conformity with the law and require to have their weights and measures verified and stamped.

Whatever might be the result of such an application we believe that it would have the effect of protecting those who made it from vexatious prosecution. At any rate it would be evidence that an attempt had been made to comply with the requirements of the Weights and Measures Act. As the local authorities are for each town or district the only persons who have power to take the initiative in putting the Act into operation, and to provide the means as well as lay down the regulations by which that is to be done, it is with them that the responsibility lies of seeing that chemists and druggists are furnished with due opportunities for satisfying its requirements.

We think it is a great mistake to trust, as so many seem disposed to trust, to the inaction of the local authorities, because there is no knowing how long that may last, and after being lulled into a false security in that way chemists and druggists might suddenly find themselves in a position of much difficulty. Even supposing their apothecaries' weights and graduated measures to be correct they would still be liable to a penalty if those weights and measures were not duly stamped, and they have reason for complaint against the local authority of their town or district so long as they are unprovided with the means of obtaining verification of their weights and measures.

We believe that it is equally a mistake to suppose that because the Weights and Measures Act does not contain any provision for penalties in the event of any local authority failing to carry it out, the Act may be looked upon as one of a merely permissive character, so that, if the local authorities be inclined to remain inactive, the Act may be disregarded altogether as not deserving any attention. Those who will take the trouble to read the Act will perceive from its language that it is not by any means permissive, but that the duties assigned to the local authorities who are empowered to carry it out are assigned to them as obligations which they shall perform. There is no evidence of the Act being intended to remain a dead letter, and we have no doubt that if the absence of provision for penalties in case of non-performance of duties appertaining to local authorities were to have the effect of making it so to any extent, this defect would speedily be remedied by further legislation.

Provincial Transactions.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The annual meeting of this Association was held at the Flying Horse Hotel, Nottingham, on Tuesday, June 1, Mr. R. Fitzhugh, F.C.S., the President, in the chair. The gathering was a very good one, a fair number of members being present, together with a few visitors.

The minutes of the last meeting having been read and confirmed, and Mr. C. Fletcher having been unanimously elected a member,

The Honorary Secretary proceeded to read the annual report, which was as follows:—

Annual Report.

In presenting their annual report the Council have pleasure in congratulating the members on the continued prosperity of the Association, and on the better attendance at the general meetings during the session. There are now fifty-five members and twenty-five associates against fifty-nine members and twenty-six associates last year, and the Treasurer has a balance in hand of £51 17*s.* 9*d.* The Council have to regret the loss of two old members of its body by death during the past year.

Six meetings have been held during the session, four general ones and two social ones for members only.

At the inaugural meeting the President presented the prizes to the successful associates in last session's classes on materia medica, the recipients being Messrs. Talbot, Gill, Hare and Granger, and then delivered his address, in which he spoke principally of the advantages of education to the chemist, and the relationship between masters and apprentices.

The second meeting was for members only, and the subject discussed was "The Present Aspect of the Drug Trade," ably introduced by Mr. Bolton. At the third meeting, Mr. H. Major, B.A., delivered a most interesting and instructive lecture on "Earthquakes and Volcanoes." Mr. F. H. Spenser was the lecturer at the fourth meeting, when the subject was "Sound," illustrated by numerous experiments, which was treated in a most interesting manner by the lecturer. The next meeting was a social one, and the subjects discussed were "The Present Rates Charged for Carriage of Goods;" "The Thursday Afternoon Closing Movement," and a letter from the Manchester Chemists' Association relative to the sale of patent medicines containing poisons by unregistered chemists. A sub-committee was appointed to make inquiries about the high rates charged for carriage of drugs with a view to their reduction, and a resolution was passed asking the Council of the Pharmaceutical Society to use their influence to amend that portion of the Pharmacy Act of 1868 which excludes proprietary medicines from its operations. The meeting was very divided in opinion about the Thursday afternoon closing movement, and although a vote was taken on the subject it was understood to be merely an expression of opinion, and no decision was come to.

At the sixth meeting Mr. Rayner read a paper on "The Health of the Drug Trade," being some observations on a recent correspondence in the *Pharmaceutical Journal*, on the longevity of chemists, in which he expressed a very strong opinion that chemists as a body are as long lived as any other trade.

Prizes were offered by Mr. Atherton, F.C.S., and Mr. W. Widdowson, for the best essay by the associates. The subject chosen for competition was "The Art of Dispensing." Nine students entered, and the winners of the prizes were Mr. Judge and Mr. Gill.

The Council arranged with Mr. Reuben Widdowson to give a course of lectures on "Inorganic Materia Medica and its Chemistry" to the associates. Only a very small number entered for the course, but the Council are pleased to notice that the attendance was extremely regular and the attention and general conduct very good.

An examination has recently been held and the prizes offered by the Council will be presented to the successful associates at the inaugural meeting next session.

In accordance with the wish expressed at the last annual meeting, the Council made application for a room at the new University Buildings, and for the use of the laboratory. Some correspondence has taken place on the subject with the Town Clerk, but the University Buildings Committee have not yet come to any decision. In view of the likelihood of having a room, where the library and museum may be permanently located, the Council have not deemed it expedient to expend any of the funds in increasing either, but would recommend their successors, in the event of the application being successful, which they have every reason to hope will be the case, to make such increase as may serve to uphold the position of the Association and be of benefit to the members and associates.

The library has been fairly used during the session, and with one or two exceptions the books are in a satisfactory state.

The annual supper was held at the Flying Horse Hotel in January, and it is almost unnecessary to say was a thoroughly enjoyable evening.

Mr. Wilford, on behalf of the Auditors, then presented the Treasurer's report, and upon the motion of Mr. Lewis, seconded by Mr. Clarke, both reports were received and adopted.

The meeting then proceeded to appoint the officers for the ensuing session, with the following result:—Mr. R. Fitzhugh, F.C.S., was re-elected President; Mr. W. H. Parker, Vice-President; Mr. J. Rayner was re-elected Treasurer, and Mr. C. W. Warriner, Honorary Secretary, in the place of Mr. Robert Jackson, who has been compelled to resign on account of his leaving the profession. Messrs. F. White and J. Lewis were appointed Auditors.

Fifteen gentlemen were nominated for the Council; the ballot was taken with the following result:—Messrs. Beverley, Bolton, T. B. Fletcher, Humphreys, Jackson, Oldershaw, W. Widdowson and Wilford.

A hearty vote of thanks was accorded to the retiring officers for their services during the past session, for which the President briefly thanked the members present on behalf of himself and his colleagues.

Mr. Fletcher suggested that non-members should be admitted to the social meetings, and after a short discussion, the President thought that would be met by Byelaw 10, which says that each member may introduce two friends.

Mr. W. H. Parker then introduced the subject of the Thursday half-holiday closing movement, mentioning that the chemists at the West-end had already commenced to close from one o'clock until six in the evening. This was supported by Mr. C. Fletcher, who remarked that no decrease in business had taken place on that day in consequence. After a lengthy discussion in which Messrs. Warriner, Humphreys, Bolton, Clarke and Jackson took place,

Mr. Rayner proposed, and Mr. Warriner seconded:—"That a special meeting of the trade be called to discuss the question of the half-holiday closing movement," which was carried.

The President then rose and stated that he had a most pleasant duty to fulfil. In consequence of the retirement of their late energetic Honorary Secretary, Mr. Robert Jackson, the Council thought that in recognition of his valuable services for the past five years to the Association and the trade generally, some suitable mark of respect and esteem should be made to him, and he was happy to say such feeling was endorsed by the whole Association with the exception of two or three members, and the result was the handsome testimonial before them. The President in a graceful and appropriate speech, then in the name of the Association presented Mr. Robert Jackson with a handsome timepiece and liqueur cruet, the former having upon it a plate bearing the following inscription:—"Presented to Mr. Robert Jackson by the Nottingham and Notts Chemists' Association, as a recognition of his useful and energetic services as Honorary Secretary to their Society for a period of five years. Nottingham, June 2, 1880." He said that in losing Mr. Jackson the Association was losing a member who had thoroughly had its interest at heart, and who for five years had been untiring in the discharge of his duties as Honorary Secretary, and for the past eleven years had been an active member of the Association.

Mr. Jackson then responded and heartily thanked the members of the Association for their kind testimonial and high appreciation of his efforts, feeling personally that he had not merited it, but assuring the members that so long as he should live and especially while he remained in Nottingham, the welfare and success of the Association and of the private members of the trade generally would always be dear to him, as amongst them he had spent some of the happiest hours of his life.

A hearty vote of thanks to the President concluded the meeting.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, June 3, Professor H. E. Roscoe, President, in the chair.

The President announced that a ballot would take place at the next meeting of the Society, on June 17. The following certificates were read for the first time:—J. K. Crow, A. G. Chamberlain, H. A. Mott.

The President then called upon Mr. W. H. PERKIN to read a paper—

On Some Products of the Oxidation of Paratoluidine.—In a previous paper on mauvein, *Journ. Chem. Soc.*, 1879, 728, the author briefly referred to some experiments on the oxidation of paratoluidin by chromic acid. The present paper continues the study of this reaction. A solution of the sulphate of paratoluidin was mixed with a solution of potassic dichromate. After twenty-four hours a large quantity of a brown precipitate formed; this was collected, washed, dried and extracted with benzene. The benzene was coloured a rich orange-red, and on evaporation furnished a red crystalline product. After a great deal of trouble and many recrystallizations this was separated into two new bases, one less soluble than the other. The least soluble gave on analysis numbers indicating the formula C_7H_7N. Its crystalline form has been described and figured by Mr. L. Fletcher. The substance melts at 216° to 220°; it crystallizes in beautiful rhombohedral, garnet-red crystals from benzol and ether. It readily dissolves in alcohol acidified with hydrochloric acid, forming a brownish-red solution, changing to a red-purple. With concentrated sulphuric acid this substance assumes a magnificent blue colour. A platinum salt was formed, indicating as the formula for this substance $C_{21}H_{21}N_3$. It is designated by the author triparatolylenetriamine. The more soluble base was also obtained pure after much trouble. Analyses indicated the formula $C_{28}H_{27}N_3$. It may be derived from the preceding substance by replacing one atom of hydrogen by tolyl, and is therefore designated tolyltriparatolylenetriamine. It melts about 175° C. and dissolves in alcohol acidified with acetic acid with a purple colour. It separates from its ethereal solution in small, flat, prismatic crystals. It is an organic base, forming easily decomposable salts. In concentrated sulphuric acid it dissolves with a dull violet colour, quickly changing to a pale yellowish-green. A platinum salt was prepared and analysed. No special advantage was obtained by substituting acetic for sulphuric acid in the oxidation process. By using a solution of paratoluidin in glacial acetic acid and a solution of chromic acid in the same solvent a different reaction was obtained. Golden yellow needles were deposited which when purified proved to be parazotoluene, and fused at 143°.

Dr. DUPRÉ then read a paper—

On the Detection of Foreign Colouring Matters in Wine.—In January, 1876, the author proved that the true colouring matter of wine dialysed very slowly (*Analyst*, ii. 26 and xi. 186), while the various colouring matters said to be used in adulterating wine dialysed freely. Also that small cubes of jelly, ⅝" in the side, cut from a plate of jelly with a wet knife could be used with great advantage in the analysis, as follows:—Such a cube immersed for a definite period in the wine is taken out, washed with a little water and a central slice cut out; if the wine is pure it will be found that in twenty-four to forty-eight hours the colour has penetrated but a very little way in the cube, whereas many colouring matters will have reached the centre. Since then the author has extended his researches and the present paper gives an account of experiments made with many colouring matters as above described. The results confirm those already obtained. The colouring matter of pure wine dialyses very slowly. The only artificial colouring matter tried which does not dialyse quickly is that of alkanet root. Althæa, beet, bilberry, Brazil wood, carnation, cherry (red and black), clematis (purple), cochineal, cranberry, currant (red and black), elderberry, indigo, litmus, logwood, mallow, raspberry, red cabbage, red poppy, rhatany root, rosanilin, saffron and strawberry all dialyse and penetrate rapidly into the jelly. Alkanet can be readily distinguished from the colouring matter of wine by giving an absorption spectrum of three bands in acid solution. Ammonia changes wine colouring matter to greenish-brown, which gives one indistinct absorption band in the yellow. Alkanet is turned blue and gives two absorption bands. The nature of the colouring matter can often be detected by the colour of the gelatin cube, *e.g.*, indigo, logwood, etc.; if not, it is best to dialyse the wine through parchment paper and then apply the tests suggested by Gauthier and others to the dialysate. The cubes of jelly are cut from a jelly containing 10 per cent. of dry gelatin, to which it is preferable to add 10 per cent. of glycerin.

The President asked if Dr. Dupré could account for the non-diffusibility of the colouring matter—whether it was of an albuminous nature?

Dr. Frankland suggested that the colouring matter might be in suspension; that it did not subside was no evidence against this view, as gold had been obtained by Faraday in a state of suspension so fine that it did not settle after many years' standing.

Professor Emerson Reynold asked if the age of the wine did not alter the dialysing power of the colouring matter.

Mr. Page suggested as a substitute for the sheets of paper stretched on hoops usually employed in dialysis, tubes made of parchment paper, which could be obtained of almost any length, and were very convenient, as no joint had to be made. They could be obtained from K. Brandegger, Elwangen, Würthemburg, at 4s. to 5s. the 100 metres.

Dr. Dupré, in reply, did not think that the colouring matter was albuminous, but that it resembled somewhat a tannin. In his opinion the colouring matter was not in suspension, in proof of which it did not colour the must until sufficient alcohol had formed to bring it into solution. He had examined 1834 port and two year old port without detecting any difference in the dialysing power of the colouring matter.

On the Action of Organozinc Compounds upon Nitrites and their Analogues. I. Action of Zinc Ethyl on Azobenzene. By E. FRANKLAND and D. A. LOUIS.—When azobenzene is added to an ethereal solution of zinc ethyl, and the mixture warmed to the boiling point of the ether, a reaction commences, accompanied with the evolution of much gas; as soon as it ceases it can be continued by adding a fresh quantity of azobenzene, and so on until the reaction becomes sluggish, care being taken to employ an excess of zinc ethyl. An amber coloured jelly was thus obtained. It was decomposed by water, much gas being evolved; a reddish-brown oil separated out with the zincic hydrate. By treatment with caustic soda the zincic hydrate was removed. The oil thus obtained was purified, and proved by analysis, etc., to consist mainly of anilin. The gas evolved during the reaction consisted of three volumes of ethylene and one volume of ethylic hydride. From 80 grams of azobenzene 70 grams of anilin were obtained. Besides the anilin a small quantity of a high boiling point viscid oil was obtained, the investigation of which is not yet complete.

II. On the Action of Zinc Ethyl upon Benzonitrile. By E. Frankland and J. Castell Evans.—Equal volumes of zinc ethyl and benzonitrile were heated in a sealed tube to 150°. On cooling the contents solidified to a brownish mass. After treatment with alcohol and hydrochloric acid white needles remained, sparingly soluble in alcohol, but dissolving readily in carbon disulphide, fusing at 229°. By analysis, etc., this substance was proved to be cyaphenine, $C_{21}H_{15}N_3$. The above reaction also takes place under ordinary pressure. On heating cyaphenine with concentrated hydrochloric acid in a sealed tube to 250° it can be converted entirely into benzoic acid and ammonia. The liquid obtained by treating the product of the zincethyl reaction (after decomposition by alcohol) with hydrochloric acid deposited on standing faintly greenish six sided plates. These, after purification, gave numbers indicating the formula $C_{17}H_{21}N_2Cl$. A further investigation of this hydrochlorate, which fuses at 257°, is promised. The gas evolved during the action of zinc ethyl on benzonitrile consisted of equal volumes of C_2H_4 and C_2H_6.

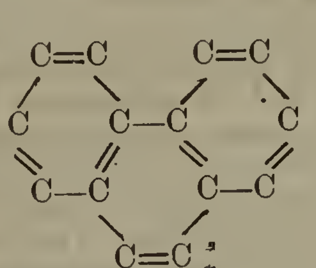
Dr. Armstrong suggested that it would be better to get rid of such terms as ethylic hydride. The researches of Dale and Schorlemmer had proved that there was no difference between ethane and ethylic hydride, moreover, the latter name suggested a distinction between one atom of hydrogen and the other atoms of that element, which did not exist.

Dr. Frankland quite agreed with Dr. Armstrong as to the desirability of abolishing the term if the identity of the two substances was fully proved, but in his opinion it was necessary to be very careful in abolishing an idea because it did not conform to the theories of the day. He quite admitted that Schorlemmer had proved the identity of a fraction of the products of the action of Cl on the two gases, but nothing had been done with the remainder of the products. He had waited for several years for any further investigation of the subject and at last had determined to take up the question himself.

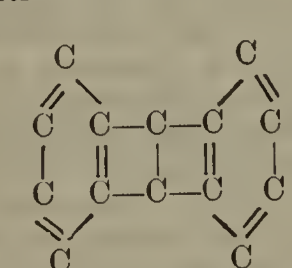
Dr. Japp contended for the convenience of the term methylic hydride, irrespective of the question of isomerism, as in Butlerow's reaction.

Professor Hartley then read a communication—

On the Relation between the Molecular Structure of Carbon Compounds and their Absorption Spectra.—In a previous paper in which the author was associated with Professor A. K. Huntington, it has been shown (1) that every increment of CH_2 in a homologous series of alcohols or of acids effects an absorption of the more refrangible of the ultra-violet rays, so that the greater the number of carbon atoms in the molecule, the shorter is the transmitted spectrum. (2) That the terpenes always transmit continuous spectra, but polymerization largely increases their absorptive power. (3) That benzene and its derivatives invariably show, in addition to abnormally great absorptive power, the peculiarity of absorption bands. After taking into consideration the numerous substances examined, the conclusion seemed inevitable that banded absorption spectra were caused by the double linking of three pairs of carbon atoms in a compactly closed chain, and in the present paper the author has studied the effects of various atomic groupings on the absorption of ultra-violet rays. The first question was whether substances with two doubly-linked adjacent carbon atoms exhibit any peculiarities in their absorption spectra. To decide this point ethylene, amylene, and allyl alcohol were selected for examination, but in neither case were any absorption bands seen. To ascertain the effect of the treble linking of two carbon atoms the spectra of acetylene and valerylene were examined, but no absorption bands were noticed. In all cases, therefore, where the carbon atoms are arranged in an open chain no absorption bands are seen. In no carbon compound has any arrangement of the hydrogen or oxygen atoms been identified with the presence of absorption bands. With hydrocarbons containing at least six atoms of carbon and their derivatives there are three possible arrangements which admit of the carbon atoms forming a closed chain. (1) Three pairs of carbon atoms may be doubly linked as is assumed to be the case in benzene. (2) Two pairs may be doubly linked. (3) The six atoms may be singly linked. There are reasons for believing that oil of turpentine and terpene have two pairs of carbon atoms doubly linked, and that a closed chain including these two pairs of atoms forms the nucleus of such substances. These bodies exhibit no absorption bands, so the author concludes that a closed chain of carbon atoms in which only two pairs are doubly linked exhibits no absorption bands. Now, the constitutional formula of camphor is probably founded on a closed chain of carbon atoms; it is found to be very diactinic, more diactinic than the terpenes, so that probably its atoms are not so compactly united; this is consistent with a singly linked closed chain of carbon atoms. Camphoric acid similarly shows no absorption bands. The author, therefore, concludes that no molecular arrangement of carbon atoms causes selective absorption, unless three pairs are doubly linked together in a closed chain. The author next considers the absorption spectra of condensed benzene nuclei; it was expected from the generally accepted views as to the constitution of naphthalene and anthracene, that these substances would give a larger number of absorption bands than benzene, and that the bands would be of greater intensity, *i.e.*, they would be capable of withstanding a great degree of dilution before they disappeared. The results obtained are rather remarkable. Thus a solution of naphthalene containing 1 in 60,000 shows four strongly marked bands. Phenanthene contains the carbons of three benzene rings, disposed as follows:—

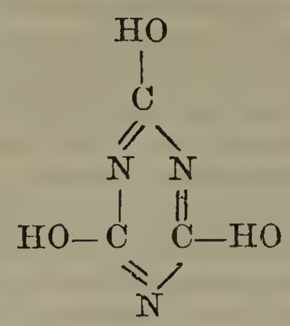


And it shows three strong absorption bands in a solution containing 1 in 4000. Anthracene, which may be considered to have a structure—



was also examined, it was dissolved in glacial acetic acid, it has a considerable absorption when the dilution is carried as far as 1 in 50 millions. Pyrridin gives an absorption spectrum. Hydrocyanic acid is very diactinic.

Cyanuric acid is not, and the author concludes that it has the formula—



Many of the photographs of the spectra were exhibited.

The President congratulated Professor Hartley on his interesting results. Such work was of the greatest importance. The question as to the connection between structure and physical properties would probably form one of the most interesting chapters in the chemistry of the coming time.

Mr. Groves asked if Professor Hartley had investigated the effect of substitution in the side chains.

Professor Emerson Reynold asked if the absorption spectra were sufficiently definite to identify the various substances. The work seemed to him to be most important; it gave some air of reality to the three links and two links of which chemists now speak so frequently.

Dr. Japp suggested the investigation of the class of trimolecular nitriles, so as to have compounds with a closed chain, like the benzene ring.

Professor Hartley, in reply, said that if the substances were pure, it was perfectly easy to identify them, and the quantity of some substances, even in mixtures, could be roughly estimated.

On a Simple Method of Determining Vapour Densities in the Barometer Vacuum By C. A. Bell and F. L. Teed.—Notwithstanding the simplicity of the apparatus recently proposed by Meyer, many cases remain, *e.g.*, those of easily decomposable substances of high boiling point, etc., in which the older method of Hofmann would be preferable. Moreover, most liquids volatilize in a vacuum at 100°, and this temperature can easily be maintained for any length of time. The authors have introduced two new devices: (1) By varying the external pressure or otherwise, the vapour is made to occupy a known volume; and (2), its pressure is directly determined by a single observation, which is independent of the atmospheric pressure. Thus the calculations are enormously simplified, and errors of observation are avoided. The simplest form of the apparatus consists of a glass cylinder, 34 centimetres long and 3·3 centimetres internal diameter, closed at its upper end; to its lower end is fused a stout glass tube, 8 millimetres internal diameter and 83 centimetres long; 5 centimetres below the junction with the cylinder a glass tube is fused in so as to form a T, which is bent up so as to lie parallel with the cylinder, and is sealed off a little below the upper end of the cylinder. The lower end of the long glass tube is closed by an indiarubber cork, through which passes a glass stopcock. The whole of the upper part of the apparatus is surrounded by a steam jacket. A fine line is etched on the glass tube about 1 centimetre below its junction with the cylinder, and from a point on exactly the same level, the side tube, which serves as a barometer, is graduated upwards in millimetres. The apparatus is filled with mercury, and after various precautions, the liquid introduced in a thin glass bulb, converted into vapour, and the pressure in the barometer tube observed at which the vapour depresses the mercury to the mark etched on the tube. The volume of the cylinder being known, the calculation is extremely simple.

Mr. Kingzett communicated verbally some results on—

The Oxidation of Phosphorus in Moist Air.—He had proved that under these circumstances both ozone and peroxide of hydrogen were formed. Details are promised in a future paper.

The Society then adjourned to June 17, when a ballot for the election of Fellows will be held, and the following papers read:—1. "On Penthathionic Acid," by T. Takamatsu and Watson Smith; 2. "On a Crystal of Diamond," by Harry Baker; 3. "Some Orcinol Derivatives," by J. Stenhouse and C. E. Groves; 4. "On the Determination of Carbon in Soils," by R. Warington and W. A. Peake; 5. "Note on Camphydrene," by H. E. Armstrong; 6. "On the Action of Nitric Acid on Diparatolylguanidine," by A. G. Perkin.

Parliamentary and Law Proceedings.

Prosecution under the Pharmacy Act.—Pharmaceutical Society of Great Britain *v.* Hartley.

This action, which was brought for the recovery of a penalty of £5, incurred by the defendant "in selling or keeping open shop for the retailing, dispensing or compounding poisons or a poison, contrary to the provisions of the Pharmacy Act, 1868," was tried on June 3, at the Sheffield County Court, before T. Ellison, Esq., the judge.

Mr. Granger appeared for the Society; the defendant, who resides at Neepsend Lane, Sheffield, did not appear.

Proof having been given that the summons had come to defendant's knowledge,

Mrs. Jane Brown proved that on April 28 last she purchased at defendant's shop a pennyworth of "red precipitate," and,

Mr. Ward having proved that he had tested the purchase made of defendant, and found it to be red precipitate,

The Judge gave a verdict for the plaintiffs for the amount of the penalty and costs.

Death from an Overdose of Laudanum.

On Wednesday June 3, an inquest was held at the Fleece Hotel, Thirsk, concerning the death of Harriet Clarkson, a domestic servant, sixteen years of age, who had been found dead in her bed that morning at the house of Mr. R. Jaques, postmaster, at Thirsk. The girl had been subject to toothache, and on Tuesday night had obtained at a chemist's shop in Thirsk a 3-ounce bottle of laudanum.

The Coroner (J. S. Walton) strongly condemned the law as it now stands as regards the supplying indiscriminately laudanum in any quantity, and to those who choose to buy it, and he thought that at least the parties to whom it was sold ought to be personally acquainted with those to whom they were supplying it, for in this case the young man who supplied it to the deceased did not know her.

The jury returned a verdict of "Found dead, and that deceased had died from an excessive dose of laudanum."

Poisoning by Laudanum.

An inquest has been held at Hoyland Nether, touching the death of Jane Evans, aged 2½ years, the daughter of a miner residing at High Royd, near Hoyland, who died from having laudanum instead of paregoric administered to it by mistake. The child was suffering from a cold, and the mother purchased twopennyworth of paregoric at the shop of Mr. Willey, at Hoyland. She administered three doses to the child, which became affected by it, and died on Tuesday. Dr. Ritchie found that laudanum, instead of paregoric, had been administered. The jury, after hearing the evidence, returned the following verdict:—"Inadvertently poisoned by laudanum, sold by Joshua Willey, druggist, for paregoric."

THE SALE OF PAREGORIC DEVOID OF OPIUM.

At Sheffield, on Tuesday, before T. W. Rodgers, Esq. (in the chair), and S. Roberts, Esq., John Skelton, a herbalist, carrying on business at 144, Gleadless Road, Heeley, was charged, on a summons, with selling 4 ounces of paregoric not of the nature, substance and quality of the drug demanded by the purchaser, Mr. P. O'Connell, one of the inspectors of nuisances for the borough.

The Town Clerk (Mr. Yeomans) appeared in support of the summons, and Mr. H. Auty represented the defendant.

The purchase of the article was admitted, and therefore only Mr. S. H. Allen (the borough analyst) was called. He produced his certificate of the analysis, which stated that the article submitted to him was deficient of alcohol and was coloured with cochineal and wholly destitute of opium, which is the most important ingredient of paregoric. The object of selling it without opium, added Mr. Allen, was, without doubt, to avoid the Pharmacy Act. Paregoric was, in the common acceptation of the term, a drug, and was composed of the oil of anise, benzoic acid, camphor, spirit and opium.

Mr. Auty, for the defence, said the article sold to Mr. O'Connell was what was known as balsam of aniseed and was given to him in mistake.

The Bench, in giving judgment, said that in their opinion this was a very bad case. The defendant did not profess to sell drugs and he was not authorized to sell drugs, but when a person applied to him for paregoric he gave him what was not paregoric, but a compound entirely destitute of the principal ingredient of that drug, and so contrived as to deceive the purchaser. The sale was a wilful violation of the law, for something which was not a drug was sold for a drug. The sentence of the court was that the defendant should pay a fine of £5 and costs, the alternative being a month's hard labour. The defendant was allowed a fortnight in which to pay the money.—*Sheffield Daily Telegraph.*

Dispensing Memoranda.

Replies.

[409]. I think in this prescription the quantity of phosphoric acid ordered is insufficient to dissolve the quinine. I should dispense this by rubbing the quinine to a fine powder, putting it into an 8-oz. bottle with the phosphoric acid, phosphate of soda, and tincture of colchicum; and then filling with aqua, labelling "The mixture to be shaken." Its appearance then made is a colourless mixture, with a white powder which is readily diffusible on being shaken.

GRIFFITH ROBERTS.

[411]. This mixture should have a diffusible precipitate of finely powdered quinine sulphate. It would, in my opinion, be very wrong to add acid.

GRIFFITH ROBERTS.

Queries.

[412].
℞ Acid. Sulph. Dil. . . . . ʒj.
Syr. Rhœados. . . . . ʒj
Mag. Sulph. . . . . ʒj.
Aq. Menth. Pip. . . . . ad ℥viij.
Pulv. Tragacanth. Co. . . . . ʒss.
M. Ft. mist. Two teaspoonfuls every six hours.

Will some reader kindly inform me if that was the dose the physician intended the patient to take?

H. H. R.

[413]. Will a simple solution of morphiæ acet. not do as well for the hypodermic injection as that of the more complicated process in the B.P.?

QUÆSTOR.

[414]. Can the following prescription be dispensed without a separation taking place?—
℞ Ol. Ricini . . . . ʒij.
Tr. Opii . . . . gtt. viij.
Liq. Potassæ . . . . ♏ xx.
Muc. Tragac. . . . . ʒj.
Sacch. Alb. . . . . ℈ij.
Aq. . . . . ad ℥iv.

H.

[415].
℞ Carbolic Acid Crystals . . . . . . ʒss.
Aq. . . . . ad Oj.
Ft. lotio.

In the above prescription, what size bottle should be used, ℥xx or ℥xvj?

DISPUTANT.

[416].
℞ Acidi Carbolici . . . . gr. ij.
Pulv. Acaciæ . . . . gr. iss.
M. Ft. pil. Mitte viij.

What would be the best excipient to use so as not to make the pills unusually large?

PERCONTATOR.

[417]. Can any reader of the Journal inform me how to dispense the following, and what appearance the mixture should have?—
℞ Tinct. Guaiac. Ammon.,
Mist. Acaciæ . . . . āā ʒij.
Quiniæ Sulph. . . . . gr. vj.
Acid. Sulph. Dil. . . . . ♏ viij.
Potas. Bicarb. . . . . ʒiss.
Aquæ Font. . . . . ad ℥iv.
M. Ft. mist. Cap. coch. amp. ter die.

A. P. S.

[418]. Can any reader suggest any reason why the following mixture should become thick soon after it has been made? Sometimes the change takes place almost immediately, whilst on other occasions some time elapses before any difference is seen.
℞ Quin. Sulph. . . . . gr. xxx.
Tinct. Ferri Perchlor. . . . . . ʒj.
Syrupi. . . . . ʒj.
Aq. . . . . ad ℥viij.
M.

PUZZLED.

Notes and Queries.

[657]. LIQ. AMMON. ACET. CONC. 1 to 7:—
℞ Ammon. Carb. . . . . ʒiv.
Acid. Acetic. Fort. . . . . ʒxx.
Solve.

This solution should be neutral. Test in the usual way, and if too acid, add a little more ammon. carb.; if too alkaline, a little more acid.

PAGE D. WOODCOCK.

[657]. The formula for liq. ammon. acet. conc., 1 to 7, is prepared thus:—

Saturate acid. acet. sp. gr. 1·038, ½ gallon, with pulv. ammon. carb. 2½ lbs. or q. s., carefully avoiding excess.

ʒj added to ʒvii of water form liq. ammon. acet. (P. L.)

Patrington, Yorks. TWADDELL.

[658]. COMPOUND TINCTURE OF MYRRH.—I think there is no formula for the above, under tr. myrrh, in any text-book, but it is a thing frequently asked for and much used in veterinary practice. Tinctura myrrhæ et aloes is intended, sometimes called "Black Tincture," the formula for which is—

Aloes	3
Myrrh	$1\frac{1}{2}$
Spirit	40
Water	20

Methylated sp. is commonly used by "vets" themselves.

T. S. MINETT.

[658]. In answer to F. W. Wood concerning compound tincture of myrrh, I infer he means that used in veterinary practice. I send formula from 'Morton's Veterinary Pharmacy':—

Take of—

Spiked Aloes in Coarse Powder	1 pound.
Gum Myrrh in Coarse Powder	$\frac{1}{2}$ pound.
Rectified Spirit	1 gallon.
Water	$\frac{1}{2}$ gallon.

Digest for fourteen days, frequently shaking, then filter.

Patrington, Yorks. TWADDELL.

[658].

℞ Myrrh.,	
Aloes BB.	āā ℥j.
S. V. R.	℥xv.
Aq.	℥x.

Powder myrrh and aloes coarsely, and put to the spirit for three or four days, frequently shaking, then add aq., shake as before for three or four days longer and filter.

PAGE D. WOODCOCK.

[658]. In reply to F. W. Wood, I beg to append a formula for tinct. myrrh. co.:—

℞ Gum Myrrh	℥j.
Aloes Barb.	℥ij., ʒvj.
Cake Saffron	ʒvj.
Proof Spirit	$\frac{1}{2}$ gallon.

This may be made by macerating the saffron in boiling water q. s. for twelve hours, and then prepare by percolation or by macerating the whole for seven days. The first is the plan by which I have always made it.

W. S.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

PHARMACEUTICAL EDUCATION AND PHARMACEUTICAL EXAMINATION.

Sir,—At the meeting of Council last week, I stated, during the discussion on the motion for "an inquiry into the relation to each other of pharmaceutical education and the pharmaceutical examinations," that the Scotch Board of Examiners had recently passed a resolution to the effect that "they were not altogether satisfied with the existing condition of things, and that they were inclined to favour certain possible changes if found practicable."

I have just received a communication from the Chairman of that Board telling me that I have been misinformed as to the terms of that resolution.

I beg therefore to withdraw the statement, and to express my regret for having uttered what was not strictly correct.

When, however, the words of the resolution which really was passed come to be published, your readers will be able to judge of the extent to which I inadvertently misrepresented its meaning.

Clifton. G. F. SCHACHT.

MR. HOWARD HALL AND THE ELECTION OF COUNCIL.

Sir,—Mr. Howard Hall has once more buckled on his armour in defence of his London colleagues and in defiance of those country members "who invariably vote on the system of excluding all London candidates."

Mr. Hall, however, is on a false scent, and refuses to see anything pharmaceutical beyond the sound of Bow bells. What all the provincial members of the Pharmaceutical Society desire is "a true and correct representation of the whole national electorate," and not a Council comprised almost exclusively of town members, who have no sympathy with or practical knowledge of the wants of provincial chemists and druggists.

The Council of 1880 consisting of thirteen country and eight town members, is, in my opinion, a fairly representative body. For many years the rulers of the craft were chosen from the ranks of London pharmacists, the result being a reign of sleepy conservatism and neglect of provincial pharmacy, which was yearly leading to most serious consequences to the trade generally. Thanks, however, to the exertions of the Chemists and Druggists' Trade Association, the slumberers in the snug rooms of 17, Bloomsbury Square were rudely awakened to a sense of their neglect. Country members became alive to the importance of a change in the constitution of the Council, and Mr. Hall and his coadjutors should not complain if for some time to come Messrs. Symes, Churchill and Co. keep the question of trade interests more prominently before the Council than did the aristocratic West Enders of the old *régime.* Mr. Symes and the other "pet local nominees" are proving themselves faithful representatives of "the whole country" and deserve our warmest thanks.

Leominster. M. J. ELLWOOD.

Sir,—If Mr. Howard Hall is correctly reported in the Journal of May 22, p. 945, I must be included in the all there stated by him. I have waited in the hope and expectation that a younger and more vigorous pen than mine would have vindicated the Liverpool voters, for from what I know of the Liverpool members, I believe them to have a will of their own and a way of their own, which could not be bound by any single cord however strong.

Mr. Hall's sweeping charge could not have occurred except by concerted action, of which, I think, I should have known something; but the first notice I have of plumping is from the report of your Council proceedings of the above date.

I do not think it needful to go into the manipulation of votes and members as given by the same gentleman in the Journal of June 5, nor do I think even the Liverpool voters need the assistance of such an electioneering agent as Mr. Hall appears to be to convince them that there is necessarily such an amount of detail work, for which we are indebted to the London members of Council in the past, present, and to come, as to induce the country members to record their vote largely for metropolitan men, and then the best selection from the country to which our judgment may lead us. Such has been my object in the past and such I expect it to be so long as I vote. I thank Mr. Mackay for his remarks as to scrutinizing the scrutineers, and hope the Council, if they cannot protect us from such a more than unpleasant position as the present, they will allow us to record our name at foot of voting paper and make it open voting.

Liverpool. R. SUMNER.

WEIGHTS AND MEASURES ACT, 1878.

Sir,—I shall be greatly obliged if you will allow me space to again impress on members of the trade through the medium of your pages the advice you have on so many seasonable opportunities given them as to the desirability of their obtaining, as far as possible, weights and measures conforming to the requirements of this Act of Parliament.

Stamped apothecaries' weights and measures legalized for use throughout the United Kingdom may now be procured through the usual channels for the supply of weights and measures used by chemists, and I cannot too strongly urge all members of the trade to at once provide themselves with these stamped weights and measures, as by so doing they adopt a cheap, and at the same time the most complete, safeguard against annoyance and expense to which they otherwise would be liable in the event of a prosecution being brought against them, for the possession of an unstamped weight or measure renders the owner liable to a penalty of £5, although the weight or measure may be otherwise accurate.

An erroneous impression appears to be gaining ground that weights and measures stamped in one district will not be acknowledged by the authorities residing in other districts. The provisions of the statute are very clear on this point, the 45th section being as follows:—"A weight or measure duly stamped by an inspector under this Act shall be a legal weight or measure throughout the United Kingdom, unless found to be false or unjust, and shall not be liable to be re-stamped because used in any place other than that in which it was originally stamped."

The Board of Trade was empowered by the Act to adopt standards for apothecaries' weights and measures, such standards to be approved by Her Majesty in Council. The standards for these weights and measures were issued to certain metropolitan districts on August 14, 1879. On May 19 last several London chemists were summoned to appear at the Southwark Police Court for having in their possession inaccurate apothecaries' weights, and nominal fines were in each case inflicted. The inspector who prosecuted acknowledged in course of cross-examination that no notice had been given to chemists residing in his district that he had been supplied with standards for apothecaries' weights.

Inspectors appointed under this statute, residing in country districts, will, if not already supplied with these standards, in all probability receive them from the Board of Trade at an early date, when wholesale prosecutions may result if some steps are not taken by chemists themselves, either to obtain new weights and measures duly stamped, or to ascertain when the inspector for their district obtains standards, and forthwith take their old weights and measures to him for verification.

It cannot be too widely known that the Board of Trade has no power to issue instructions to local authorities as to the carrying out of this Act; the appointment of inspectors, and the duty of testing and stamping weights and measures resting with justices and town councils. It would be only courteous treatment to members of the trade for inspectors to give them notice when they receive their standards, and to allow some little time in which apothecaries' weights and measures may be verified before enforcing the penal clauses of the statute.

The chief inspector for the Birmingham district has promised, in response to a representation from the President of this Association, to give such notice to all chemists residing in the district, and to allow two or three months in which their weights and measures may be verified. It is very desirable, and such a course would probably obviate a considerable amount of vexation and expense to the trade, that one or two leading chemists in each district should call upon the inspector appointed for the district, and request him to give a similar undertaking, and failing a satisfactory reply to then proceed to the local authorities, who would doubtless take care that no injustice should be done by precipitate action on the part of the inspector.

W. F. HAYDON,
Secretary to the Chemists and Druggists' Trade Association of Great Britain.

Office of the Association, 23, Burlington Chambers, New Street, Birmingham, June 9, 1880.

"ARTISTS' COLOURS."

Sir,—I attended the meeting held at the Grosvenor Gallery on Tuesday last, when the subject of artists' colours was taken into consideration, and it occurred to me that beyond the great interest necessarily attaching to a subject so important as the relationship of science to art, the matter was worthy of attention by pharmacists, as suggesting a source of legitimate profit in a new field of labour.

I will not attempt to give a detailed account of the meeting, but the complaint of Mr. Holman Hunt and other artists amounted to this:—"That for the last twenty years their colours had been deteriorating in quality; that they did not know the nature or composition of some of the pigments they were using, as they were often sold under deceptive titles, and that even when correctly named, they were frequently so adulterated as to be a source of the greatest inconvenience and injury." In short, the subject generally was considered of so much importance that one speaker proposed that the whole question should be submitted to a committee of chemists for their advice. Whether this will be done or not, I, of course, cannot say, but I hope I shall not be considered intrusive if I suggest to some of our younger members that a new occupation seems here to present itself, which will not only be especially interesting, but lucrative also.

The principal requirements are, not so much new inventions, though undoubtedly there is scope in that direction, but that, firstly, known pigments should be prepared in the utmost possible purity, and secondly, that their composition and the substances with which they are incompatible should be distinctly stated.

34, *Leinster Terrace.* FREDERICK ANDREWS.

CLAY'S CHIAN TURPENTINE EMULSION.

Sir,—Professor Clay having stated that his formula was in successful use at Birmingham, an unqualified statement that it was an impossible one appeared with an air of improbability. That it was not impossible it was the object of my note to point out. Difference of material must, I suppose, account for difference of result; Mr. Martindale's skill is known to be above the reach of criticism.

There was no desire to defend Mr. Clay's formula; it is obviously not of the best, and I certainly never said that the mixture made with tragacanth was superior or equal to that made with gum arabic.

The use of a mortar is justifiable in this case, because the ether forms no part of the remedy; as Professor Clay's paper shows, it was adopted as a means of transforming the pills originally used into a mixture.

I may add that the "principle" of the emulsion referred to was in use here thirty years ago, long before the date of Mr. Martindale's paper.

Lombard Street. CHARLES EVE.

Sir,—I have had considerable experience in respect to the Chian turpentine emulsion, and I can fully corroborate the statement of Mr. Martindale that made according to the published form a satisfactory emulsion cannot be obtained. I have also proved the fallacy, as Mr. Martindale points out, of attempting to make it by adding the ethereal solution of Chian turpentine to the powdered tragacanth. After numberless experiments the following I have found the most successful, though far from perfect.

Into a clean dry 16 ounce bottle put first the pulv. tragac. and moisture with S. V. R. about ʒj; then add the whole of the water necessary for mucil. tragac., B.P.; to the mucilage thus formed add the solution of Chian tereb., and agitate briskly until thoroughly mixed. Next place the sulphur in a mortar and rub to a paste with a little water before adding the syrup, taking care that every lump of sulphur is broken; this is now to be poured into the bottle containing the tereb. Chian and mucilage, and the whole well shaken.

A much better emulsion can, however, be made by dissolving the tereb. Chian in ol. amygd. instead of ether, and rubbing the "oleo-resin" thus artificially made with mucil. tragac. or acaciæ (the latter is better) in a mortar.

I conclude by saying that everyone who appreciates good dispensing will do well to profit by the very valuable and practical suggestions thrown out by Mr. Martindale from time to time through the medium of the Journal.

9, *Bruton Street, Berkeley Square.* J. S. PALMER.

TINCTURE OF SENEGA AS AN EMULSIFYING AGENT.

Sir,—I have shown that mercury shaken with tinct. senegæ is reduced to such an extreme state of subdivision that it has the appearance of a powder resembling hyd. c. creta, and this powdery condition is maintained so long as the senega is present. Now if some chloroform or any fixed or volatile oil be treated in a similar manner it is formed into a cream-like fluid, the particles are entirely separated, and if a sufficient quantity of senega has been used they permanently retain this condition of subdivision. This cream of oil and senega, when mixed with water, upon agitation is at once diffused and after a time the cream separates, forming a layer at the top of the water, easily miscible again by shaking. In the paper which I read at an evening meeting of the Pharmaceutical Society, I gave a number of formulæ for the preparation of various emulsions in which 5 minims of tinct. senegæ were used to render miscible an ordinary dose of oil. Mr. Levy, of Cape Town, who has experimented with these formulæ, finds that it takes twenty-four hours for the separation of the oil. He has obtained very excellent results with his tinct. senegæ; all the emulsions I have prepared separate in a considerably shorter time than this. It is one of the objections which may be urged against tinct. senegæ as an emulsifying agent,—and the same objection applies also to the use of alkalies—that the separation is more rapid than with acacia or tragacanth. All emulsions separate upon standing, the time required for separation depending upon the thickness of the fluid. The milk of animals may be taken as the type of this class of preparations. In this case the fat or butter is diffused through an aqueous liquor, and held in suspension by the presence of caseine, sugar, and alkaline salts. After a time the fatty matter separates as a layer of cream. This is precisely what occurs with emulsions of oil and tinct. senegæ. If sufficient tincture has been used the oil separates as a cream, not as free oil; if an insufficient quantity, as for instance, ℥ss ol. morrhuæ and 5 minims of the tincture, the separation occurs as a layer of cream and oil. This, however, mixes upon agitation very readily.

Mr. Levy makes some remarkable statements regarding the taste and effects of small doses of senega. At Guy's Hospital both the infusion and tincture are largely used. There is a mixture in the Hospital Pharmacopœia containing ʒss of the tincture with ℥ss of the infusion for a dose. Tinct. senegæ is used daily as an emulsifying agent for copaiba, ol. terebinth, and especially ol. morrhuæ; hundreds of prescriptions containing it have been dispensed. I frequently see the prescribers, but I have never heard one word saying that any unpleasant results have followed the use of this tincture; on the contrary, I have frequently been told that it is an excellent thing to make cod liver oil mixtures for children.

It is very remarkable also that Mr. Levy in his seventeen years' experience of pharmacy has not heard of the use of liq. potassæ simply as an emulsifying agent. It was used for this purpose long before he entered into pharmacy. In Mohr and Redwood's 'Practical Pharmacy,' bearing the date 1849, page 342, occurs the following:—"Emulsions are sometimes made with an expressed oil and an alkali. One of the most common emulsions used as a simple remedy for cough is formed by agitating some oil of almonds with solution of potash or spirit of ammonia." "Six drachms of oil of almonds, 1 drachm of solution of potash, and 5 ounces of distilled water, form a good emulsion if mixed in the proper way." Liq. potassæ is used in the preparation of mistura olei, Guy's Hospital Pharmacopœia, as an emulsifying agent. It would be possible for me to give more instances of the use of liq. potassæ for this purpose, but I have no doubt that the above will be sufficient to show that this agent is employed for the preparation of emulsions.

I desire by no means that acacia should be discarded, as Mr. Levy appears to think, for senega. Acacia is one of the most valuable emulsifying agents we have; it is not, however, perfect. Mucilage of acacia is apt to become sour and lose its emulsive property to a great degree. Emulsions made with it are generally thick, and in this condition they are very repulsive to some patients.

Guy's Hospital. HENRY COLLIER.

THE SEASON.

Sir,—My experience does not at all coincide with that of your correspondent, Mr. T. Romans, whose letter appeared in your last week's issue. On referring to my diary I find that I gathered a specimen of *Convallaria majalis* in full bloom on May 18. So far as the immediate neighbourhood of this town (Blandford) is concerned, I can thoroughly endorse the statement made in your excellent article, 'The Month,' "that flowers are *fully* a fortnight in advance of last year,"—and not only are they earlier, but they are far more abundant. Last year, the whole energy of the plant seemed to be devoted to the production of leaves; flowers were few, and perfected fruits and seeds were fewer still. In my short walks in this locality in the course of last month I noticed, amongst others, the following plants in full bloom much earlier than last year:—

Cruciferæ:—*Lepidium campestre*; Cistaceæ:—*Helianthemum vulgare*; Polygalaceæ:—*Polygala vulgaris*; Caryophyllaceæ:—*Lychnis vespertina, Silene inflata, Stellaria graminea*; Celastraceæ:—*Euonymus Europœus*; Leguminosæ:—*Lotus corniculatus, Onobrychis sativa, Vicia sativa, Lathyrus pratensis, Trifolium incarnatum, Trifolium minus*; Rosaceæ:—*Geum urbanum, Potentilla anserina, Tormentilla officinalis, Rubus fruticosus, Rosa canina*; Cucurbitaceæ:—*Bryonia dioica*; Saxifragaceæ:—*Saxifraga umbrosa*; Umbelliferæ:—*Sanicula Europœa*; Caprifoliaceæ:—*Lonicera caprifolium, Viburnum opulus, Sambucus nigra*; Rubiaceæ:—*Galium Aparine, Asperula odorata*; Compositæ:—*Chrysanthemum leucanthemum, Carduus nutans, Leontodon hispidum, Picris hieracioides, Tragopogon minor*; Aquifoliaceæ:—*Ilex aquifolium*; Convolvulaceæ:—*Convolvulus arvensis*; Scrophulariaceæ:—*Rhinanthus Crista-galli*; Labiatæ:—*Stachys sylvatica*; Boraginaceæ:—*Myosotis palustris, Borago officinalis*; Dioscoreaceæ:—*Tamus communis*; Orchidaceæ:—*Listera ovata, Habenaria bifolia, Cephalanthera grandiflora, Orchis maculata.*

Blandford. M. MITCHELL BIRD.

Sir,—A correspondent in your last issue bases his surprise at your opinion as to the comparatively earlier advent of spring flowers this year upon one case which he cites, that of *Convallaria majalis*, without, however, giving the date on which he found it last year. The proverb about the one swallow which does not make a summer may apply. One stumbles occasionally upon an unusually early specimen, and mere accident may cause us to overlook others which will seem late. It is safer to take a larger number of perhaps more ordinary specimens for forming a general conclusion, and these I feel sure will fully substantiate your opinion. I append a few chosen at random from my calendar for May only, to which month your notes referred.

Ryde, I. W. HENRY H. POLLARD.

Found in 1880.		Found in 1879.
May 2.	*Veronica Beccabunga*	June 2.
,,	*Sherardia arvensis*	,, 6.
,,	*Geranium molle*	May 28.
,,	*Trifolium pratense*	,, 18.
May 5.	*Cratœgus oxyacantha*	,, 18.
May 9.	*Potentilla anserina*	,, 18.
,,	*Galium Aparine*	,, 18.
,,	*Orchis maculata*	June 8.
,,	*Listera ovata*	,, 29.
,,	*Poterium sanguisorba*	,, 6.
May 20.	*Solanum dulcamara*	,, 11.
,,	*Lychnis Flos-cuculi*	,, 1.
,,	,, *vespertina*	,, 6.
,,	*Silene inflata*	,, 22.
,,	*Anthyllis Vulneraria*	,, 25.
,,	*Tamus communis*	,, 6.
,,	*Viburnum opulus*	,, 1.
,,	*Lithospermum officinale*	July 2.
,,	*Fumaria muralis*	,, 3.
,,	*Onobrychis sativa*	June 19.
,,	*Scandix Pecten-Veneris*	,, 22.
,,	*Senebiera coronopus*	,, 22.
,,	*Chrysanth. leucanthemum*	May 30.
,,	*Sambucus nigra*	June 15.
May 25.	*Rhinanthus Crista-galli*	July 2.
,,	*Convolvulus arvensis*	July 2.
,,	*Euonymus Europœus*	June 19.
,,	*Glaux maritima*	July 3.
May 30.	*Parietaria diffusa*	June 8.

Lex Sonans and W. Vinson.—See the answer given to "*Vance*" and "*Dentist*" last week, before, p. 992.

J. M. I.—Possibly the recipe you require is—Collodion, 60 parts; resin, 20 parts; ether, 40 parts.

"*Fraxinus.*"—*Anthoxanthum odoratum.*

J. F. E.—'How Crops Grow,' published by Macmillans.

C Knight—Though the correspondence columns of the Journal are intended for the discussion of subjects interesting to members of the Society and to the trade, it is necessary to exercise a discretionary judgment as to the fitness of letters for insertion, and those you speak of as not having appeared were probably in our opinion as unsuitable for insertion as the one just received.

F. Hebron.—*Carex glauca.*

A. Deck.—No person succeeded to the business in question, and at present there is no one who makes the calling a specialty. But there are plenty of coppersmiths who would construct apparatus according to instructions.

C. H. B.—(1) The question of chloric ether has been discussed on several occasions in this Journal. See the comments in "The Month," *Pharm. Journ.* [3], vol. viii., p. 67. (2) See Mr. Palmer's paper on "Hydrobromic Acid," vol. ix., p. 721.

J. A. J. and G. H. are referred to the rule as to anonymous correspondents.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Watts, McIlwaine, Miller, T. F. Abraham, Mitchell, Jessop, Lavandula, Wilkinson-Newsholme, Lees, Robinson, W. H. D., Potens.

CONTRIBUTION TO THE CHEMISTRY OF NIGELLA SATIVA.

BY HENRY G. GREENISH.

(*Concluded from page* 913.)

IV. Extraction with Solution of Soda.—The residue of the seeds, after treatment with alcohol, was macerated with a 1 per cent. solution of soda for twenty-four hours. The liquid at the end of that time being only very slightly alkaline, it was made distinctly so with solution of soda, and the maceration continued for a few hours. The filtered liquid was then acidulated with sulphuric acid, which caused the precipitation of very dark grey flocks. These flocks collected, washed, dried and powdered, formed a dull black powder, which on burning with soda-lime yielded ammonia corresponding to 15·08 per cent. nitrogen (calculated on dry substance free from ash). This substance may therefore be regarded as impure albuminous matter.

The acid filtrate, on being tested with alkaloid reagents, was found to give a precipitate with most of them. To isolate the alkaloid, the presence of which was thus indicated, an attempt was made to remove it from solution by shaking it with petroleum ether, benzine, ether, chloroform, bisulphide of carbon and acetic ether, but neither from acid nor alkaline solution could more than traces be removed. Recourse was then had to precipitation with potassio-mercuric iodide, and for this experiment 800 grams of the seeds, freed from oil by petroleum ether, were macerated with water acidulated with sulphuric acid. After removal of mucilaginous substances by alcohol and recovery of the alcohol by distillation, the filtrate, evaporated to a small bulk, was precipitated with potassio-mercuric iodide, the precipitate filtered off, washed, suspended in water, decomposed with sulphuretted hydrogen, and the filtrate from the sulphide of mercury, after removal of excess of sulphuretted hydrogen by warming, freed from iodine by precipitation with sulphate of silver. Excess of silver having been removed from the filtrate as sulphide, hydrate of barium was added to remove sulphuric acid and liberate the base. The filtrate from the sulphate of barium freed from excess of barium hydrate by CO_2 was evaporated to dryness. Boiled with absolute alcohol this residue gave up to that solvent but a small quantity, which still contained traces of barium, and the aqueous solution of which possessed an alkaline reaction. The insoluble residue was dissolved in water, freed from barium, which it still contained, by sulphuric acid, and the filtrate precipitated with alcohol. The substance so precipitated was identical with the albuminous substance previously isolated (*II.* (*d*)). It contained nitrogen, dissolved easily in water with a strong acid reaction, and precipitated by addition of alcohol, the so purified substance yielding reactions similar to those of the albumens. So far is it from being an alkaloid that it forms with barium an easily soluble compound from which CO_2 fails to precipitate that base.

The amount of melanthin which I had had at my disposal having been only a few grams, it was considered desirable to obtain, if possible, a further quantity. Accordingly 2 kilograms of crushed seeds (which in this case were obtained from plants cultivated in Germany) were percolated to exhaustion with petroleum ether. The petroleum ether solution showed a magnificent blue fluorescence, which in the petroleum ether extract from Russian seeds could not be distinctly observed. After the recovery of the petroleum ether the residue was heated on the water-bath to expel the last traces of that menstruum, as well as the volatile oil. The fixed oil thus obtained still retained the blue fluorescence, which became much more evident on dilution with petroleum ether. The fluorescent substance is therefore not, or at least not wholly, volatile on the water-bath. It differs from the pœoniofluorescin isolated by Dragendorff and Stahre from peony seeds in its solubility in petroleum ether. Unfortunately a further quantity of these German seeds could not be obtained, so that the preparation of the volatile oil and its comparison with that prepared and examined by Flückiger was necessarily postponed. Worthy of note is the fact that the formula which I have found for melanthigenin, $C_{14}H_{20}O_2$, calculated to C_{20}, gives almost exactly $C_{20}H_{34}O_3$, differing in only two atoms of oxygen from $C_{20}H_{34}O$, found by Flückiger to constitute the greater portion of the volatile oil. Possibly by the ripening of the seeds melanthin decomposes into sugar and melanthigenin, which latter by reduction yields part, at least, of the volatile oil.

Examination of the Solid Fat.

The three several portions of fixed oil obtained deposited, on standing, solid fat. This was filtered (the three portions being united), allowed to drain, and saponified with solution of soda. The soap, after salting out, was decomposed with hydrochloric acid, the fat acids washed repeatedly with warm water and finally dissolved in warm absolute alcohol. From this alcoholic solution there separated, on cooling, white crystalline mammilar masses. The filtrate from these crystals was subjected to a fractional precipitation with alcoholic solution of acetate of magnesia in the presence of ammonia. The precipitates were washed with alcohol, and dried by pressing between filter paper. They were then decomposed by hydrochloric acid, and the fat acids so liberated washed repeatedly with warm water.

The fat acids from the first precipitate contained a large quantity of a fluid fat acid, probably oleic acid, and were not further examined.

The acids from the second precipitate were dissolved in warm 95 per cent. alcohol. The solution, on standing, deposited crystals which, filtered off, washed and dried, melted at 47°–50°.

The filtrate on standing deposited a second crop melting at 53·5°. The filtrate from this crop deposited at 0° a third crop melting at 54·5°–55°. The filtrate from this third deposit at $-10°$ a fourth crop melting at 57°.

The acids from the third precipitate were recrystallized repeatedly from 95 per cent. alcohol. The following were the melting points of each crystallization:—

i.	The crude fat acids	52·5°—53°
ii.	First crystallization	54·5°—55°
iii.	Second crystallization . . .	55·5°
iv.	Crystals from the mother liquor.	55·5°
v.	Third crystallization	55°—55·5°

On crystallizing for the second time a small quantity of a fluid oil, difficultly soluble in alcohol, was separated, probably causing the slight rise in the melting point.

From the last crystallization sufficient fat acid was obtained to allow of a combustion being made which gave the following results:—

0·2462 gram fat acid free from ash yielded 0·2857 gram H_2O and 0·666 gram CO_2

$C=73·77$
$H=12·88$

There can be no doubt that the fat acid examined was myristic acid, which possesses the composition

$C=73·69$
$H=12·28$

and which, according to Heintz, melts at 53·8°. It crystallized from alcohol in pure white mammilar masses consisting of tufts of feathery crystals. The presence of this acid in nigella seeds has already been conjectured by Professor Flückiger. The small quantity of fat acid melting at 57°, isolated from the second precipitate, I take to be a mixture of myristic with probably palmitic or stearic acid.

The succeeding precipitates yielded similar results, but in each case, especially in the fifth and sixth, the solid fat acid was mixed with a relatively large quantity of the fluid oil mentioned in the description of the third precipitate. The melting points of the crude fat acids in 4 and 5 were respectively 47° and 48° C.

The white solid substance which had crystallized from the alcoholic solutions of the fat acids was filtered off, washed, and proved on examination to be partly easily soluble in boiling 95 per cent. alcohol, partly difficultly soluble. The part easily soluble in alcohol was undecomposed soda soap, and yielded, after decomposition with hydrochloric and repeated recrystallization of the fat acids, a small quantity of an acid melting at 71° C., which may be regarded as stearic acid, although I had not sufficient at my disposal to render a combustion possible.

The part difficultly soluble in alcohol proved to be a calcium soap produced by the decomposition of the soda soap with calcium chloride present in the common salt used in the separation of the soda soap. This insoluble lime compound yielded a tolerably large quantity of a pure white fat acid, melting at 55°–55·5° C.

The mean of three analyses showed the composition of the recrystallized acid dried at 100° C., to be

$C=70·7$
$H=12·4$

The formula $2(C_{14}H_{28}O_2)H_2O$, requires

$C=70·88$
$H=12·23$

There can be no doubt then that this is a further quantity of myristic acid. That it still contains water may be explained by the fact that it was only once recrystallized from alcohol. In an attempt to estimate the amount of moisture present in the acid it was found to undergo volatilization and partial decomposition at a temperature of 110° C.

The fatty acid in the solid fat of nigella seeds consists therefore of myristic, with traces of stearic and (?) palmitic acids.

Quantitative Analysis.—The seeds employed were the Russian seeds previously examined, carefully freed from impurities by picking.

I. Determination of Moisture and Ash.—0·6472 gram of the powdered seeds lost by drying at 110° C. 0·0590 per cent. moisture and essential oil, = 9·11 per cent. The residue incinerated yielded 0·0265 gram ash = 4·08 per cent.; 0·5740 gram yielded moisture and essential oil 9·04 per cent., ash 4·21 per cent. Mean of the two estimations:—

Moisture and Volatile Oil = 9·07 per cent.
Ash . . . . = 4·14 „

The ash, treated with water, did not impart to that solvent an alkaline reaction (absence of more than traces of alkali metals). It dissolved almost entirely in dilute nitric acid without effervescence (absence of carbonates), and the solution proved to contain traces of sulphates and chlorides with much phosphate of calcium. The ash consisted, therefore, principally of phosphate of calcium.

II. Volatile and Fixed Oils.—The method adopted for the determination of the volatile oil was that described by Osse.* Although this method carefully performed may be taken as the best at our disposal, it must be admitted that, considering the difficulties which stand in the way of an absolutely correct determination of volatile oils, the results here given must be received as approximate rather than exact. The determination was made as follows:—

5 grams of the seeds, reduced to as fine a powder as possible in an agate mortar with 10 grams of powdered glass, were transferred to a glass stoppered cylinder and 42·5 c.c. petroleum ether added; the whole occupying a bulk of 50 c.c. The petroleum ether used was obtained from the ordinary petroleum ether by distillation in a water-bath, the first portion only being used. The seeds were macerated seven days with frequent shaking.

A watch glass capable of containing about 5 c.c. was enclosed between two large closely-fitting clamp glasses, and the whole tared. The clear petroleum ether solution was measured into the watch glass with a pipette, and allowed to evaporate at the ordinary temperature in a current of dry air. Before the whole of the petroleum ether had been removed, the watch glass was enclosed between the clamp glasses and weighed; it was then exposed to the current of air for periods of thirty seconds, being weighed immediately after the expiration of each such period. As soon as two successive weighings showed the same loss, the watch glass with the oil was heated for half an hour to 100° C., cooled and weighed. The loss in weight, *plus* the difference between the two previous weighings, gives the amount of essential oil. A further exposure of half an hour to a heat of 100° failed to produce increase or decrease in weight:—

		P.C.	Per cent.
1 c.c. yielded volatile oil	0·0018	= 1·53	Mean 1·64.
2 c.c. „ „ „	0·0040	= 1·70	
5 c.c. „ „ „	0·0107	= 1·81	

The remainder of the petroleum ether solution was filtered off, the residue of the seeds washed, dried, again powdered and extracted with petroleum ether to ensure, as far as possible, the removal of the fatty oil. The petroleum ether filtrates were evaporated to dryness and weighed. To this was added the weights of residues in the three foregoing estimations. The whole amounted to 0·8223 gram = 36·44 per cent.

The residue of the seeds dried at 40° C., was macerated with absolute ether. This solvent removed 0·0281 gram = 0·56 per cent., apparently the last traces of fatty oil. Total quantity of fixed oil 37·00 per cent.

The residue after treatment with ether, was dried at 40° C. and macerated with benzin, which, however, removed only 0·0120 gram = 0·24 per cent.

III. Treatment with Ether, Alcohol and Water.—1 gram of the powdered seeds was macerated with

* *Archiv der Pharmacie*, 3te R., vii., 104.

pure ether (50 c.c.) seven days, filtered and washed. The ethereal solution, evaporated to dryness, left a residue consisting of a thick, yellowish-brown oil, weighing 0·3810 = 38 10 per cent.

The dried residue of the seeds was treated similarly with absolute alcohol. The alcoholic solution evaporated to dryness left a residue weighing 0·0545 gram = 5·45 per cent. This residue, treated successively with ether (to remove traces of oil) and water, was found to be almost entirely soluble in those liquids.

The dried residue of the seeds was macerated for two days with 100 c.c distilled water and filtered. 25 c.c. of the filtrate, evaporated to dryness, left a residue weighing 0·0283 = 11·32 per cent.

IV. Treatment with Alcohol and Ether.—2 grams of the powdered seeds were macerated for seven days with 100 c.c. absolute alcohol, filtered, washed, and the alcoholic solution evaporated to dryness. The residue weighed 0·8678 = 43·39 per cent. The residue was only partially redissolved by alcohol, having apparently undergone some change during the evaporation and drying. This was accomplished first at 100° C., towards the end at 110° C., and required considerable time for its completion.

The dried residue of the seeds was treated with ether. The ethereal solution, evaporated to dryness, left a residue weighing 0·0027 = 0·13 per cent.—traces of fatty oil. The total amount extracted by alcohol and ether (43·52 per cent.) shows a satisfactory agreement with the amount extracted by ether and alcohol in experiment III., viz., 43·55 per cent.

V. (a). Treatment with Water.—To facilitate the action of the water, 5 grams of the powdered seeds were exhausted of oil by petroleum ether. The residue collected on a tared filter, washed, dried and weighed, was found to have lost 2·324 grams = 46·48 per cent., fixed and volatile oils and mixture.

The residue was macerated with 95 c.c. distilled water at the ordinary temperature for forty-eight hours, and filtered. Of the filtrate 5 c.c. evaporated to dryness at 110° C., left a residue weighing 0·0390 gram, and containing ash 0·0047. Combustible substances soluble in water 13·03 per cent.

15 c.c. were acidulated with acetic acid, a small quantity of chloride of sodium added, and the whole boiled for five minutes. The coagulated albuminous matters were filtered off, washed with dilute spirit, filtrate and washings concentrated to a small bulk, and three volumes absolute alcohol added. The precipitate which had formed after the lapse of twelve hours was collected on a tared filter, washed with alcohol, dried and weighed. It weighed 0·0195 and contained ash 0·0045. Mucilaginous substances free from ash 0·0150 = 1·90 per cent.

The filtrate and washings were collected and evaporated to a small bulk (to remove alcohol), carefully neutralized with a weak solution of soda and acetate of copper solution added in slight excess; the resulting precipitate, which was small in quantity and of a whitish colour (absence of tannin), was collected on a tared filter, quickly washed with a small quantity of water, dried and weighed. It weighed 0·0045, and on incineration left ash (oxide of copper) 0·0015. Organic acids precipitated by acetate of copper = 0·0030 = 0 38 per cent.

To the filtrate from the copper precipitate, neutral acetate of lead solution was added in slight excess, and the precipitate, after standing three hours, was collected, washed, dried and weighed; it weighed 0·0070, and contained oxide of lead 0·0023. Organic acids precipitated by acetate of lead = 0·0047 = 0·59 per cent.

The filtrate from the lead precipitate was freed from lead and copper by a stream of sulphuretted hydrogen; the filtrate from the deposited sulphides was concentrated on the water-bath, and boiled with an excess of Fehling's solution. The resulting suboxide of copper was rapidly collected, washed with boiling water, dried, incinerated, the ash moistened with nitric acid and again incinerated and weighed; it weighed 0·0480, equivalent to 0·02175 gram grape sugar = 2·79 per cent.

10 cubic centimetres of the aqueous filtrate were mixed with 30 c.c. absolute alcohol, and the precipitate of albuminous and mucilaginous substances, which had formed after twenty-four hours' standing, was collected, washed and dried; it weighed 0·0255 and contained ash = 0·0045. Mucilaginous and albuminous substances (insoluble in 75 per cent. alcohol) = 0·0214 = 4·06 per cent.

Deducting from this the mucilaginous substances previously estimated, 1·90 per cent., there remains for albuminous matter 2·16 per cent.

The filtrate and washings from this precipitate were evaporated to dryness in a tared glass dish. The residue weighed 0·0513 gram = 9·74 per cent. This residue was then treated with absolute alcohol; the insoluble matter was collected, washed and dried; it weighed 0·0202, and contained ash 0·0033. Substances not precipitated by 75 per cent. alcohol, but insoluble in absolute alcohol = 0·0169 = 3·21 per cent. Part at least of this precipitate consists of the acid albuminous substance mentioned in the first part of this paper, part probably is the substance known as arabic acid.

The filtrate and wash alcohol were evaporated to dryness in a platinum dish, and the residue weighed. It weighed 0·0312 and contained ash = 0·0022. Substances soluble in alcohol = 0·0290 = 5·51 per cent. Of this sugar forms 2·75 per cent., the organic acids precipitated by acetate of copper and lead 0·97 per cent., together 3·72 per cent., leaving 1·79 per cent. substances soluble in water and in alcohol not further identified.

The estimation of nitrogen in the aqueous extract showed the presence of 0·08857 per cent. corresponding to 5·58 per cent albuminoid matter. Of this 2·16 per cent. have been already accounted for, the remaining 3·42 per cent. may be sought for partly in the substances not precipitated by 75 per cent. spirit, but insoluble in absolute alcohol (3·42 per cent.), partly, probably, also in the unidentified substances (1·79 per cent.).

The residue of the seeds after extraction with water was washed with water containing 0·2 per cent. salicylic acid. This addition was found necessary to retard the development of bacteria, which otherwise quickly make their appearance and thrive rapidly, though the washing be conducted in the ice-cellar. The residue was dried and weighed. The loss in weight was 1·0115 gram = 20·23 per cent., or 5·41 per cent. in excess of the substances dissolved by water. This 5·41 per cent. must be reckoned an albuminous matter, the presence of which in the filtrate was proved. The slowness with which the liquid filtered, and the final blocking of the filter rendered the complete removal of these albuminous substances by water impossible. They were subsequently dissolved accompanied by other matters, by treatment with dilute solution of soda.

VI. Treatment with Alcohol.—The residue of the seeds was now macerated with 100 c.c. absolute alcohol for six days, then filtered off, washed, washings and filtrate evaporated to dryness. The residue weighed 0·0971 = 1·94 per cent. and consisted of a resinous substance (melanthin) and traces of fixed oil. Freed from the latter by treatment with petroleum ether the residual melanthin weighed 0·0705 = 1·41 per cent.

VII. Treatment with Solution of Soda.—The residue of the seeds, after treatment with alcohol, was dried, macerated twenty-four hours with 100 c.c., 0·5 per cent. solution of soda and filtered. 50 c.c. were acidulated with acetic acid, the precipitate collected, washed and dried, weighed 0·0550, and contained ash 0·0014. Albuminous substances dissolved by soda reprecipitated on the addition of an acid 0·0536 = 2·14 per cent.

25 c.c. of the filtrate from albumen precipitate were mixed with 75 c.c. 95 per cent. alcohol and the precipitate, after twenty-four hours, collected, washed, dried and weighed. It weighed 0·0205 and contained ash 0·0034. Metarabic acid = 0·0171 = 1·36 per cent.

The residue of the seeds was collected, washed with water, dried, and weighed. The loss in weight incurred by treatment with soda was found to be 0·4249 = 8·88 per cent. Deducting albuminous substances 2·14 per cent. and metarabic acid 1·36 per cent., there remains as substances not further identified 5·38 per cent.

The nitrogen present in the residue of the seeds after extraction with solution of soda amounted to 5·62 per cent. = albuminoids 35·40; or calculated on the original seeds 12·19 per cent., showing a total loss of 15·21 per cent. (see *XI.*,) of which 5·58 per cent. were present in the aqueous extract, and 5·41 per cent. in the wash water, leaving a residue of 4·22 per cent. dissolved by soda. Of these 4·22 per cent. 2·16 per cent. have been accounted for; the remaining 2·06 per cent. are probably to be referred to albuminous substances soluble in water, not removed by treatment with solvent and accounted for here under the 5·38 per cent. unidentified substances.

VIII. Treatment with Sulphuric Acid.—The residue of the seeds (after washing and drying) was macerated with sulphuric acid (1 vol. diluted with 4 vols. water) for forty-eight hours. The filtrate, which was almost colourless, contained no oxalate of calcium, and on dilution with alcohol gave but a very trifling precipitate. No further notice was taken of this solution.

IX. Treatment with Chlorine Water.—After removal of the sulphuric acid by washing with water the residue was treated with 500 c.c. chlorine water (containing 0·538 per cent. chlorine), and after forty-eight hours standing, collected, washed first with water, then with very dilute (0·3 per cent.) solution of potash, finally with alcohol, dried and weighed. The loss in weight by treatment with sulphuric acid and chlorine water amounted to 0·1925 = 3·85 per cent.

The substances already removed from the seeds amount in all to 82·05 per cent., leaving a deficit of 17·95 per cent. not yet accounted for.

X. Estimation of Cellulose.—1·5595 gram of the powdered seeds were freed from oil by treatment with ether, and then mixed with 50 c.c. nitric acid (1·16 sp. gr.) and 1 gram chlorate of potash; the mixture was gently warmed to set up the action and then allowed to stand two days. After dilution with water the resulting cellulose was collected on a tared filter, washed first with water, then with weak ammonia, finally with alcohol. It weighed when dry 0 1330, and contained ash 0·0032. Cellulose = 0·1298 = 8·32 per cent.

Deducting the cellulose, 8·32 per cent., from the substances not yet accounted for, there remain 9·63 per cent. substances removed by the digestion with nitric acid and chlorate of potash, or deducting ash 2·11 per cent., 7·52 per cent.

XI. The analysis of the residue insoluble in solution of soda shows that these substances must be very rich in nitrogen. Possibly they represent an insoluble form of albuminous matter. The estimation of the total nitrogen present in the seeds amounted to 4·35 per cent. (mean of two estimations), equivalent to albuminous matter, 27·64 per cent. These albuminous substances are distributed as follows:—

Dissolved by Water . . .	10·99 per cent.
" " Soda Solution .	4·22 "
" " treatment with Chlorine Water, and with Chlorate of Potash and Nitric Acid	12·43 "

Recapitulation.

Moisture	7·43
Ash	4·14
Fixed Oil	37·00
Volatile Oil	1·64
Albumen (sol. in water)	8·22
Mucilage	1·90
Organic Acids ppt. by Cu	0·38
" " " Pb	0·59
Sugar (Glucose)	2·75
Arabic Acid? (*V.* (*a*))	3·21
Undetermined Subst.	1·79
Albumen (sol. in soda)	2·14
Metarabin	1·36
Other Subst. dissolved by Soda . .	5·38
Melanthin	1·41
Traces of Oil, etc., removed by Alcohol	0·53
Dissolved by Chlorine Water and Sulphuric Acid	3·85
Removed by Chlorate of Potash and Nitric Acid	7·52
Cellulose	8·32
	99·56

Conclusions.

The close analogy which the melanthin of *Nigella sativa* bears to the helleborin of the botanically nearly related *Helleborus* carries out the anticipation of Dragendorff, that plants naturally closely allied frequently contain similar important constituents. At the same time, the well-defined alkaloids which characterize *Delphinium* and *Aconitum* appear in *Nigella* to be entirely unrepresented. Possibly a connecting link could be found in the fat acids of the stavesacre seeds, which have not as yet been subjected to a thorough investigation, just as the presence of myristic acid in the *Nigella* seeds points to the *Myristicaceæ* as not standing far removed.

The pæoniofluorescin of Dragendorff and Stahre differs from the fluorescent substance of *Nigella* in its insolublility in petroleum ether. The presence, however, of a substance resembling the phlobaphens has been shown, and although no tannin could be found, it may be regarded as resulting from the decomposition of a body belonging to that class.

Noteworthy in the seeds is the presence of volatile oil, which in Ranunculaceæ is generally absent. Connecting this with the fact that nigella is one of the few Ranunculaceous annuals, and dependent therefore on its seeds for its propagation, it does not appear improbable that the antiseptic ethereal oil should act, in the universal "struggle for existence," as an additional protection to the seed. As has already been pointed out, melanthigenin stands in a simple relation to that portion of the volatile oil found by Flückiger to possess the formula $C_{20}H_{34}O$, the production of which from melanthigenin would only be another of those cases of reduction, which in the life of the plant play so important a part. The difference in the amount of melanthin obtained from Russian and German seeds may be due to the different circumstances under which the seeds were grown. The latter were a trifle smaller, but it is possible that the severer Russian climate exerts an influence on the ripening of the seed. From unripe seeds I should expect a larger percentage of melanthin than from the Russian or German seeds now analysed.

As to the object of melanthin in the seeds, be it observed that, like saponin, this body possesses considerable emulsifying properties, and is probably of service in the secretion of the fixed oil.

Finally, the nitrogenous body isolated seems deserving of closer investigation. Agreeing with the albumens in the qualitative reactions, it differs from them in important characters, viz., easy solubility in water, and in forming with barium a compound from which carbonic acid fails to precipitate the base.

Dorpat, Russia.

THE EXHIBITION OF PHARMACEUTICAL APPARATUS, ETC.

(*Concluded from page* 997).

The only pill machines exhibited were those patented by Mr. Cocking. The smaller one (fig. 14), Cocking's cylindrical piper, consists of two grooved

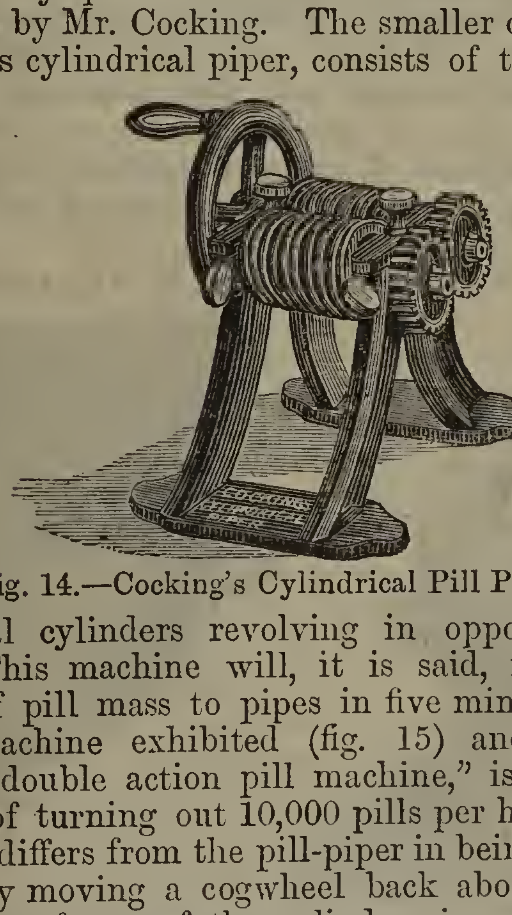


Fig. 14.—Cocking's Cylindrical Pill Piper.

horizontal cylinders revolving in opposite directions. This machine will, it is said, reduce one pound of pill mass to pipes in five minutes. The larger machine exhibited (fig. 15) and called a "patent double action pill machine," is said to be capable of turning out 10,000 pills per hour. This machine differs from the pill-piper in being arranged so that by moving a cogwheel back about an inch the action of one of the cylinders is reversed, the one then revolving in a downward and the other in an upward direction, so that the pipes if laid across the space between the cylinders are immediately

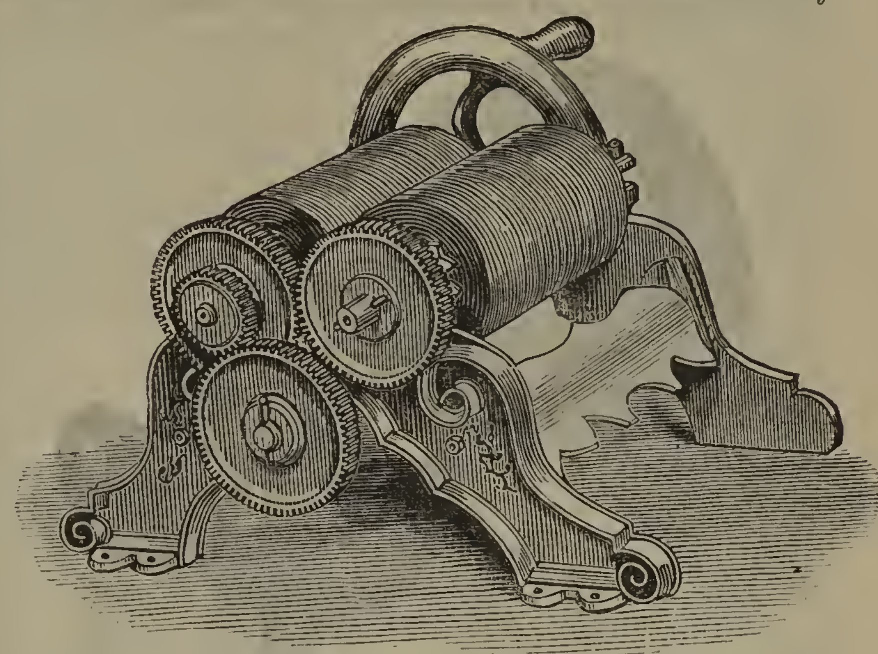


Fig. 15.—Cocking's Patent Double-Action Pill Machine.

cut and rolled into pills as fast as they can be made to succeed to one another.

One of the most ingenious pieces of apparatus in the Exhibition was a machine for printing the names on each pill, exhibited by M. Vial, of Paris. This instrument consists of a hopper in which the pills are placed and from which the pills pass down a tube one by one and are dropped into a hole in a revolving cylinder, from whence one turn brings them under a wheel, furnished with type that takes the ink from another wheel with which it comes in contact at each revolution. The pill is ingeniously kept in place, while it is being printed, by a pin which rises at the right moment; the next turn of the handle depresses this pin and causes another to rise which pushes the printed pill out of the machine. According to the inventor, from 25,000 to 30,000 pills can be printed in ten hours at the rate of fifty turns a minute. The whole apparatus does not occupy 18 inches in length by about 6 in width and is worked with the greatest ease. Another simple but ingenious contrivance, by the same inventor, is a pill finisher, which consists of a movable ring in which a flat disk of wood works freely. Pills of any size can therefore be finished by the same instrument, instead of having, as with the ordinary pill finisher, to use a separate one for pills of different sizes.

A pill-counting machine was also exhibited by Messrs. Lynch and Co. This consisted of a trough or open box, having at one end twenty-four small holes of a sufficient size to easily admit of one pill passing through each. The trough is suspended on two pivots, fixed in lateral supports; underneath the trough is a spring flap, which when pressed admits one pill through each hole, and when the pressure is released and the machine tilted delivers the twenty-four pills through a tube into a pill box placed beneath the instrument. The number of holes can be reduced by covering them with stops, which may be fixed securely by a screw pressure at the side, and thus the trough being filled with pills, six, twelve, or twenty-four pills can be delivered as rapidly as the machine is tilted and the flap pressed or the boxes placed beneath the delivery tube.

Of pill coaters there were three forms exhibited. One by Messrs. Bourne and Taylor, called Cartner's patent pill coater (fig. 16), consists of a spherical copper vessel, open at one end and made to revolve in a semi-vertical position by turning a handle connected with cogwheels. No. 1 size is said to coat a pound of pills in fifteen minutes. In using it the globe is set in motion and revolved about twenty times a

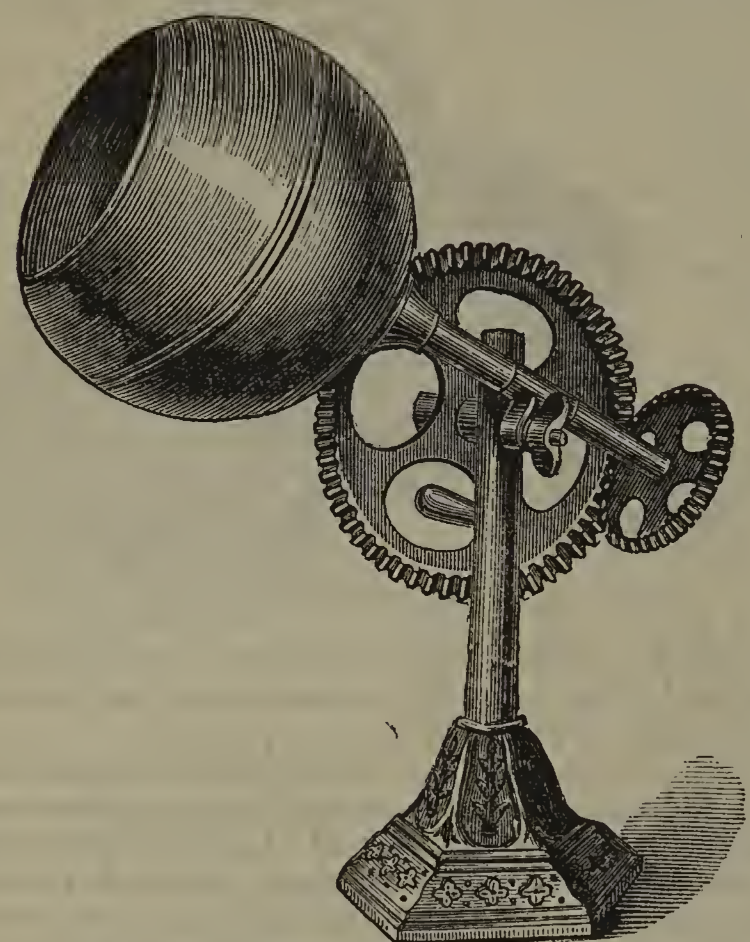


Fig. 16.—Cartner's Patent Pill Coater.

minute, a thin solution of syrup and mucilage (½ drachm of each to 1 oz. water) being sprinkled over them during their revolution, and in about two minutes afterwards a little finely powdered French chalk, repeating the operation as often as requisite.

The pill coater exhibited by Messrs. Lynch and Co. consists of a closed cylinder in a horizontal position, supported on two posts, the pin on which it revolves being attached to the cylinder so as to give it an oblique position when at rest, and an eccentric motion when the handle attached to it is turned round.

Mr. Hoddinott's pill coater essentially consists of a cylinder revolving horizontally and possessing a few small holes to let off the superfluous chalk. The advantages claimed are: (1) the horizontal revolution of the cylinder gives an increased "throw" to the pills, so that each is thoroughly and equally covered; (2) the perforations dispose of superfluous powder, the presence of which prevents the pills from polishing.

Messrs. Symes and Co. exhibited a form of percolator for continuous extraction. The receiver is placed in a tin can containing water and heated by a gas burner, and as the fluid percolates into it, a portion of the spirit continually ascends in the form of vapour through a tube in the centre of the percolated mass, and coming into contact with a vessel containing cold water or ice, which fits on the top of the percolator, is condensed and falls back as pure spirit on the mass to be percolated.

Messrs. Erhardt's capsuling machine (fig. 17) for

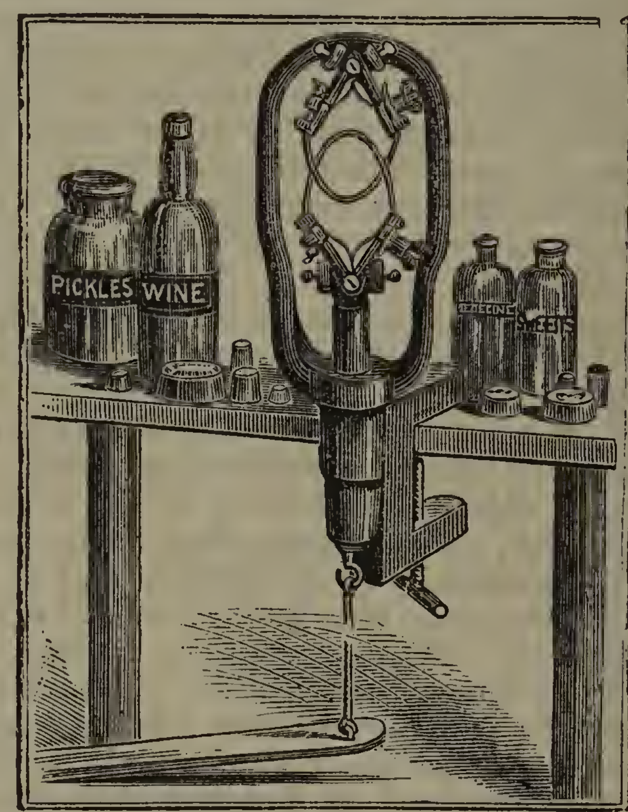


Fig 17.—Erhardt's Capsuling Machine.

quickly covering bottles with metallic caps, is a small instrument which can be attached to the counter by a clamp. The capsule having been placed on the top of the bottle is pushed between the two cords, and the cords tightened so as to be pressed close to the neck of the bottle, the pressure being applied by means of a treadle, and afterwards removed and the bottle then disengaged quickly by a spring in the lower part of the machine.

Messrs. Wyleys, of Coventry, exhibited a cheap and effective student's microscope, materia medica cabinets for medical and pharmaceutical students, and a number of microscopical slides illustrating botany, objects of materia medica, and various chemicals; also a student's chemical balance and volumetric apparatus, etc.

Johnson's hydraulic filter (fig. 18), exhibited by

FIG. I.

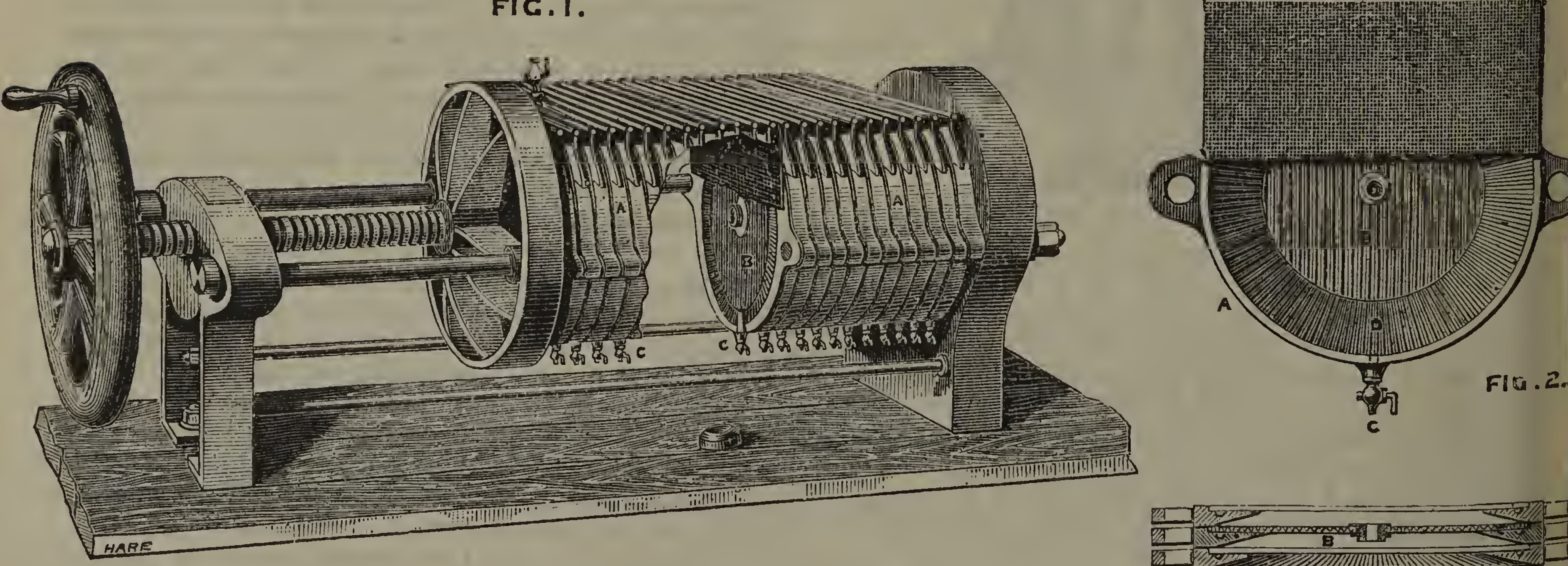


Fig. 18.—Johnson's Hydraulic Filter.

Mr. N. Nutter, attracted much notice from chemical manufacturers. In this machine, the substance to be pressed is placed between cloths and put between the vertical plates of the press and the fluid runs out at the bottom perfectly clear. It is said to be especially suitable for precipitates, from which it is desirable to remove as much as possible of the mother liquor and the salt contained in it, such as peroxide of iron or alkaloids, the pressed cake being thin. This result is obtained in less time and with greater certainty than if the pressed cake be thick, as in an ordinary press. The machine is easily cleaned and is said to be very lasting.

Mr. P. Burton exhibited Kenrick's American drug mill in action (fig. 19). This mill was shown at an

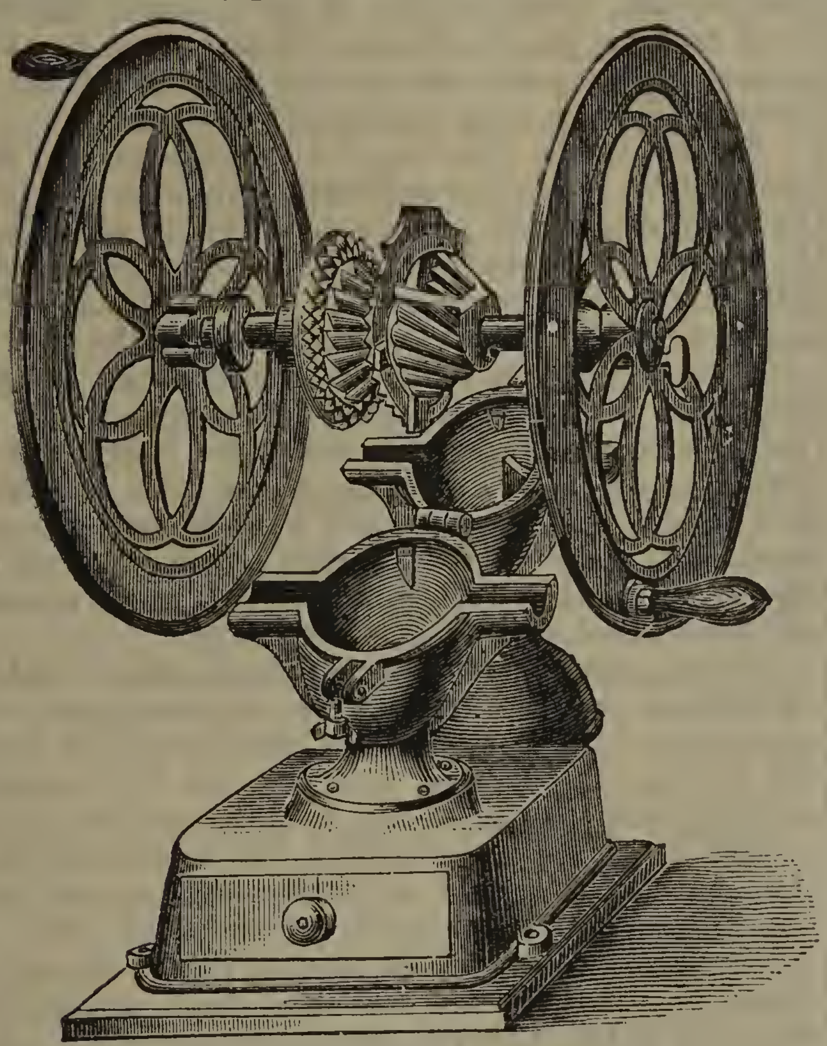


Fig. 19.—Kenrick's American Drug Mill.

evening meeting of the Society in 1877. It is stated to grind powders sufficiently fine for percolation, provided that they do not contain much resin or fixed oil. The above figure shows the mill opened for cleaning.

Of plaster spreading machines only one was exhibited, by Mr. E. Oberdorffer, of Hamburg. In this apparatus the calico, or other material, is fastened to a roller, from which it can be unwound at any rate required by means of a handle and clamp; it is then passed under a funnel-shaped trough, containing the melted plaster, and heated by a row of small gas jets; finally it passes over another roller, over which it is pulled by the operator, arrangements in the machine permitting of any desired width and thickness being spread.

A very pretty model of an exhaustive percolator and air pump, designed and exhibited by Mr. J. G. Oliver, of Brighton, attracted considerable attention. It consists of a stand, in the centre of which is supported a double metallic cylinder, with a piston working in the central one. The outer cylinder is moved over the inner, to which it fits closely, by a handle and cogwheel at the side. In the central cylinder the substance to be percolated is packed between metallic gauze strainers and the liquid is poured on the top of it. When the outer cylinder is drawn down by means of the handle, a vacuum is gradually produced, and the liquid is, so to speak, drawn through the mass to be percolated. The outer cylinder has two taps at its base, and to make the apparatus into an air-pump one of the taps is closed, and the other connected with the vessel to be exhausted by means of an indiarubber tube.

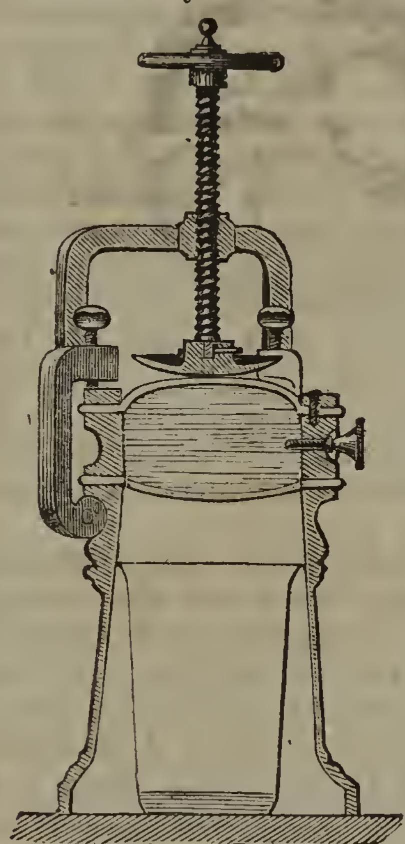


Fig. 20.—Christy's Tannin Testing Apparatus.

Messrs. T. Christy and Co. exhibited a small apparatus for testing the amount of tannin available for tanning purposes in barks, leaves, pods, etc. (fig. 20). In this apparatus a decoction of the substance to be tested is deprived of its tanning material by being made to percolate through a piece of hide of given size, and the liquid tested before and after the operation.

The improved label damper exhibited by Mr. Gall, of Carshalton, differs from the ordinary form in having a second roller covered with vulcanized indiarubber above, but coming into contact with the first.

Other objects exhibited in this room were Messrs. Bourne and Taylor's collodion filters, which have glass covers, fitting air-tight, and a tube in the funnel to allow the air to pass from the receiver back into the funnel as it is displaced by the liquid.

The Silicated Carbon Filter Company also exhibited various filters, including some for use in hot climates, for travellers, for shop and home use, etc.

In the room devoted to mineral waters, there was an abundance of material, the taste of some of which the visitors evidently enjoyed.

Among the aerated waters Messrs. Corbyn and Stacey exhibited Zoedone; while Messrs. Idris, Trevena and Co. exhibited Phosphade, an effervescing solution of various hypophosphites; Peptade, a similar solution of pepsine; lemonade, potash and other waters. The last-named firm also exhibited an effervescing solution of carbonate of magnesia in syphons for dispensing use, which is said to have the advantage of not depositing any magnesia in crystals, the solution remaining clear until the bottle is emptied.

Messrs. Godfrey and Cooke exhibited a solution of hypophosphites, under the name of Eau Restaurative; whilst, on the other hand, Messrs. Palk and Smith showed a liquid, under the name of Sparkling Rozelle, which is stated to be a non-alcoholic tonic fruit beverage, and unlike some of its rivals boasts of being free from phosphorus in any form. Mr. Riley exhibited ginger ale which was claimed to have the advantage of never becoming "mothery." Some of these liquids were evidently much approved of, judging by the celerity with which the bottles were emptied, zoedone, phosphade and lemonade being especially appreciated by the visitors.

Messrs. Prentice Brothers, of Stowmarket, exhibited their "chemical manure" for stimulating the growth and blossoming of flowers, and made an attractive show with specimens of flowers which had been treated by it. Messrs. Palk and Smith, of Torquay, also exhibited a similar compound.

In the room containing scientific apparatus, to which reference has been previously made (p. 977), Messrs. Cetti and Co., also, exhibited several useful pieces of apparatus, amongst which more especially worthy of notice were a petroleum test apparatus as supplied to Trinity House and required by Act of Parliament; Dr. Mills's colorimeter, in which a movable white disk shows by its position in the tube containing coloured fluid the difference in tint as compared with a similiar disk in a standard solution, the colorific value being read off in figures on the side of the testing tube; the distance of the disk from the surface of the fluid indicating the depth of colour. Another useful piece of apparatus was Dr. Russell's and Dr. West's apparatus for estimating urea in urine, in which the amount of urea is estimated by the quantity of nitrogen given off when urine is warmed with a standard solution of hydrobromite of sodium.

An excellent series of microscopes was exhibited by several makers. Messrs. Baker and Co. showed also the most recent forms of microtomes for cutting sections, and various forms of camera lucida; also botanical lenses on adjusting stands, which form a very cheap dissecting microscope for students. A binocular dissecting microscope with the tube bent almost at a right angle was evidently new to many of the visitors, and appeared to be an excellent instrument.

Mr. C. Collins exhibited a full-size Harley binocular microscope, cheap botanical dissecting microscopes, histological and pharmaceutical microscopes and microscopic slides. The largest collection of microscopical slides was, however, that of Mr. E. Wheeler, which seemed to be drawn from all the kingdoms of nature, animal, vegetable, and mineral; some of them were of extreme beauty, and others of much interest to pharmacists. The slide of tonga, the new remedy for neuralgia, was a remarkably pretty object.

Messrs. Field and Co., of Birmingham, had a cheap and very compact instrument for the use of pharmacists; also a useful polarimeter of a low price, having a polarizer and analyser of Jellett's and Nicol's prism respectively, and tube of 100—200 millimetres for holding essential oils, etc., when under examination. A similar cheap polarimeter was also exhibited by Messrs. Schmidt and Haensch, of Berlin. These instruments are now coming into somewhat general use, not merely for essential oils, but for testing alkaloidal and other solutions. The last-named firm also exhibited a cheap microscope with a curious rachet movement connected with the stage, so that by moving a small lever with the fingers the glass slide is made to travel backwards and forwards, at the same time being pushed upwards in such a manner that no portion of the object on the slide can possibly escape observation.

Messrs. Murray and Heath exhibited their "Steinheil's Applanatische Loupen," a new combined achromatic triplet magnifying glass, resembling a Coddington lens in power, but allowing more light to fall on the object, the focal distance being greater, and forming a very useful lens at a moderate price for examining minute objects. It is stated that the demand for these little lenses is in excess of the supply.

Mr. J. Swift exhibited several valuable microscopes with all the recent improvements of construction; one of these was a new petrological microscope for viewing biaxial crystals of extreme wide angle, the two systems of rings being brought into the field of the microscope by a special optical arrangement of the inventor.

The room containing the medical appliances and shop fittings seemed to be the one most interesting to visitors, next to that containing the pharmaceutical and gas-heating apparatus.

In this room Filmer Kidston's handsome prize dispensing counter formed a prominent and ornamental feature in the centre. It was furnished with many of the recent improvments; the pill machine, cork presser, etc., being capable of being drawn out and used without placing them on the counter, and the sponge case so arranged that the sand would not be scattered on removing a sponge.

A very useful show case was exhibited by Mr. Howlett, in which the ordinary trays were replaced by movable drawers; this was shown to advantage by being placed in the chemical department and filled with numerous bottles of chemicals while others were placed on the shelves outside the case.

Messrs. Allen and Co. exhibited their useful apparatus for invalids, including various forms of kettle for use in bronchitis, the water being heated either by a lamp or over a fire, as desired. Inhalers, a ventilating croup kettle, and a useful food warmer for infants and invalids were also shown. Several of these are probably already well known to the readers of this Journal, or if not, deserve to be.

Messrs. Arnold and Sons exhibited a large number of enemas, with all the latest improvements and combinations, so that some of them could be used for rectum, vagina, eye, ear, nose or for cleaning wounds, an arrangement which, however economical, strikes one as not altogether an agreeable one. Among other improved apparatus exhibited by this firm were a patent clinical thermometer, with a coloured scale to render the reading more easy, and a constriction to prevent the index from descending into the bulb; Lister's carbolic steam spray producer for surgical operations; and a new patent constant current battery, with high electromotive force, requiring to be recharged only once in two years, if used with ordinary care.

Messrs. Lynch and Co. exhibited a very pretty and powerful perfume spray diffuser, the jet being produced by a piston, and continued for some seconds after pressure is removed; a new form of adjustable truss; and glass measures graduated and stamped according to the requirements of the Weights and Measures Act.

Mr. W. Toogood also exhibited a number of glass measures, having the stamp of the Marylebone and Westminster inspectors respectively marked upon them, and also specimens of the standards used by inspectors for testing apothecaries' measures.

The Glasgow Apothecaries' Co. exhibited a number of their patent shop bottles, in which the label is let into a recess in the front of the bottle, the label itself consisting of a curved strip of glass with the label at its back, so that when cemented into the recess, only the glass surface covering the real label is exposed to the action of the air or of fluid running down the side of the bottle; these bottles attracted a considerable share of attention. Others exhibited by Poths and Co., with burnt-in labels, also unaffected by spirit or acids, were much admired, as well as some porcelain grease-proof jars for ointments, with similar labels. Cheap wooden hollowed-out blocks for sending bottles by post, and flat pill boxes with an overlapping rim, so that the lid cannot easily be crushed in by pressure, and coloured inks in powder were other useful and curious articles shown by the same firm.

Messrs. Bourne and Taylor exhibited absorbent cotton wool, spray producers, improved feeding bottles, clinical thermometers, etc., and a very useful little article, made of boxwood, for extracting stoppers which have stuck fast in bottles. Messrs. Erhardt and Co. showed tinfoil of remarkable thinness and polish, five thousand sheets being not more than an inch in thickness. Some pliable vegetable parchment exhibited by the same firm also seemed to be generally approved of, and the request on the label, "Please take a sample," was very generally complied with.

Among other articles of interest were Cowan's vaccination shields, for preventing the clothes from touching the part of the arm which has been vaccinated and thus preventing irritation. Cauty's poultice bags, exhibited by Messrs. Ayrton and Saunders, consist of an indiarubber bag with a spongio-piline surface and capable of containing hot water. These were of different shapes, one of the most generally approved of which appeared to be in the form of a collar for the neck, to be used for mumps, bronchitis or sore throat, etc. Messrs. Gabriel and Troke's capsuled horse balls consisted of a gelatine capsule with a gelatine label, containing the ingredients in a somewhat softer and more readily soluble state than could be possible if not enclosed in a capsule.

A VISIT TO THE NATIVE CINCHONA FORESTS OF SOUTH AMERICA.*

BY HENRY S. WELLCOME.

(*Concluded from page* 1002.)

All barks enter the market bearing certain brands, such as "J. P.," or "T. B." These brands gain a reputation according to the quality of bark they represent, but it is sometimes the case that as soon as a brand has established a good name the dealer sophisticates with inferior grades.† No large buyers of Europe or America purchase cinchona barks without first making careful assays; but, even with this precaution, they are sometimes deceived, on account of the adroit manner in which the barks are mixed.

The points of shipment for Ecuadorian barks are Guayaquil and Esmeraldes; for the barks of Northern Peru, Payta; from Southern Peru and Bolivia, Arica, Islay, Iquiqui and Callao. A limited quantity of Bolivian bark is exported by way of the Amazon to Para.

The greater portion of the bark produced in the northern and eastern districts of the United States of Colombia reaches the market by way of Carthagena and Barranquilia, on the Caribbean coast, but that collected in the State of New Grenada is mostly shipped from Buenaventura, on the Pacific coast.

Venezuela furnishes very little bark,* and that is sent from Puerto Cabello.

As regards the prospects for future supplies of cinchona barks from the native forests of South America, the outlook is exceedingly discouraging; the greatly increased use of cinchona alkaloids during the past few years, with the consequent demand for larger supplies of bark, has caused a very thorough working of the old forests and energetic seeking for new ones. The discoveries of paying forests are becoming more and more rare every year, and the new forests are found at greater distances from the shipping ports and more difficult of access.

The tract of country yielding the cinchona is not so unlimited as some writers would lead us to believe, nor is the supply inexhaustible; it is a fact recognized by natives and dealers, who are well informed about the extent and resources of the cinchona-bearing districts, that if the present ruinous system of destroying the trees is continued and no effort made to propagate new growths, they will before many years be practically exterminated from their native soil.

With the abundance of seeds yielded by the cinchonas one would naturally expect young plants to spring up in great numbers, but such is not the case; the light-winged seeds mostly fall upon and adhere to the ever-moist foliage, where they quickly germinate and decay; or if, perchance, they fall to the earth, it is almost impossible to gain a rooting, as the soil is covered to the depth of ten to twenty inches with loose, decaying leaves. Beyond all doubt the cinchonas might be successfully cultivated in their native country, especially in the localities of the exhausted forests; but the natives show no enterprise and foreigners receive no encouragement from the Government to attempt it.†

Two Germans have made a venture at cultivating cinchonas near the city of La Paz, Bolivia, but as yet the plants are not sufficiently developed to determine the results.

The almost continuous revolutions and wars in those South American countries so unsettle everything as to render investments hazardous; the roads and ports are sometimes blockaded for months, preventing the importation of goods or shipment of barks, often entailing heavy losses upon the dealers.‡

In case of war or revolution every Indian peon is subject to military duty, and if required is forced to enter the army; sometimes it is impossible to obtain sufficient cascarilleros to make it pay to enter the forests; hence it is that political troubles in those countries so greatly influence the price of bark and quinine.

We have no reliable history of the discovery of the medicinal virtues of cinchona bark, and the question as to whether or not its therapeutic value was known to the Indians before the Spanish conquest is still a subject of controversy. Of the several legends extant regarding its discovery and early history, one is of a certain saint who saved the life of a very holy padre§ by divulging to him the medical virtues of cinchona; this is told with several variations. The version which savours most of reality is that a padre was cured of fever at a small village, near Loja, by a decoction of cinchona bark administered to him by an Indian cacique.||

A legend which has gained wider circulation—probably on account of its romantic character—is that while a

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* From the 'Proceedings of the American Pharmaceutical Association,' 1879.

† I was told of one merchant who, thinking his brand sufficiently well established, made a very large shipment of high-grade bark, with which he mixed about one-third of inferior quality; but the trick was detected in the foreign market, and his entire lot could only be sold as inferior grade, causing a heavy loss and serving him a very just punishment.

* The tapering-off points of the Andes, as also of the cinchona-producing forests, are in Venezuela.

† The Dutch and British Governments have shown great wisdom in taking such energetic measures to insure against the possibility of the world's bark supply becoming exhausted, and happily their experiments in their Eastern plantations are proving successful.

‡ During a revolution the property of any person suspected of sympathizing with a rival party is liable to be confiscated.

§ Jesuit priest.

|| Priest of the worshippers of the sun.

body of Spanish soldiers* was passing through the forests, one of their number was attacked by fever and left by the way to die. To quench his thirst he drank from a pool of water in which grew a cinchona tree; very soon he recovered and joined his comrades, heralding his salvador.†

The Spanish priests endeavoured to destroy every relic of native civilization, giving as little credit as possible for the many valuable products which they obtained from the people, whom they reduced from wealth and thrift to the most degrading serfdom; defiling their magnificent temples of worship and forcing‡ upon them a form of religion§ which, to this day, they observe only as a ceremonial performance, hedged about as it is by superstition and ignorance.||

It was the policy of the conquistadors to appropriate to themselves all creditable things. This is undoubtedly the reason why we have no authentic history of the medicinal use of cinchona by the natives at the time of the invasion.¶ It may be that its use was not general among all the Indian tribes, as the forests of Ecuador and Northern Peru** were the only sources from whence bark was collected by the Spaniards for nearly a century after it was introduced into Europe. However, this may be attributable to the fact that the Indians were (and they are now) very secret about the source of their remedies.

Several eminent travellers state (from hearsay, I suspect) that the Indians could not be induced to take cinchona bark as a medicine, and that they would not believe it was sought by foreigners for other than dyeing purposes. If this be true, how is it that the term applied to cinchona bark by the Indians is quinia-quinia, which signifies medicine bark? Herndon and Gibbons state that the Indians of the Matto-Grosso country use an infusion of red cinchona bark, which they deem a very efficacious remedy for calenturas.††

Ecuadorian Indians told me that they regarded it as a specific for fevers.

I was informed that pieces of the bark had been discovered in some of the ancient tombs; but I was unable to have this verified by positive proof.‡‡ It is very probable that such relics have been found, as I obtained specimens of *Erythoxylon coca* leaf§§ from the old Inca tombs in Peru.

It is a general belief among the natives that cinchona bark was well known and highly regarded as a remedy by their ancestors long before the Spaniards, under the daring Pizarro, invaded their coast.

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* After or about the time of the conquest of Peru.

† This legend is especially commended to the credulity of believers in high dilution.

‡ By establishing the Inquisition.

§ With all respect to the religion of Christ and its redeeming qualities.

|| It is told that a party of priests, borne on the backs of Indians, went as missionaries among the Napa Indians (a tribe that had never acknowledged the authority of the Spanish invaders), soliciting them to accept the religion of the cross, like the other nations (who after the fall of Atahualpa humbly accepted the yoke of oppression); but the heathen, shaking their heads and laughing with derision, said (pointing to the slaves bearing the Jesuit fathers), "And carry you on our backs? Oh, no. We don't want a god that will transform us into beasts. Our god is the sun; he smiles upon us, gives light, and makes men of us, not dogs."

¶ It was first introduced into Europe under the name of Jesuit's bark.

** At the time of the conquest the whole of Western and Northern South America was known as Peru; hence the name Peruvian bark.

†† Fevers.

‡‡ Experience teaches one to receive all statements made by the natives with due allowance.

§§ Coca was cultivated and used by the natives throughout the country; it is still cultivated, but its use is not so general as before the conquest; more is consumed in Bolivia than elsewhere.

MEDICATED PENCILS.*

BY M. LEGRAS.

The author has recently communicated to the Société de Thérapeutique the following formulæ for a series of medicated crayons intended for use in the treatment of affections of the eyes and face. They are enveloped in a wrapper of tinfoil to preserve them, and another of ordinary paper to prevent them softening through contact with the heat of the hand.

Red Precipitate Pencil.

Pure Glycerine	10	grams.
Cacao Butter	20	,,
Red Precipitate	1·5	,,

Oil of Cade Pencil.

Pure Glycerine	10	grams.
Cacao Butter	20	,,
True Oil of Cade	15	drops.

Iodoform Pencil.

Pure Glycerine	10	grams.
Cacao Butter	20	,,
Iodoform	30	,,
Oil of Peppermint	6	drops.

Corrosive Sublimate Pencil.

Pure Glycerine	13	grams.
Cacao Butter	27	,,
Corrosive Sublimate	1	,,

Balsam of Peru Pencil.

Pure Glycerine	5	grams.
Cacao Butter	20	,,
Balsam of Peru (the resinous matter precipitated)	5	,,

Another Form.

Vaseline	5	grams.
Cacao Butter	20	,,
Balsam of Peru	5	,,

Turpeth Mineral Pencil.

Pure Glycerine	10	grams.
Cacao Butter	20	,,
Turpeth Mineral (Basic Sulphate of Mercury)	1	,,
Salep	2	,,

Another Form.

Pure Glycerine	10	grams.
Cacao Butter	20	,,
Turpeth Mineral	1·50	,,

Tar Pencil.

Vaseline	5	grams.
Cacao Butter	20	,,
Norwegian Tar	5	,,

Belladonna and Opium Pencil.

Pure Glycerine	5	grams.
Extract of Belladonna	5	,,
Extract of Opium	5	,,
Cacao Butter	20	,,

Ophthalmic Pencils.

(*a*)	Red Precipitate	3	grams.
	Oxide of Zinc	3	,,
	Crystallized Acetate of Lead	3	,,
	Dried Alum	3	,,
	Corrosive Sublimate	0·45	,,
	Pure Glycerine	10	,,
	Cacao Butter	20	,,
(*b*)	Red Precipitate	0·30	grams.
	Sulphate of Zinc	0·60	,,
	Vaseline	10	,,
	Cacao Butter	20	,,
(*c*)	Red Precipitate	1·50	grams.
	Powdered Camphor	1·50	,,
	Crystallized Acetate of Lead	1·50	,,
	Vaseline	10	,,
	Cacao Butter	20	,,

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* *Répertoire de Pharmacie*, May, 1880, p. 196.

The Pharmaceutical Journal.

SATURDAY, JUNE 19, 1880.

THE USE AND SALE OF METHYLATED SPIRIT.

In speaking last week of the Bill introduced by the Government to consolidate and amend the law relating to the manufacture and sale of spirits we confined ourselves to stating what were the provisions contemplated by the Bill as it now stands. In most respects they amount merely to a reiteration of the provisions of former enactments, and so far may be regarded as presenting a correct view of what the law is at the present time. But in view of the possible passing of this Bill as a measure of consolidation, it must not be forgotten that in several particulars the law has been materially relaxed by various general orders of the Inland Revenue Board. This has been notably the case in reference to methylated spirit, and under the sanction of these general orders several things may be done with methylated spirit which are, according to the strict letter of the law, unlawful.

The prohibitions of the use of methylated spirit are all of such a nature as are requisite for preventing fraud on the Revenue by its application in preparing beverages or any articles that could be used as such, and all of them may be taken as having that object in view. Thus, for instance, the Act of August, 1866 (29 and 30 Vict., cap. 64), provides that neither methylated spirit nor any derivative of it shall be used in the manufacture, composition, or preparation of any article capable of being used either wholly or partially as a beverage or internally as a medicine. But in the application of this Act an exception has always been made in favour of certain preparations for external use, such as liniments, that are required to be made as cheaply as possible. Clause 131 of the new Bill, however, deals simply with the provision in the old Act, stating that if any person uses any methylated spirits or any derivative thereof in the preparation of any article capable of being used wholly or partially as a beverage or *internally as a medicine* he shall for each offence incur a fine of one hundred pounds.

With respect to this clause it may be remarked that it is not at all obvious how the words "internally as a medicine," which are precisely the words used in the existing Act, can be legitimately construed so as to include poisonous liniments and other similar medicinal preparations capable of being used externally only. Nevertheless, as will be remembered, the Council of the Pharmaceutical Society some time since had to use its influence to obtain the consent of the Inland Revenue Commissioners to the use of methylated spirit in the preparation of belladonna and aconite liniments in cases where it is not required that they should be prepared according to the British Pharmacopœia.

Here, then, is one important point in regard to which it will be necessary to embody in the new Bill a specific permission of the use of methylated spirit in making liniments and preparations for external application that are not required to be in strict accordance with the British Pharmacopœia.

Were it not for the importance of the interests involved in connection with this matter it would be almost unnecessary to point out that there are numerous instances in which it is an object to have such preparations as belladonna and aconite liniments made with the most inexpensive materials. Thus, for hospital use and in some kinds of medical practice large quantities of liniments made with methylated spirit are contantly employed, and a prohibition to use the cheaper article would be a great privation to the poorer classes and to charitable institutions.

It was upon the strength of this representation of the case by the Council of the Pharmaceutical Society four years ago that the Commissioners of Inland Revenue issued a general order authorizing the use of methylated spirit in making aconite or belladonna liniment as well as soap liniment and compound camphor liniment. In point of fact the use of methylated spirit for these purposes could not offer any opportunity for fraud upon the Revenue, and since the preparations in question could not be used as beverages, they ought to be quite outside the operation of the law for protecting the Revenue. The exception recognized by this general order ought, therefore, for this reason alone to find a place in the Bill now before Parliament.

But there is a still stronger reason why it should be made quite clear that the use of methylated spirit in making preparations for external use and not required to conform to the directions of the British Pharmacopœia is not unlawful. To make this clear we must revert to the circumstances which led to the representation made to the Board of the Inland Revenue by the Council of the Pharmaceutical Society. Under the influence of an impression that the law prohibited the use of methylated spirit in making preparations for external use, certain makers of such articles had been in the habit of obtaining from the Inland Revenue authorities special permission to use methylated spirit for those purposes. In the month of August, 1876, an official notification was sent to them to the effect that the Commissioners saw reason to withdraw this permission, and in consequence considerable inconvenience and embarrassment was experienced.

Upon reference to the Acts of Parliament bearing upon the matter, it turned out that the use of methylated spirit in making preparations for external application, such as the liniments above referred to, was not in any way unlawful, and that it was indeed quite outside the provisions of the Act relating to the use of methylated spirit. At the time it was pointed out in an article in this Journal that having regard to the object of the legislation concerning the use of the methylated spirit as being exclusively the protection of the Revenue from fraud, it would be contrary to the principle and spirit of the Act of 1866 that any restriction should be imposed upon the use of methylated spirit in preparing articles so incapable of being used as beverages as the liniments of aconite, belladonna, or even those of soap and camphor.

It was also pointed out that the Act itself merely provided that methylated spirit should not be used in the preparation of any article capable of being used as a beverage or internally as a medicine. This is the whole extent of the prohibition. Beyond this the Act provided that if any person sold or had in his possession any *such* article he should be subject to a fine of one hundred pounds. As was pointed out at the time this is clearly to be understood as not applying at all to preparations incapable of being used as a beverage or internally as medicine, and therefore leaving the liniments above mentioned quite outside the operation of the Act.

That was undoubtedly the purport of the Act of 1866, but it so happened that immediately after the Act was passed a general order was issued by the Board of Inland Revenue embodying the provisions of the Act, and in this document there was a clerical error which has given rise to all the misconception that has prevailed. This error consisted in the omission of the word "such," which we have italicized above. By the omission of this word it appeared to be illegal to sell or possess *any* article in the preparation of which methylated spirit had been used.

The circumstance that this general order was circulated by the Board of Inland Revenue may account for its having received more attention than the Act itself, and for the impression under which persons desirous of using methylated spirit in preparing liniments made application to the Board of Inland Revenue to be permitted to do so. Probably the increase of applications of this kind may have caused the Board some difficulty, and have led to the general withdrawal of the permission. That difficulty, however, was overcome by the representations made by the Council of the Pharmaceutical Society, and practically it was removed by the consequent decision of the Board to consent to raise no objection to the use of methylated spirit in the preparation of aconite or belladonna liniment.

But in the fourth division of clause 131 of the Bill now before Parliament the reading of the General Order of August, 1866, is adopted, instead of the words of the Act of that year. The qualifying word "such," as indicating articles capable of being used as a beverage or internally as a medicine, is there omitted, and consequently the scope of the provision as it stands is very different from that of the original Act and from what was really the intention of that measure. As these words stand, although the Bill would allow methylated spirit to be used in an art or manufacture it would appear to render it illegal to be in possession of a substance—a varnish, for instance—prepared under this permission.

Among the articles in the preparation of which methylated spirit is now allowed to be used is chloral hydrate, but it is not so specified in the second part of clause 131, which merely provides that it may be used in making sulphuric ether or chloroform.

In addition to these points there are some others which will probably require revision when the Bill comes before the House. Among these we may mention the provision by which a retailer of methylated spirit is restricted to having in his possession at one time no more than fifty gallons. We believe that under certain conditions this limit is sometimes largely exceeded in practice with the consent of the Inland Revenue Board; but we do not find in the Bill any reference to the conditions under which this may take place without involving liability to the penalty of fifty pounds for infringement of clause 127.

Another point that has been referred to by a correspondent is the difficulty of keeping a strict account of stock in the case of retailers who are often required to sell a few ounces of methylated spirit. In regard to this objection, however, we think it should be borne in mind that the permission to sell methylated spirit is a concession, and that it almost necessarily involves the adoption of such precautionary measures as will adequately prevent improper advantage being taken of it.

From what we have already said of this Bill it will be evident that its further progress through Parliament will have to be watched in the interests of the trade.

REGISTRATION OF FIRMS.

In a recent number (before, p. 778) attention was called to a Bill that was introduced into the late Parliament for the consolidation and improvement of the partnership law, which contained a provision as to the registration of firms that it was suggested might, if carried, be of assistance in carrying out of the provisions of the Pharmacy Act. A similar Bill has now been introduced into the new House of Commons. But it is worthy of notice that the schedule of trades to which it provides that the term "trader" in the Bill shall apply does not contain "pharmacist" or "chemist and druggist," although it does contain "apothecary." It is moreover curious that the word "trader," although defined as applying to persons mentioned in this schedule, is not used in the Bill.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A MEETING of this Association will be held on Thursday, June 24, at 8.30 p.m., when the chair will be occupied by the President, Professor ATTFIELD, F.R.S. A paper will be read on "The Green Extracts of the Pharmacopœia," by Mr. W. A. H. NAYLOR, F.C.S. A Report upon Organic Chemistry will be made by the Secretary.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

June 16, 1880.

Present—Mr. Greenish, President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, T. E. Greenish, Linford, Martindale, Moss, Plowman, Southall and Taylor.

Dr. Greenhow was also present, on behalf of the Privy Council.

MAJOR EXAMINATION.

Nine candidates were examined. *Five* failed. The following *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Chapman, Joseph George ......Binfield.
Evans, John ....London.
Holmes, William Albert ....Kendal.
Jones, William ....Oswestry.

MINOR EXAMINATION.

Eighteen candidates were examined. *Six* failed. The following *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Barnett, John Arthur ....Salisbury.
Bryant, Richard William ......Swansea.
Butler, Christie Havelock ......Tooting.
Carter, William ....St. Neots.
Court, Sydney ....Colchester.
Coverdale, George.................Leeds.
Davidge, Henry Ernest Fredk...King's Lynn.
Davis, Ifor..........................Dowlais.
Dickinson, David ....Boston.
Fitzjohn, Francis ....Whittlesea.
Francis, Matthew Robert ......London.
Leicester, Thomas.................Chester.

MODIFIED EXAMINATION.

One candidate was examined but failed to pass.

June 17, 1880.

Present—Mr. Greenish, President; Messrs. Allchin, Barnes, Benger, Brady, Carteighe, Corder, Gale, T. E. Greenish, Linford, Martindale, Moss, Plowman, Southall and Taylor.

MINOR EXAMINATION.

Twenty-five candidates were examined. *Ten* failed. The following *fifteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Griffith, Philip ....Weston-super-Mare.
Jackson, William Hodgkinson...Crediton.
Joy, Francis John Jessop ......Cardiff.
Leigh, Harold Malcolm ....Dover.
Martell, Richard ....Portsmouth.
Mason, Joseph Robert............Workington.
Moore, Jonathan Reuben ......Kettering.
Parker, William ....Sessay.
Porter, John Thomas ....Coalville.
Rowe, John Bullen ....Ilfracombe.
Simpson, Samuel ....Gosport.
Trible, Edward.....................Launceston.
Vertue, Ernest Sutherland ......Ely.
Wallis, George ....Ryde.
Wilcock, James William.........Brighouse.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's Examination:—

Certificates of the University of Oxford.

Hoare, William Herbert.........Windsor.
Kirton, William Henry ....Boston.

Certificates of the University of Edinburgh.

Hislop, James Andrew............Hawick.
Robison, Ebenezer ....Hawick.

Certificate of the University of Glasgow.

Dalziel, John Logan...............Grahamston.

Certificates of the College of Preceptors.

Gummow, James Freeman ......London.
Haward, George Robert ....Lowestoft.
Hemens, Enoch John ....Banwell.
Morrison, John William Thos. Upper Holloway.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

Wednesday, June 2, 1880.

Present—Dr. Aquilla Smith, Vice-President, in the chair; Sir George Owens, M.D., Dr. Collins; Messrs. Bennett (Kingstown), Brunker, Goodwin, Hayes, Holmes, Oldham, Simpson.

The minutes of the meeting held on May 5 were read and signed.

Read a letter from William S. B. Kaye, LL.D., Clerk to the Privy Council, requesting on the part of a Committee of that Council that in the resolution relating to a course of practical chemistry the names of all the schools intended to be included in the resolution be submitted to them, and the words "and such other schools as may be approved by the Council" be omitted.

The Registrar was instructed to comply with the request.

Read a letter from Mr. John P. Harold, M.P.S.I., of Dublin.

The Registrar to inform him that his letter has been read, and that the Council will give it their consideration.

Read the following report:—

"The Committee appointed for the purpose have inspected the laboratory of the St. Cecilia Street School of Medicine, and beg to report that it appears to be furnished with sufficient appliances and conveniences for teaching practical chemistry."

Thomas Collins, *Chairman.*

The report was received and adopted, and the above school was ordered to be placed on the list of those recognized.

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, June 10. Mr. H. Allen, Vice-President, in the chair.

The Secretary read a paper by Mr. R. W. Houghton, of Hong Kong, on "Cinchonas forwarded to India." The paper described the condition of some cinchonas during their voyage to India. The plants, which were in the charge of the Curator of the Royal Botanical Gardens, Calcutta, were destined for the Neilgherries and Darjeeling and were packed in Wardian cases. There were six Calisaya de Santé Fé (soft Columbian) and four Carthagena Crown Plants. The author was given to understand that the former were the first of the kind sent to India, and it is anticipated that a larger yield of quinine will be obtained from them than from the better known barks. The young shoots kept up well till in the vicinity of Port Said, when a parasitic fungus formed on the centre of the stem and they began to droop. On nearing Ceylon, however, there was an improvement, and on reaching Point de Galle there was every indication of their being landed alive in India. The author has since learnt that they have been planted in the Neilgherries. The four Carthagena plants grew perceptibly during the voyage and received no check whatever, being finally deposited at Darjeeling. Mr. Houghton suggests that when parasitic fungi appear on the stem of cinchonas a solution of sodium hyposulphite should be brushed over the fungoid growth; also that delicate cinchonas, Calisaya de Santé Fé for instance, should be less tightly packed than more hardy plants; and further that the route *viâ* the Cape be selected to forward the plants to India, so as to avoid the Suez Canal and the Red Sea.

A vote of thanks was passed to Mr. Houghton for his paper.

Mr. R. H. Parker then read the following paper on "Chian Turpentine."

Chian Turpentine.

BY R. H. PARKER.

Chian turpentine may now be added to the list (much lengthened of late) of remarkable remedies; a remedy claiming considerable antiquity,—for Theophrastus and Dioscorides were acquainted with this and other products of *Pistacia terebinthus*, L.; a remedy long ago subjected to therapeutical examination and found to possess exactly the properties of the pinic turpentines; still described in our most recent works on materia medica as "obsolete in British medicine," and suddenly, like some startling American invention, flooding the country with astonishment as to its curative properties, and in all probability destined to share in a short time the fate of transatlantic wonders and to sink into greater disuse than ever.

Professor Clay, of Birmingham, prescribed this oleoresin combined with sulphur in cases of cancer, and met with remarkable cures, and a communication of his results to the *Lancet* (March 27, 1880), set almost every physician writing prescriptions for Chian turpentine and sulphur, until the commodity threatens to be unobtainable.

The sulphur seems to have been originally used as an excipient for the remedy when administered in the pilular form. It was added to the emulsion of Chian turpentine because it was not thought desirable to omit any ingredient of the medicine that had been found to give such good results. We can only infer from this that the prescribers were not certain whether it was the turpentine or the sulphur, or the combination of both that had wrought the cures. Indeed, Dr. Battye* seems inclined to attribute this remarkable "melting away of cancerous growths" to the silica, which has been stated by Professor Rodgers to exist in Chian turpentine in the small proportion of ·78 per cent. With such evidence as this, medicine can scarcely be called an "exact science."

The analysis as given by Dr. Battye is as follows:—

Resin and volatile matter . . .	98·06
Ash	1·94
	100·00

The ash after burning was composed of—

Silica	·78
Alumen, iron and silicate of iron .	·029
Lime	·52
Residuum, chiefly fine sand . . .	·62
	1·949

The analysis of the ash seems rather remarkable, for the amount of silica present is given as ·78, while there appears a "residuum" of fine sand of nearly equal quantity, ·62.

Again, "alumen" is a curious ash constituent, and why this should be bracketed with iron and iron silicate does not seem evident. Possibly a typographical error occurs here.

An obsolete remedy having been so suddenly called to the front, it is not surprising that its botanical and geographical sources and all recorded information bearing on the drug should have been sought out and collected.

* *Lancet*, May 1, 1880.

The result is that nearly every journal claiming any connection with medicine or pharmacy has published papers on Chian turpentine. This drug, as every one is now well aware, is derived from *Pistacia Terebinthus*, L., growing profusely on the islands and shores of the Mediterranean and in varying forms throughout Asia Minor, Syria, Palestine, Beluchistan, and Afghanistan. These forms, *P. palæstina*, *P. cabulica* and *P. atlantica*, are considered by Hanbury simply as varities of *P. Terebinthus* produced by development under widely differing conditions.

The tree is not difficult to cultivate; it grows vigorously in the botanic gardens of this country. It is not known in the wild state at present,* although said to have been found wild in 1858.†

Secretion.—Unlike the analogous oleoresins produced by the coniferæ, the secretion of Chian turpentine takes place in the bark only; this accounts for the very small produce, since a large tree will only yield 10 or 11 ounces annually, while as many pounds of oleoresin, or more, are obtained from some pines.

Chemistry.—The proximate constituents of Chian turpentine do not appear to have been separated and subjected to individual analysis. Some light is thrown on the subject by analyses recently made by Wigner,‡ but the constituents given by him appear to have been named only from an examination of their solubilities and general physical characters. Genuine Chian turpentine, he finds, has a sp. gr. 1·050 at 60° F., melts in boiling water and becomes lighter than it, dissolves freely in hot alcohol 60 o. p., but a portion of one of the resins separates on cooling. The small residue from the hot alcoholic solution consists of earthy matter and sand, not of silica which had been in a state of combination as indicated by Dr. Battye in the analysis made by Rodgers.

The composition according to Wigner's results is:—

Volatile oil	9·2 to 12·1	per cent.
Alpha resin of mastic	79 to 81	„
Gamma resin of benzoin	4 to 6	„
Benzoic acid . . .	traces.	
Impurities	2 to 7·3	„

An obviously adulterated sample contained 26 per cent. of volatile oil; its sp. gr. was 1·000. Another, 16·3 per cent. volatile oil and sp. gr. 1·025. The oil distilled from each of these samples differed materially from the true oil in odour, and especially in its rotary action on polarized light.

In conclusion, Wigner says:—"The practical test which results from all these facts is the specific gravity. Genuine Chian turpentine should float in a solution containing 8 per cent. by weight of concentrated sulphuric acid, and should sink as soon as this is diluted. On the other hand, the adulterants used being lighter than water the spurious samples will float in this acid even after it has been diluted, say to three times its volume, and will sometimes even float in pure water. This test is perfectly easy to apply."

This is certainly a somewhat extraordinary conclusion, to isolate the specific gravity as a crucial test; for in an authentic specimen Flückiger and Hanbury found nearly 14½ per cent. of essential oil, sp. gr. 0·869, while Wigner found in one case 9·2 per cent. Probably greater extremes than these might be found among old and new specimens, and since a constituent of specific gravity 0·869 may be present in an oleoresin of sp. gr. about 1·050 in such varying proportions, it is evident that the sp. gr. must have considerable latitude, and cannot, except in extreme cases, be considered proof of adulteration.

Determination of Purity.—Since the annual produce of Chian turpentine is so small (according to Maltass 850 pounds), and the trade is monopolized by the Jews, who

* 'Medicinal Plants,' No. 69.
† Maltass, *Pharm. Journ.*, [1], xvii., 541.
‡ *Lancet*, May 29, 1880.

dispose of the greater part of it in the Turkish Empire, we are prepared to learn that very little finds its way to English markets, and as a consequence, adulteration and sophistication may be expected.

It has been stated that very little of the genuine drug can be obtained. Professor Clay said that out of a large number of samples submitted to him not more than 5 per cent. were genuine; but he does not say by what evidence he proved the discarded specimens to be adulterated. It has been even suggested that the drug originally used by that physician gave evidence of admixture with Canada balsam.

In the midst of so much probable sophistication it is essential that we, as pharmacists, should make ourselves intimately acquainted with the distinctive features which characterize the pure drug. The chemistry of Chian turpentine has not been carried far enough to supply chemical tests indicating its purity; we have, therefore, to rely for evidence of adulteration on its physical characters, viz., the taste, odour, solubility, etc.

The taste is feeble, only slightly aromatic and terebinthinate, entirely devoid of bitterness and acridity. One sophisticated sample which came under my notice had an extremely persistent bitter taste; adulteration with even a small proportion of such a specimen could not escape detection by the taste.

The odour of the true drug is very characteristic, and has been compared to fennel and elemi; but is, I think quite distinct from either. It is pleasantly aromatic, very feebly terebinthinate. The odour is not powerful, and should be observed by triturating the specimen in a warm mortar; under these conditions the coniferous oleoresins are easily detected. It is, of course, impossible for the odour to be diagnosed from a written description; but after making a few batches of pills with this drug, the olfactory nerve becomes perfectly acquainted with its distinctive peculiarities.

In some of the descriptions of true Chian turpentine which have been published of late, considerable stress is laid on its *consistency*. This is absurd, because at the present time samples can be found quite hard and brittle, while others are of nearly treacly consistence, the latter acquiring the former condition by age in consequence partially of resinification and partially of volatilization of essential oil. Either may be used for medicinal purposes; we cannot even say which is preferable, for the therapeutist has not yet told us whether the medicinal activity resides in the resin or in the oil, or whether both are alike good.

Chian turpentine is rarely free from a considerable trace of impurity consequent upon the paucity of its production and the necessary careful scraping when being collected.

Important data may be obtained by making a microscopical examination of the *débris* left from the ethereal or alcoholic solution, since the detection of the pitted tissue so characteristic of coniferous wood is tolerably certain evidence of adulteration.

The solubility of the drug in alcohol is important to observe. It dissolves in one volume of warm rectified spirit (sixty over proof), leaving only earthy impurities, etc.; the solution is not quite bright, but does not deposit to any large extent on cooling. Many of the coniferous oleoresins may be detected by this solvent. It dissolves freely in ether, acetone, benzol, etc., but these solvents do not distinguish it from analogous bodies.

The taste, odour and solubility are perhaps sufficient tests for pharmaceutical requirements, but more certain evidence of adulteration and the extent to which it occurs may be obtained by examining the optical powers of the oleoresin and its constituents with reference to polarized light.

An idea of the optical powers of some oleoresins and their constituents may be gained from the following table, constructed on data furnished by 'Pharmacographia':—

	Tereb. Chio.	Tereb. Canaden.	Tereb. Venet.
Oleoresin .	2 in 1 of acetone 7° right.	4 in 1 benzol 2° right.	2 in 1 benzol 9·5 right.
Resin . . .	Probably left.	2 in 1 benzol 8·5° right.	2 in 1 acetone 12·6 right.
Essential Oil.	12·1° right.	Distilled at 160 F., 5·6° left. Distilled at 170° F. 7·2° left.	6·4 left.

The French and American turpentines vary very much in their optical powers, but most of them are lævo-rotatory, while a few, such as obtained from *Pinus Tæda* and *P. australis*, are dextro-rotatory, while some have no rotary action at all on polarized light.

It will be observed in the foregoing table that the essential oil of Chian turpentine is strongly dextro-rotatory, while those of most other turpentines are lævo-rotatory; also that the *resins* from the coniferæ are dextro-rotatory, while that of Chian turpentine is probably lævo-rotatory, since the essential oil is much more powerfully dextro-rotatory than the oleoresin.

Observations on the optical powers of these bodies are of course only of value when made with the same instrument and the same solutions, comparing the results with parallel experiments conducted with authentic samples of Chian turpentine.

The pharmacy of Chian turpentine is perhaps what concerns us most. At present the drug is administered in two forms, viz., in pills and emulsion. Professor Clay's formula for the pills is, 3 grains of Chian turpentine and 2 grains of sulphur.

A tolerably firm sample of the drug must be used, or the pills will require much hardening excipient, and be inconveniently large. When fresh it is said to be of the consistence of honey. This would be useless for pills, and should be exposed in shallow vessels in a warm air chamber until sufficiently inspissated. Such procedure, of course, entails loss of volatile oil, but a sample hardened by old age could not be objected to; moreover the medicinal activity would probably vary far less than that of some of our potent official extracts, *e.g.*, belladonna, nux vomica, etc., with their varying degrees of consistence and composition.

The Chian turpentine being fairly hard it is easily made into pills by the use of a warm mortar or slab, the sulphur being incorporated with the addition, if necessary, of a little powdered liquorice or marsh-mallow, to enable the pills to retain their form. If the pills are to be coated they should be made tolerably hard, and allowed to stand some time, with occasional rounding, and then covered with very fine French chalk by means of thin mucilage of tragacanth or white of egg.

The emulsion is made with a solution of Chian turpentine in ether of such strength that 2 fluid ounces contain 1 ounce of the turpentine. Professor Clay's formula is:—

Solution of Chian turpentine .	℥ss.
Mucilage of tragacanth . . .	4 ozs.
Syrup	1 oz.
Sublimed sulphur	40 grains.
Water to	16 ozs.

Dose: 1 ounce three times a day.

The mucilage should be quite fresh, but the tragacanth must be thoroughly diffused. As the formula stands the best *modus operandi* is to dilute the mucilage with about half of the water, throw in the whole of the turpentine solution, agitate gently, add the remainder of the water and the sulphur, previously rubbed down with the syrup.

If the mucilage be not fresh, or the sulphur be added before the turpentine, the latter will aggregate into a sticky mass with the sulphur and adhere to the side of the bottle.

Another method is to triturate the turpentine solution in a mortar with powdered tragacanth, gradually add the water and other ingredients as above. This gives a good result but scarcely better than that obtained by the first process.

Almond mixture gives a far nicer emulsion, and if sweetened with spirit of chloroform keeps well; for this suggestion I am indebted to Mr. Branson. With this excipient it should be made as follows:—

℞	Compound almond powder	℥ss.
	Solution of Chian turpentine . . .	℥ss.
	Spirit of chloroform	ʒiv.
	Sublimed sulphur	gr. 40.
	Water to	16 oz.

Triturate the powder with a little of the water, add the solution of turpentine and the remainder of the ingredients.

The facility with which emulsions are made with gum-resins induced me to try to make an artificial gum-resin of Chian turpentine, by incorporating with it while in a fluid state in a hot mortar, a sufficient quantity of powdered acacia gum to render it hard and pulverizable when cold. By triturating this powder with water an emulsion is produced in which the tendency of the oleoresin to aggregate is completely overcome, and even if largely diluted, the resin subsides as a white sediment, which may be readily diffused by gentle agitation.

The addition of a small quantity of powdered tragacanth with the *acacia* is perhaps an advantage, as it gives an emulsion in which there is less tendency for the resinous particles to subside. The requisite quantity of powdered gum must of course vary with the consistence of the oleoresin. The following are the proportions I used:—

Tereb. Chiæ.	ʒj.
Pulv. tragacanth.	ʒss.
P. acaciæ.	ʒiiss.

The mixture should be allowed to remain for some time until thoroughly set, so that it may be easily reduced to a fine powder. It is then made into a thin paste with a little water and triturated until perfectly emulsified. This emulsion is by far the most perfect of any produced.

The tasteless character of Chian turpentine would indicate an electuary as a very convenient form for its exhibition. The following formula gives an elegant preparation:—

℞	Tereb. Chiæ.	ʒj.
	Spirit. Rectif.	ʒij.
	Pulv. acaciæ	ʒj.
	Pulv. glycyrrh	ʒj.
	Conf. rosæ caninæ	ʒj.

The dose may be from half to one teaspoonful.

The oleoresin is dissolved by warming with the alcohol and triturated in a mortar with the powdered gum; the liquorice is then added and finally the confection of hips.

The emulsion made from the artificial gum-resin and the electuary are decidedly the best forms for its administration. The emulsion with almond mixture is the most convenient for dispensing, that with the artificial gum-resin being somewhat tedious. Pills of almost entirely resinous composition are always of doubtful solubility, especially if hard, as these must be in order to retain their form.

A discussion followed in which the Chairman, Messrs. Branson, Hardwick, Hooper and James took part.

Mr. D. Hooper then gave his Report on Botany, being a paper on the "Medicinal Flora of Afghanistan." The author first gave a description of the country of Afghanistan and its climate, and then proceeded to describe the flora, arranged according to the natural system, giving the history, properties and botanical origin of the drugs which are mentioned in the Pharmacopœia, also many of those which constitute the bazaar medicines in India. The paper was illustrated by numerous specimens.

A discussion followed the reading of the paper, after which the meeting adjourned.

SOCIETY OF ARTS.

The Chemistry of Bread-Making.*

BY PROFESSOR GRAHAM, D.SC.

Lecture II.

(*Continued from page* 926.)

I think I have now gone through the more important properties by which we may recognize starch, dextrin, sucrose, maltose, dextro-glucose and lævo-glucose, and I have, therefore, done for the present with the description of the properties of these important carbohydrates.

I have been somewhat lengthy in my remarks on these carbohydrates, and I daresay there are some few here who are very well acquainted with the properties of those bodies, but of course, in lecturing to a public audience, one must consider the audience in general, not those who may happen to have studied chemistry for some considerable period, and are tolerably familiar with these things; but I am bound to deal with these matters in this way, because, if we take a general audience, we shall find there are many who have not had the opportunity of studying chemistry sufficiently long—or perhaps not even at all—to have acquired a knowledge of these bodies. Manifestly, when we come to consider what goes on in the important process of panification, and in the more important process of fermentation, we shall only be groping in the dark if we have not previously laid a solid foundation of knowledge connected with the important properties of these bodies that have to enter into the composition of the bread.

I now revert to the consideration of the phenomena that occur when certain albuminoid ferments act upon starch paste. I pointed out at our last meeting the valuable researches of Mr. O'Sullivan, the chemist for Messrs. Bass and Co., of Burton-on-Trent. It is some few years since he pointed out (not that he was the first, because it was Dubrunfaut who first clearly recognized and named it), a new sugar, to which he gave the name maltose, and, even before O'Sullivan, Musculus gave an explanation of the hydration products brought about by the action of albuminoids on starch paste which was not in accordance with the previous views on the subject.

Six or seven years ago, when I had the honour to address an audience here, I was aware of what had just been published, but it was too late to alter my tables and statements; nor was I prepared to adopt Mr. O'Sullivan's researches in their entirety, so that, even then, I spoke of glucose and dextrin as being the products of the action of albuminoid ferments upon starch and sugar. We now know, however, thanks to the researches of O'Sullivan and to the later works of Musculus and Grüber, and also to those of Brown and Heron, corroborated by other chemists, that under no circumstances does malt infusion ever produce either dextro-glucose or lævo-glucose, but only maltose and dextrin, and, consequently, maltose and dextrin are the products of the action of that important ferment on a solution of starch.

These equations† represent, according to Mr. O'Sullivan, the nature of the reaction. At about 140° Fah. the reaction consists in one molecule of water being added on to a molecule of starch. The molecule I have here made very much larger than I have represented it in a previous table, where it was C_{12}. Here I have multiplied that 12 by six, the value I have given to the n, and the molecule represented here is C_{72}. We have, then, one molecule of maltose formed, and this complex molecule of a dextrin. Under other circumstances, a lower heat and a longer time, two molecules are added on, a similar lesion of the compound molecule takes place, by which two molecules of maltose sugar are formed and β dextrin No. 1. Under still more favourable conditions, four molecules of water are added to the complex molecule; a lesion takes place, by which four molecules of maltose sugar and a less

* Cantor Lectures: Delivered November and December, 1879. Reprinted from the *Journal of the Society of Arts.*

† See before p. 806.

complex molecule of β dextrin No. 3 are formed. Lately, Messrs. Brown and Heron have communicated to the Chemical Society the result of very long researches on the action of malt infusion on starch paste; and they find that, at a temperature of 60 degrees Centigrade, the following set of phenomena occur. They agree with O'Sullivan in the main, but not altogether. In the first place, if you take the molecule of starch, as they have here taken it, to consist of ten times C_{12}, in other words, if you give to that unknown n the value of 10, what occurs, according to them, is this:—

Hydration Products of Soluble Starch. (*Brown and Heron.*) [*a.*]

	j. 3·86	k. 3·86	Resulting Dextrin.
Soluble Starch.	216·0°	0	
(1) $C_{12}H_{20}O_{10}$	209·0°	6·4	Erythro-Dextrin α
+ (2) $C_{12}H_{20}O_{10}$	202·2°	12·7	" " β
+ (3) $C_{12}H_{20}O_{10}$	195·4°	18·9	Achroo-Dextrin α
+ (4) $C_{12}H_{20}O_{10}$	188·7°	25·2	" β
− (5) $C_{12}H_{20}O_{10}$	182·1°	31·3	" γ
− (6) $C_{12}H_{20}O_{10}$	175·6°	37·3	" δ
(7) $C_{12}H_{20}O_{10}$	169·0°	43·3	" ϵ
+ (8) $C_{12}H_{20}O_{10}$	162·6°	49·3	" ζ
(9) $C_{12}H_{20}O_{10}$	156·3°	55·1	" η
(10) $C_{12}H_{20}O_{10}$ (Maltose.)	150·0°	61·0	"

A solution of soluble starch, at first, when examined by a saccharometer, indicates a right-handed rotation of the plane of polarized light of 216 degrees, and the reducing power on Fehling's liquid is nothing. In the course of a few minutes they find that the mixture, when acted on by a solution of iodine, indicates a brown colour. Of course, so long as there is soluble starch, the reaction with iodine would have given a blue colour, but after a few minutes at that temperature the solution indicates a brown colour, with a right-handed rotation of 209°, and 6·4 action on Fehling's solution. In the course of two or three minutes longer there is still a brown reaction, indicating what has been termed by Grüber erythro-dextrin. After that, however, at the particular period, where the right-handed rotation is 195° and the reduction of Fehling's solution 18·9, they find that there is no coloured product, but they obtain an achromatic dextrin. I will not go through the whole of this table, but the ultimate action, when carried out for a considerable length of time, is that no dextrin is left, and that the whole has been converted into maltose sugar, having a right-handed rotation of 150° and a reducing power on Fehling's solution of 61 per cent., that is to say, 100 parts by weight of maltose sugar only reduces Fehling's solution as much as 61 parts by weight of dextro-glucose or lævo-glucose. According to them, what occurs is this:—This very complex molecule, $10C_{12}H_{20}O_{10}$, is hydrated and a lesion occurs, by which the first $C_{12}H_{22}O_{11}$ is cut off, that is, maltose sugar and the complex body which is left has nine times C_{12} in its molecule. The next hydration product is where another C_{12} is cut off. At the successive steps successive molecules are cut off, all these being separate molecules of maltose, till finally, when this hydration process has been prolonged for sixteen to eighteen hours, the whole of the dextrin has been converted into maltose sugar, and the action then upon polarized light is +150°. The sign + on the table indicates that these different reactions, 2, 3, 4 and 8, having a corresponding action upon the ray of polarized light and a corresponding reducing power on the sulphate of copper, have been well established. They think, also, that the reactions indicated by 5 and 6 have been fairly well established, but the lower two have not been so.

Now, you may say to me, what is the practical meaning of all this? What does it matter whether three or four molecules of dextrin are formed, or whether there are a great many? We shall see. The practical result, I take it, is this. You must remember that Brown and Heron, precisely like O'Sullivan, have acted on starch paste, which is the representative of the boiled potatoes of the bakers, with a very powerful hydrating agent, and Heron indicates that, even though he uses so powerful a hydrating agent as a malt infusion, there are a series of dextrins formed, and that, practically, the amount of maltose that is formed at a low temperature with a hydrating agent of weak power, as the albuminoids of wheat, manifestly must give us bodies very rich in dextrin and particularly poor in maltose sugar. Possibly some of you may have forgotten, what I have already mentioned, that the yeast organism converts maltose into carbonic acid and alcohol, but the yeast organism has a very slight action on dextrin. Dextrin is a very stable body. It is so stable, as regards the power of the yeast organism upon it, that the German brewer, for example, and even the English brewer who wishes to imitate him, does all he can to try and obtain, in his infusion before fermentation, as much dextrin as possible from the hydration products of the barley. Now the dextrin is of no use to the baker; on the contrary, the more dextrin the baker forms in the panification process, either by employing bad flour, as I shall have hereafter to point out, or a bad process of fermentation—the more dextrin he forms in a given unit of time—whether it be six hours or twelve hours, the worse colour his loaf will be, because when you put dextrin bodies in the presence of moisture into an oven they are converted into highly-coloured products, and the object of the baker, therefore, must be to find out some method by which he will get as much maltose formed and as little dextrin as possible.

Then, I think, the next point we have learned, not merely from these researches of Heron and O'Sullivan, but from all previous studies, is this—that yeast has a considerable action on flour paste, but that yeast has a still greater action on soluble starch. I shall have to refer to these matters again.

(*To be continued.*)

Parliamentary and Law Proceedings.

PROSECUTIONS UNDER THE PHARMACY ACT, IRELAND, 1875.

In the Northern Division Police Court, Dublin, on June 5, 1880 (before Mr. A. J. O'Donel), James Haughton, carrying on business at 12, Rathmines Terrace, was summoned by the Pharmaceutical Society of Ireland, for compounding a prescription, he not being qualified or registered in accordance with the requirements of law.

Evidence was given that the defendant had made up a prescription, and Mr. H. J. Fennell, the Registrar of the Society, proved that defendant's name was not on the register of the Pharmaceutical Society.

The case was adjourned in order that defendant might have professional assistance, and be prepared with a legal defence.

He stated that he had let the compounding department to a Mr. Newbold. Mr. Newbold was at present absent, and he (defendant) was acting for him.

Mr. O'Donel suggested that Mr. Newbold, who was said to be in Dingle, might be communicated with, that the nature of the agreement might be laid before the court.

In the Southern Division Police Court, on the same day, before Mr. J. W. O'Donnell, a summons against Mr. Joseph Brownrigg, carrying on business at 46, South Richmond Street, Dublin, as Keily and Co., came on for hearing. He was charged by the Pharmaceutical Society of Ireland with illegally compounding a prescription without having been duly qualified or registered. Mr. J. C. Ennis appeared for the Society, and stated that the defendant was fined on a previous occasion for a similar offence, committed when he was carrying on business at Talbot Street. Evidence was given that a prescription was made up at defendant's establishment on the 27th of April last, but the case was allowed to stand adjourned in order that evidence might be produced showing who had made up the prescription. Defendant did not appear.

On June 12, the above cases, which stood adjourned from the previous week, were called on for hearing. Mr. Edward A. Ennis appeared for the Society. The Registrar, Mr. Hugh James Fennell, was also in attendance.

Mr. James Haughton appeared, and submitted to the judgment of the court.

In this case Mr. Ennis stated that as the defendant had promised to abstain from illegally compounding in future, the Society would be satisfied with the infliction of a nominal fine, defendant agreeing to pay the costs of the prosecution.

The court ruled accordingly.

In the case of Mr. Joseph Brownrigg, before Mr. Exham, the defendant did not appear.

The informations were read over, and evidence was given identifying Mr. Brownrigg as the person who had made up the prescription. The Registrar proved that the name of the defendant was not on the register of pharmaceutical chemists.

Evidence having been given that the prescription was written by a duly qualified physician, Mr. Exham, the presiding magistrate, considered the offence fully proved, and fined the defendant £5.

The Proprietary Rights in "Gum Extract."

On Thursday, June 10, 1880, before Vice-Chancellor Sir C. Hall, an application was made in the action of Bush *v.* Young to commit the defendant to prison for disobeying an injunction whereby he had been restrained from selling, imparting or publishing a recipe, which is an infringement of a certain patent known as "Gum Extract," the property of the plaintiff, which is used in the mineral water trade for giving a creamy head or foam to ginger beer and other beverages; the defendant having published and sold a recipe for the preparation of the same compound under the name of "Compound Fluid of Saphacarnium" to be used for the same purpose. The defendant resisted on the ground that the bark used by him was not the same as that used by the plaintiff, being known as "Panama Bark."

The plaintiff, however, proved that this was in fact the same, and the court granted the injunction. The defendant also threatened to publish the recipe unless it were bought up by the plaintiff.

His lordship made an order that in default of defendant paying the costs of the former applications and five guineas for those of the present motion, he should stand committed.

Obituary.

WILLIAM WALTER STODDART, F.I.C., F.G.S.

Mr. William Walter Stoddart, whose death we had recently to record, was born February 24, 1824, at Freshford, near Bath. On leaving school, at the age of sixteen, he was first placed in a carpet manufactory with his father, at Kidderminster, where he learned the usual routine of weaving and dyeing. This, however, was soon given up for chemistry, of which he was especially fond, and he then became the pupil of Mr. Hodgkinson, now a member of the firm in Aldersgate Street. For six years he remained with Messrs. Steele and Smith, of Bath, and soon after leaving them, commenced business for himself in Bristol.

Most of Mr. Stoddart's time for recreation was spent in scientific pursuits, and he occasionally contributed papers to various publications. Amongst others may be specially mentioned "A Singular Compound of Iodine and Quinine," and "The Growth and Nature of Sarcina Ventriculi." He also paid special attention with regard to the potable waters of Bristol, and the air of town dwellings. Geology was with him a favourite study, and he read a paper on "The Lias Formation of the Bristol Neighbourhood" before the Geological Society of London, and those who were present at the meeting of the British Pharmaceutical Conference in Bristol, in 1875, will remember the reading of his interesting paper, entitled "Pharmaceutical Experiments on the Bristol Rocks," which was avowedly a supplement to the series of papers from his pen on Bristol Pharmacology, which appeared in this Journal and were devoted mainly to the plants of the district.

In 1853, Mr. Stoddart joined the Pharmaceutical Society, and in 1868 he was elected a member of the Council. He performed the duties of this office for several years, but eventually the demands upon his time became so excessive that, in 1875, he was obliged to relinquish the seat. Whilst a member of the Council, he was, in 1873, requested by his colleagues to deliver the Inaugural Sessional Address to the students.

Mr. Stoddart was, for two years, Preident of the British Pharmaceutical Conference, at Liverpool and Edinburgh in 1870 and 1871, and at its meeting at Sheffield last year he read a paper on the subject of his latest researches with regard to the growth of ergot, which were unfortunately interrupted by his health giving way.

Mr. Stoddart's services to pharmacy in prominent representative positions were not allowed to prevent his help being extended to young pharmacists in the more limited sphere of his immediate district. He took an active part in the management of the Bristol Pharmaceutical Association, and in connection with it he for some years conducted classes in his favourite subjects of materia medica, botany, etc.

Mr. Stoddart for several years held the appointment of public analyst for the city and county of Bristol, and the county of Somerset, and afterwards was elected for the city of Salisbury, and the boroughs of Bridgwater, Chard and Devizes.

A few months since his health began to fail, and his death took place on May 30, in the fifty-seventh year of his age. He was buried at Stoke Bishop on June 3.

Besides the papers already mentioned, and his Presidential Addresses, the following by Mr. Stoddart have also appeared in this Journal:—"Commercial Sulphate of Quinine" (1864 and 1865); "Nature and Properties of Heat Practically Applied" (1866); "Use of the Microscope and its Crystallographic Application" (1867); Honey, its Formation and Changes" (1868); "Lemon Juice and its Decomposition" (1868); "The Air of Bristol and its Analysis" (1869); "Application of Spectral Analysis to Pharmacy" (1869); "Chemistry of Sugars" (1870); "Modification of Liebig's Volumetric Process for the Estimation of Phosphoric Acid" (1874); "Horsley's Lactometer" (1874); "Physics of Filtration and Evaporation" (1876); "Colouring Matter of *Crocus Sativus*" (1876); "Impurity in Zinc Oxide" (1877); and, in conjunction with Mr. Tucker, "Wines and Tinctures of the Pharmacopœia" (1872).

Notice has also been received of the death of the following:—

On the 4th of April, 1880, Mr. Charles William Wallace Crook, Chemist and Druggist, High Street, Hungerford. Aged 25 years. Mr. Crook was a Associate in Business of the Pharmaceutical Society.

On the 26th of May, 1880, Mr. Francis Clarke Barrow, Chemist and Druggist, Dalton Street, Barrow-in-Furness. Aged 36 years. Mr. Barrow became an Associate in Business of the Pharmaceutical Society in 1869.

On the 7th of June, 1880, Mr. Edwin Constable, Chemist and Druggist, Green Lanes, Small Heath, Birmingham. Aged 65 years.

On ths 11th of June, 1880, Mr. Thomas Livesey, Chemist and Druggist, Everton, Liverpool. Aged 57 years.

On the 14th of June, 1880, Mr. Harrison Thompson, Chemist and Druggist, Moor Street, Sunderland. Aged 64 years.

Dispensing Memoranda.

Replies.

[413]. I have made a considerable quantity of solution of acetate of morphia for hypodermic injection, simply by dissolving morphia acetate, for a local physician, taking care that the solution is perfectly neutral; and it has always answered quite as well as that made by the complicated B.P. process, although of double the strength.

South Norwood. J. H. Baldock.

[415]. In answer to "Disputant," I should certainly send out a ℥xx lotion, which is in my opinion correct.

If he will refer to the *Pharm. Journal* of March 29, 1879, p. 809, he will find a most satisfactory explanation given by G. H. L. which thoroughly settles the whole matter.

Patrington, Yorks. Twaddell.

[415]. I think it is difficult to lay down a rule as to whether Oj means 16 or 20 ounces. In my experience I have known both intended by different writers.

South Norwood. J. H. Baldock.

[415]. If "Disputant" will refer to the appendix to the Pharmacopœia he will see that the symbol O means a pint, and he will further find that a pint is 20 fluid ounces.

H. K.

[417]. I see no difficulty in this prescription. If the quinine be dissolved in the acid and a little water, then the bicarbonate of potash dissolved in this, the mucilage added, and then the guaiacum tincture, filling up the bottle with water, a very presentable mixture is produced, of a light chocolate colour, having but slight tendency to separate. Of course a label "Shake the bottle" should be put on.

South Norwood. J. H. Baldock.

[418]. This is a very frequent form of prescription, and the deposit is pretty sure to be formed sooner or later. It is due to the formation of a basic salt containing iron, consequent on there being an insufficient quantity of acid present to retain the whole of the quinine and ferric oxide in solution.

South Norwood. J. H. Baldock.

Queries.

[419]. Ol. Santal. Flav.—*R. F.* wishes to learn of a method of dispensing ol. santal. flav. so that it shall be tasteless.

[420]. What is the best method of dispensing the following formula?—

℞	Ferri Sulph.	gr. xxiv.
	Camphoræ	gr. xxiv.
	Gum Acaciæ	q. s.
	Ol. Cinnam.	♏ vi.
M.	Ft. pil. xxiv.	

F. G.

[421]. I should be glad to be informed what appearance lotions of zinci chlor. B.P. should present. Ought they to be clear like water, or is a certain amount of the zinci chlor. insoluble? And if so, should this insoluble portion be sent out in the bottle with a "Shake the bottle" label attached, or should it be filtered out through paper?

Tyro.

[422]. I had the following presented to be dispensed. It is written exactly the same as the original.

Sulphate of Zinc . . . . ʒj.

Ft. pulv. iv.

Will some readers kindly say what they think of it, and how they should have sent it out? I sent four powders of 15 grains each, and labelled, "The powders. Poison. To be used as directed."

Bdfrd.

[423]. A short time since I had the following to dispense?—

℞ Hydrarg. c. Cretæ . . . . gr. $\frac{1}{3}$.

Ft. pulv. j; ter die sumend.

Was I justified in adding $\frac{2}{3}$rds of a grain of sacch. lactis to each powder, so as to be able to weigh them out correctly? If not, will some readers kindly say how they would have managed.

Bdfrd.

Notes and Queries.

[656]. Starch Glaze is a mixture of borax and starch, both in fine powder. The proportions vary.

Liverpool. R. Parkinson.

[657]. Liq. Ammon. Acet. Conc. has generally been understood to mean a neutral combination of acetic acid and carbonate of ammonia.

Liverpool. R. Parkinson.

[657]. Your correspondent, Mr. Page D. Woodcock, has not answered this question at all, because he does not state what strength his solution is; while your other correspondent, "Twaddell," has, I think, answered it incorrectly. Taking the strong acetic acid of the B.P. (containing 28 per cent. of anhydrous acid), which I consider the only acid practically available for the purpose, and neutralizing it with Howard's volcanic ammonia, a solution is obtained of about 1 to 6 or rather less, and not 1 to 7, and is so generally indicated in the price currents of the wholesale houses. The sp. gr. of acetic acid of the B.P. is 1·044 corresponding to the old Dublin strength; while that of the P.L. was 1·048, so that it is not clear where "Twaddell" got his gravity of 1·038 from. (See a paper on this subject by Mr. J. C. Thresh, [3], vi., 781).

J. H. Baldock.

[657]. I presume your correspondent who wrote for a process for making liq. ammon. acet. conc. 1 to 7 wishes to make it so that when diluted with water it should make a solution of B.P. strength. This cannot be done with B.P. acetic acid (acid. acetic. fort.). When this is neutralized with carbonate of ammonia a solution results of six times the B.P. strength. 80 ♏ of it are required to make ℥j liq. ammon. acet. B.P.

Acetic acid B.P. should contain 28 per cent. of anhydrous acetic acid $C_4H_6O_3$ and glacial acetic acid 84 per cent., so that the latter is three times as strong as the former, and thus a neutral solution of acetate of ammonia made with the glacial acid would be eighteen times the B.P. strength. By diluting 1 part of this with $1\frac{1}{4}$ parts of water, the solution obtained will be of the required strength, viz. 1 to 7. In working it would be best before neutralizing to dilute the glacial acid with an equal volume of water and then to make up to the $2\frac{1}{4}$ parts.

Debutant.

[657]. LIQ. AMMON. ACET. CONC.—1 to 7.—I should like Mr. Woodcock to explain how he makes his formula to be eight times the strength of the B.P. formula. The B.P. product is only six times the quantity of the acid used, so that to use undiluted acid, as Mr. Woodcock suggests, will be only six times the strength (1 to 5). The quantity of am. carb. is, in each case, to neutralization.

"Twaddell" gives a form (from Cooley, I presume) still further from the mark. He orders an acid of s. g. 1·038, whereas the B.P. acid is s. g. 1·044; so that the liq. would be to that extent weaker. He certainly qualifies his remarks by adding the letters P.L., but it is a preparation eight times the strength of the B.P. form that is required.

H. K.

[657]. LIQ. AMMON. ACETATIS CONC. 1 to 7.—
Glacial Acetic Acid sp. gr. 1065. . . . 5
Aq. Destill. 7

Neutralize with volcanic carb. of ammonia in the usual way.

Replies of last week I think would result in 1 to 5 solutions.

T. S. Minett.

[658]. COMPOUND TINCTURE OF MYRRH.—A "Veterinary Traumatic" is prepared as follows:—

Myrrh	2 lb.
Barb. Aloes	2 lb.
S. V. R.	Oiss.
Aquæ	Ois.

Digest fourteen days and filter. ('Gray's Supplement,' 1848.)

Liverpool. R. Parkinson.

[658]. COMP. TINCT. MYRRHÆ.—

℞ Gum. Myrrhæ,	
Aloes Barb.	āā ℥iv
Sp. Vini. Rect.	Oiij.
Aquæ	Oj.

Macerate for fourteen days, and strain (Gray's form).

Potens.

A similar answer has been received from Mr. Jessop.

[658]. TINCT. MYRRHÆ COMP. is the old tinct. myrrh et aloes of the 'Edinburgh Pharmacopœa,' 1744, but I have reason to believe that many pharmacists of the present day use proof spirit instead of rectified as ordered in the original formula.

Lavandula.

Correspondence.

**** No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Viviparous Plants.

Sir,—Doubtless there are a few readers who, like myself, are somewhat puzzled as to the nature and origin of viviparous plants and would like to be more familiar with them. With this reason I trespass, if I may be allowed, on such space as can be allotted to me for inquiries. On reading the paragraph in the Journal entitled "The Month," reference is made to viviparous plants, specimens of which are to be seen at Kew and Regent's Park. My interest being excited, I made a special journey to Kew, having hitherto not seen such examples, which were very evident to a marked degree in the plant named, namely, *Cypella gracilis*. My curiosity, thus gratified, was further aroused and in consequence I searched further for other specimens, on the principle that much wants more. The search was compensated in the fern house, where two instances of a somewhat different nature presented themselves. In the first instance the fronds and pinnæ of the fern (*Dipsonia obtusifolia*) were loaded with a number of young plants developed on the upper surface of the frond, so much so that the frond itself was overburdened with the weight and was in consequence supported by means of a prop; in the second instance, instead of the plants being developed on the frond and pinnæ generally, the mid-rib was prolonged analogous to the prolongation of the petiole of the leaf, and instead of producing, as in case of the leaf, a pitcher or ascidia, a complete plant was developed forming several smaller fronds and a very small rhizome. Having thus far explained the external appearances presented, I wish to know:—

(1.) The nature and cause of such developments.

(2.) Would they arise from cultivation on such plants upon which they would in their natural condition be abnormal?

(3.) Would they be regarded as parasites, since they must necessarily derive their nourishment from their parents? Could young plants of the same genera and species as that upon which they grow be regarded as parasites?

According to the Journal, the first question would be answered, in case of the *Cypella*, that the young plants were developed from the inflorescence, the abortive ovary remaining.

Thomé's 'Botany' states that it is not uncommon for a leaf or flower bud to be transformed into fleshy bodies, with scale-like leaves and a very short, fleshy axis. These buds, which often serve as reservoirs for the reception of reserved materials, very commonly grow when "detached" from their parent plants into independent plants; such plants are viviparous, and he states that such phenomena occur normally on *Polygonum viviparum*, *Poa vivipara* and are not uncommon in *Lilliaceæ*, *Graminaceæ*, etc.

I should like to be clear as to how the young plant could arise from the inflorescence. Taking it for granted the ovary is abortive, would the force or nourishment essential for the maturity of the ovary exert any power or influence in the formation of the young plant? In reference to those young plants on the frond of the fern, drawing the analogy between the ovary and sori, then it follows that the sori were abortive and would likewise exert some influence on the formation of the young plants. Assuming such might be the case, I cannot trace any analogy in the case of the second fern, viz, a species *Adiantum*, to that of the former, since the plant is developed in a different position.

W. Ralph Dodd.

T. Marshall.—We can only undertake to communicate the information through the medium of the Journal, so that it may be available for other readers.

T. S. Minett.—We agree with you to some extent; but we are not responsible for the form in which the author chose to convey his information to the American Pharmaceutical Association.

"*Amicus Tyronis.*"—The question is not suitable for insertion in this Journal; it would be more appropriately put to a medical practitioner.

"*Acries.*"—(1) We believe not. (2) Apply for a copy of the Regulations to the Registrar of the Medical Council, 315, Oxford Street.

J. W. B.—The words have been evidently written or copied incorrectly.

"*Molar.*"—The decision does not lie with the Dental Association but with the Medical Council. If your friend's name had been on the Register of Chemists and Druggists it would have been evidence that he was engaged in the practice of pharmacy. But the Dental Act does not specify that such registration shall be the only acceptable evidence of the fact.

H.—(1) *Salvia verbenaca.* (2) *Rhamnus Frangula.* (3) *Luzula Forsteri.*

"*Vance.*"—See the answer to "*Molar.*"

Erratum.—On p. 1011, col. ii., line 37, *for* moisture *read* moisten.

Communications, Letters, etc., have been received from Dr. Wright, Messrs. Robinson, Elliman, Logsdail, Van der Weyde, Chichester, Hyne, Palmer, J. A. T., R., Jek, Sufferer from Outrageous Competition, Tyro, Oxygen, Pharmakon, Inquirer.

"THE MONTH."

Just a twelvemonth ago there was snow in Scotland and hail in London and the blossom had not made its appearance on the elder tree (*Sambucus nigra*). At present the elder is more abundantly covered with blossom than for some years past, and the season may therefore certainly be said to be in advance of last year. How far this is the case may be judged, also, from reports received from Cornwall, the Isle of Wight, Dorsetshire and Kent, according to which it would appear that many plants are at least three weeks earlier in blossoming than last year. From Cornwall, in the first week in June, a correspondent sent ears of wheat in full bloom, and a similar state of things was mentioned in the *Echo* as occurring in the Isle of Thanet. Another Kentish correspondent mentions wild henbane and belladonna as being in flower early in June. Mr. Romans' inference that because the lily of the valley was not in blossom at a certain date, the season was therefore later than last year is not perfectly legitimate. Those who have cultivated this little favourite know well that the same individuals do not flower regularly every year under ordinary circumstances. In the woods near Dartford, Greenhithe and Canterbury it remains without any flowers at all in some seasons, or perhaps only two or three here and there.

As might be expected from the recent abundant rains and warm atmosphere, vegetation has made amazing progress during the past month, and the student of botany needs to work hard to keep pace with the prodigality of nature. Aconite, actæa, belladonna, dulcamara, digitalis, henbane, hemlock, buckthorn, mustard and many other medicinal plants are now in blossom in botanical gardens. At Kew, a fine specimen of arnica in blossom may be seen in the Herbaceous Ground. The caraway, angelica, alkanet and horseradish may also be observed in bloom.

One curious plant, growing in waste sandy places and flowering at this time of year, is deserving of a brief notice, as it has recently been reported to have proved fatal to cattle which had eaten it. The hound's tongue, *Cynoglossum officinale*, as might be supposed from its Latin name, was formerly used in medicine. According to Sowerby's 'English Botany,' "It is narcotic and astringent (and antispasmodic), and has been given with advantage in scrofulous complaints in the form of decoction and as an external application, but its disagreeable odour has caused it to be discarded from modern practice." Sir W. Coles, in his 'Art of Simpling,' tells us that it "will tye the tongues of houndes so that they shall not bark at you if it be laid under the bottom of your feet, as Miraldus writeth." The plant has a strong, disagreeable odour, likened by some to that of mice, but by Gerarde to dog's urine, to which he says "there is not anything smelleth so like as the leaves of this plant doe," a fact which is also expressed in the Dutch name for the plant. The seeds, or rather pyrenes, which are large for the size of the plant, are covered with short hooked spines and adhere to animals or to the clothes, and the plant evidently thus effects its distribution. If the statement be true of cattle being poisoned by it, the reputed narcotic properties of the plant would seem to demand investigation.

It is not surprising that the term viviparous, used in the last "Month," should suggest inquiries from correspondents such as have appeared in the last two numbers of the Journal. The term may be looked for in vain in the index of some of our best botanical text-books, including Sachs's, Prantl and Vines's, Balfour's, Bentley's, Henfrey's and Brown's; nor do such excellent works as 'Hooker and Decaisne,' Lindley's 'Vegetable Kingdom,' the 'Treasury of Botany,' Masters's 'Vegetable Teratology,' or Cooke's 'Dictionary of Botanical Terms' index the word. In Webster's 'Dictionary,' however, it is explained thus:—"In *botany*, producing its offspring alive, either by bulbs, instead of seeds, or by the seeds themselves germinating on the plants, instead of falling as they generally do." Asa Gray, in the glossary to his botanical text-book, defines viviparous as "germinating or sprouting from seed or bud whilst on the parent plant." It must be obvious, however, that there are cases in which the seed sprouts on the parent plant, and yet the parent could scarcely be called viviparous. Thus, during the wet autumn of last year grains of wheat sprouted on the ear in many fields, yet no one would think of calling wheat a viviparous plant. The term must almost of necessity be restricted to those plants which have acquired a constantly viviparous character as above defined. The chief cause which appears to determine this development is inability to ripen seed from some cause or other. Most plants appear to have two means of reproducing themselves, viz., either by gemmation (*i.e.*, reproduction from buds) or fructification (*i.e.*, reproduction from seeds or their representatives), and when one is curtailed the vigour of the plant appears to set in the direction of the other. Thus on mountains, where there are constant mist or moisture and cold air, many plants tend to form viviparous growths. This appears to be the case with *Polygonum viviparum*, bulbils replacing flowers in the lower part of the inflorescence, and in *Poa vivipara*, *Festuca vivipara*, etc. Any conditions which would arrest the process of fructification would probably tend to the production of buds instead of flowers. If the flower bud be regarded as a modification of a leaf bud for the purposes of reproduction by cross-fertilization (a process which is well known to give increased vigour to the resulting individuals) then the reason why viviparous growths occur on the inflorescence when the plant is unable to ripen fruit becomes evident. A tendency in this direction also appears occasionally when the apical growth of the inflorescence is curtailed, as in *Allium vineale*, *A. Babingtonii*, *A. sphærocephalum*, and other species. The formation of buds on the rachis of a fern seems analogous to the formation of adventitious buds on various trees, and it may be the result of excessive nutrition, combined with a sudden stoppage of the main axis or axes of growth, as indicated in Mr. Wall's letter on p. 1052. The formation of buds, as in the *Adiantum*, at the end of the frond, probably indicates a tendency to root at intervals, as in the runner of the strawberry. Viviparous growths appear also to take place in abnormal positions in some naturalized plants in which the conditions are different from those occurring in their native country. Thus *Scirpus Holoschœnus*, which never appears to ripen fruit in England, when it sweeps the damp sand with its almost terminal inflorescence produces young plants on the inflorescence which root and propagate the species. The horseradish also, which does not ripen fruit in this country, produces numerous buds on the root. It may be regarded as questionable how far the term viviparous can be properly applied to such plants as produce deciduous buds which do not grow on the parent into young plants, such as *Dentaria bulbifera* and various species of *Begonia* and *Lilium*. A "parasite" is defined as a plant which is without the means of elaborating crude into proper sap and which consequently derives its nourishment from a plant of another kind or species, and this term cannot, therefore, properly apply to the young produced on a viviparous plant since these are capable of forming true roots and obtaining nourishment for themselves when detached from the parent plant. How far viviparous growths would "arise from cultivation on such plants upon which they would in their natural condition be abnormal" is open to experiment. In case of a common scarlet geranium from which the flowers were picked off their pedicels as soon as the corolla withered it has been observed that one of the membranous bracts at the top of the peduncle developed into a green leaf. The nutriment which would have gone to ripen the ovary here appeared to have been diverted towards producing a vegetative organ. This mode of procedure may perhaps serve as a clue for "viviparous" correspondents to follow up by experiment.

Most of our readers who have attended botanical lectures in London are probably familiar with the handsome bell-shaped flower of *Cobœa scandens* and its remarkable disk. In *Nature* for June 17, p. 149, Mr. A. Ernst, of Caracas, gives a most interesting account of the fertilization of a closely allied species, *C. penduliflora*, Hook. f. He found that the disk only secreted nectar immediately after the anthers burst, and that it was then produced in considerable quantity, and that unless the plants were cross fertilized the same night either by moths or artificially the fruit was not developed. "As soon as the corolla has fallen off the peduncle withdraws slowly amongst the dense foliage where the fruit develops protected from all kinds of injury."

Some interesting observations have been made by Herr Stahl (*Verhandl. der phys.-medic. Gesellsch. in Wurzburg*, Bd. viii.) on the motion caused by the effect of light on some minute algæ, belonging to the Conjugatæ. He finds that *Closterium moniliferum*, one of the Desmids, under diffuse daylight of little intensity, presents its longitudinal axis to the light rays, one-half of the cell being alternately attracted and the other half repelled, so that both halves are equally exposed to light. When the intensity of the light was increased the cells changed their position, and placed themselves at right angles to the incident light.

Dr. S. Vines read last month, before the Royal Society, a paper on "Aleurone Grains," which was a continuation of his investigations on this subject, as recorded in the 'Proceedings of the Royal Society,' in 1878 (vol. xxviii., p. 218). He finds that the aleurone grains of the peony are readily soluble in distilled water, but contain myosin-globulin only, and apparently no vitellin-globulin; but hemialbumose, a substance allied to the peptones, is present in considerable quantity. In the seeds of the castor oil plant, the grains are composed, like those of the lupin, of both globulins and of hemialbumose, and enclose a crystalloid of proteid substance and a globoid which consists of inorganic matter. These crystalloids in the aleurone grains of *Linum usitatissimum* are similar to those of *Ricinus communis*, in being slowly soluble in a 10 per cent. solution, and readily soluble in a 20 per cent. solution of chloride of sodium after treatment with alcohol. The author believes that the caseins which Ritthausen has extracted from various seeds consist largely of precipitated hemialbumose.

An interesting experiment upon the fixity of chemical composition of the ash of plants has been made by Mr. H. Pellet (*Chem. News*, June 18, p. 283). He found that specimens of *Soja hispida*, grown in China, Hungary and France, yielded phosphoric acid and potash with very little variation in quantity, these constituting three-fourths of the ash. The proportion of soda, lime and magnesia was, however, more subject to variation. In other experiments made with the potato he finds that there is a great difference in the proportions of the chief alkalies, but that there is equivalent substitution of one for another, so that the proportion of sulphuric acid remains the same.

In the *Bulletin Mensuel de la Soc. Linnéene de Paris* (No. 32, p. 256), Professor Baillon describes a new Strychnos from French Guiana, which he believes likely to be a curari plant. He has named it after its discoverer, *Strychnos Melinoniana*. It differs from other allied species in being erect and not climbing, in having short and rigid opposite branches, and in having no trace of hooked spines. The leaves are lanceolate, smooth and leathery. The young ovary is two-celled and has many ovules; but the baccate fruit differs from that of nux vomica in being oval instead of round; it is not larger than an olive and usually contains only one seed, which is more elliptical than that of nux vomica.

The report comes from Uruguay of a new potato which possesses the great advantage of preferring a low and moist soil. It is well known that the potato is a native of a remarkably dry region, and that it therefore is under unnatural conditions of life in a damp soil. But the new potato flourishes well in marshy ground near rivers, and much land hitherto of comparatively little use for other purposes may now be turned to profitable account by the introduction of this new vegetable. A favourable account of this plant (which seems not yet to have received a botanical name) has been published in the *Bulletin Mensuel de la Société d'Acclimatisation*, May, p. 127.

Some years ago an attempt was made to introduce eucalyptus trees in the Campagna of Rome, and it was anticipated that by the growth of these trees a considerably beneficial influence would be exercised upon the climate of that district. A recent correspondent of the *British Medical Journal*, writing from Rome, gives a very unfavourable account of the result of this experiment. He states that in the majority of cases the young trees which had been planted in considerable numbers have been killed during the cold nights of the winter season, and in his opinion there is but little probability of rearing the eucalyptus in the Campagna to any such extent as could be hoped to produce a sensible effect upon the climate of that district. The account given by this writer is not without some indications that in describing the result of the attempted cultivation of the eucalyptus his wish was father to his opinion, since he seems to think that the peculiar character and charm of the Campagna would be destroyed by the introduction of trees.

Mr. C. Roberts has suggested, in the same journal (p. 949), that probably the seeds obtained by Prince Troubetskoi from plants cultivated in the south of France would yield hardier plants. The same writer also states that he has "found a soap containing the essential oil of *E. citriodora* a most soothing application in irritable skin diseases, and it is no doubt to a certain extent antiseptic, like thymol soap, with the additional advantage of possessing a pleasant perfume." A specimen of essential oil prepared from one of this genus (*E. citriodora?*) has been recently seen, the odour of which was scarcely distinguishable from citronelle.

Baron Mueller is now issuing an important work on the genus Eucalyptus, under the name of 'Eucalyptographia,' published in this country by Messrs. Trubner and Co., which is in fact a descriptive atlas of the species found in Australia and the adjoining islands. Great confusion exists as to the products of these trees, and Baron Mueller will do good service to the colonies in describing the distinctive characters of the various gums, oils, etc., and pointing out those which are likely to prove most important in the arts and medicine. In this work a table is given of the yield of essential oil by the different species which have been experimented on by Mr. J. Bosisto, from which it appears that the quantity obtained varies exceedingly in different species, *E. melliodora* yielding only 7 ounces from 1000 pounds of leaves and twigs, while *E. globulus*, *E. oleosa* and *E. amygdalina* give respectively 120, 200 and 500 ounces from the same quantity of plant.

In Japan, where natives suffer after inundations from a kind of fever unknown in Europe, over which quinine has no control, the cultivation of *Paulownia imperialis* in the infected districts is recommended, instead of that of eucalyptus, by E. Baelz and Kawakami (*Virchow's Archiv.*, Band. 78). This tree is said to possess many advantages over the eucalyptus.

In the *Lyons Médicale*, May 23, it is stated that Dr. Bouchard finds the administration of pure charcoal powder in typhoid fever very favourable, that it causes the fetid odour of the stools to disappear, prevents absorption of putrid matter, cleanses intestinal ulcers, and does not cause hæmorrhage or other accident. The dose given is a tablespoonful every three hours.

In the *Louisville Medical News*, May 1, Dr. Springer states that salicylic acid is readily soluble in effervescing Vichy or Seltzer water, the former, from containing an excess of alkaline carbonates, being preferable. The acid is put into a tumbler first and mixed thoroughly with a small quantity of water to prevent its floating, and the glass then filled with the effervescing water and the liquid drunk off. When perfectly dissolved it is said to have a very pleasant, exhilarating, pungent and sweetish taste.

The same journal takes exception to the orthography of the name salicylic, remarking that "nearly all writers, pharmaceutical and medical, put it salicylic, though such of them as know anything of language and terminology must know that it is wrong. We should like to know by what rule of orthography, analogy, reason or common sense the word salicilic is spelt with a 'y'? Is the genitive of salix salycis? Do we write silycic or silicic as the adjective of silix? With as much propriety we may say sulphuryc, muriatyc or nitryc." The writer of the above remarks is evidently unaware why the "y" occupies the position it does, and that the name salicylic is derived from the hypothetical radical salicyl and not from salix. Were it from the latter word it should be salicic, and not salicylic acid. He does not even seem to remember that the "y" in salicylic occurs in the third instead of the second and fourth syllable. There is a trite saying about letting well alone which might be worthy of the attention of the discoverer of this mare's nest.

In the *New York Medical Record*, May 1, attention is called by Dr. Andrew Smith to the oxalate of cerium as a remedy in certain forms of chronic cough, in doses of 10 grains three times a day, commencing with 5 grains. He found it to relieve nausea and improve digestion. He remarks that different samples met with in commerce are not equal in value.

Dr. Sawyer, of Birmingham, calls attention to the use of chloride of calcium (not chloride of lime, from the administration of which one of his patients has suffered) in phthisis. He gives 10 grains, dissolved in a drachm of water and a drachm of glycerine, with a wineglassful of milk, twice daily, immediately after meals. This substance has an old reputation for the cure of strumous glandular swellings.

A remedy which this gentleman introduced into notice some years ago, as a remedy for neuralgia, has lately been the subject of an editorial article in the *British Medical Journal* (June 5), under the name of *Gelseminum sempervirens*, which the writer of the paper adopts in preference to gelsemium, apparently in ignorance that the name gelseminum was given to the plant when it was supposed to be a true jasmine, an opinion which no botanist holds at the present day, nor indeed, has held since the time of Linnæus. Uniformity of name is always desirable, and the name gelseminum, which is that adopted in the United States Pharmacopœia and in Bentley and Trimen's standard work on 'Medicinal Plants,' has surely sufficient weight of authority on its side to secure its universal acceptance. In the same article no allusion is made to the statement of Sonnenschein that gelseminic acid is nothing else but æsculin.

Mr. J. T. Clover, in a lecture delivered at University College on May 19, and reported in the *British Medical Journal* of May 29, made the following remarks on ethidene chloride, which have some points of interest for those engaged in dispensing medicines:—"Ethidene chloride, as now found in the market, has not an uniform boiling point. It can be divided by fractional distillation into two or more substances. That which I have lately been using has a sp. gr. of 1·225 and boils at 115°, the temperature rising to 140°, at which it boils steadily and is nearly all dissipated. I am told there are greater difficulties in the way of procuring the dichloride now than last year, in consequence of the waste products in the manufacture of chloral, from which it was made, having been used up. At all events, the price has more than doubled within a year, and some of the samples I have examined have had a disagreeable after-odour. Hitherto it has nearly all been imported from Germany, but some of our English chemists are trying to make a purer drug, and I hope they will succeed. Ethidene dichloride mixes freely with alcohol, but only slightly with water, enough to flavour it only, but less than chloroform, which it resembles in taste and smell. It is less inflammable than alcohol. A piece of paper saturated with it does not readily take fire; but air passed through the liquid takes up a vapour which makes it burn at a jet like coal gas."

Mr. Clover has administered this anæsthetic to 1877 individuals with only one fatal case, which was complicated with heart disease. Occasionally, only, has he found it to cause alarming depression of the pulse.

The use of bromide of ethyl as an anæsthetic was discussed at a recent meeting of the Paris Société de Chirurgie, and the opinions expressed seemed to be in favour of its use for producing local anæsthesia only. M. Nicaise stated that he thought it was the only local anæsthetic which could be used concurrently with the actual cautery.

Herr E. Jahns, whilst examining some genuine oil of *Thymus Serpyllum*, has made the observation (*Arch. d. Pharm.*, xvi., 277) that the thymol in it was prevented from solidifying by the influence of another body belonging to the class of phenols until the temperature was depressed far below (—32° C.) that at which either of the bodies solidified. This property seems to be characteristic of the phenols, for a mixture of thymol and carbolic acid behaved similarly, remaining liquid at $-20°$. It will be remembered that some time since Mr. A. W. Gerrard reported (*Pharm. Journ.*, [3], viii., 646) that he had failed to obtain thymol from a commercial specimen of oil of thyme, and inferred therefore that the thymol had been removed from the oil before it had been sent into the market. Presuming that Mr. Gerrard was not working upon a factitious sample of oil, it may be that his failure to separate thymol finds a partial explanation in this influence which the phenols appear to exert in the mutual depression of their solidifying points.

According to C. Winkler (*Schw. Wochenschr. f. Pharm.*) pure hydriodic acid may be prepared by dissolving iodine in carbon bisulphide in a tall glass cylinder, adding water, which forms a distinct layer on the top, and passing through the iodine solution a current of sulphuretted hydrogen. The hydriodic acid formed is absorbed by the water, whilst the separated sulphur dissolves in the carbon bisulphide. The conversion is complete when the lower layer, originally violet, acquires a wine-yellow colour. The layers are then separated and the aqueous solution of hydriodic acid is boiled a few minutes to expel any sulphuretted hydrogen that may be present.

A new organic acid, to which the name of borocitric acid has been given, has been recently described by Herr Scheibe (*Pharm. Zeit. f. Russl.*, xviii., 25). It may be prepared by boiling together in water, with constant stirring, one part by weight of boracic acid and seven parts of citric acid until a clear solution is produced. The acids unite in the proportion of two molecules of citric and one of boracic acid, and upon evaporating an aqueous solution to dryness the borocitric acid is obtained as a greyish solid amorphous mass, easily soluble in water and strong alcohol. But it may also be obtained as a light snow-white crystalline mass by allowing a very concentrated solution to evaporate slowly. Borocitric acid forms with the alkalies salts that are soluble in water, but the salts of the heavy metals are only partially so. All the salts turn turmeric paper red-brown, similarly to boracic acid, and they are decomposed by the stronger acids with a separation of boracic acid.

The magnesia compound with this new acid has been alleged to exercise a solvent action upon stone in the bladder and to be useful in cases of vesical catarrh. But Professor Ludwig, of Vienna, who has carried out a series of experiments to test this statement, reports (*Wiener med. Blatt.*, 1880, No. 4) that he has obtained only negative results.

The synthesis of citric acid has at last been effected, by MM. Grimaux and Adam (*Comptes Rendus*, vol. xc., p. 1252). The steps of the process are briefly as follows:—Dichlorhydrin was prepared by means of glycerine and chloride of sulphur, and then oxidized by bichromate of potash and sulphuric acid. The resulting dichloracetone was purified by combination with bisulphite of sodium and heated in a water-bath with concentrated hydrocyanic acid. The cyanodichloracetone formed was not isolated, but treated with hydrochloric acid, then distilled in a vacuum and the product exhausted with ether. The ether upon evaporation left a thick syrup which after some days yielded a crystallization of dichloracetonic acid, differing from citric acid in containing two atoms of chlorine in the place of two groups of CO_2H. This by saturation with soda and heating with two molecules of potassium cyanide in concentrated solution was converted into dicyanacetonate of soda. The liquor was then saturated with gaseous hydrochloric acid gas, heated in a water-bath and distilled in a vacuum. From the residue the citric acid was obtained as a lime salt by treatment with milk of lime. The lime salt and the citric acid obtained from it are said to have presented characters agreeing entirely with those of the natural products. But the acid is represented as crystallizing with two molecules of water.

In a paper in the *Bulletin* of the Bordeaux Pharmaceutical Society for April M. Carles calls attention to the inconvenience sometimes resulting from the presence of lime in sugar. His attention was directed to the subject by having submitted to him specimens of chocolate that when boiled with water formed an abnormally thick liquid, and when boiled with milk caused it to curdle. The presence in the ash of a considerable quantity of carbonate of lime induced the suspicion that the peculiar reaction might be due to sucrate of lime derived from an imperfectly refined sugar used in the manufacture of the chocolate. Experiments were therefore made with a mixture of sucrate of lime and a pure sugar which showed that always when the sugar contained an excess of lime it had the property of curdling milk similarly to acids, but coloured the serum yellow. This observation is of some hygienic and industrial importance and is also confirmatory of opinions that have been expressed by more than one observer as to the noxious influence that imperfectly refined sugars may exercise upon certain pharmaceutical preparations, such as powders containing calomel, syrups of the phosphates, etc.

In the same journal M. Carles recommends the use of carbonate of ammonia as an effective means of cleansing the worms of stills. The carbonate of ammonia is mixed with water in the still and being slowly carried over in the gaseous condition with the vapour of water during distillation it penetrates to every part of the apparatus, attacking resins, fatty bodies, sulphuretted products, etc., and after about an hour only a perfectly inodorous limpid water flows from the worm.

Lecturers on chemistry may be glad to know that Dr. T. Schurhardt, of Goerlitz, has succeeded in preparing metallic potassium in fine large octahedra, 1–11 centimetres long; also metallic sodium in smaller crystals, and metallic chromium in small regular octahedra. The specimens are preserved in hermetically sealed tubes in an atmosphere of hydrogen.

It is announced in *Nature*, May 27, p. 87, that Dr. Dodel Port, of Zurich, has just issued two parts of a new botanical work that promises to be of considerable interest, called 'Illustrirtes Pflanzen Leben.' In part I. the lower fungi are described in a popular manner, and it includes illustrations of the form, size, and mode of propagation, and points out the danger arising to the human race from these minute organisms. The question of potable water is becoming an important one at the present day, and the only question that suggests itself is, that if a knowledge of these organisms is popularized, whether people will not give up water altogether as a drink, and take other more harmful liquids as a substitute.

How would the authorities on potable waters class the one which gave rise to the following observation, chronicled in *El Siglo Medico* of Madrid? The excessive dryness of the summer of 1877 caused the inhabitants of a certain village to use the water of a spring for which a colony of leeches also had a predilection; the result was a perfect epidemic of implantation of the annelids in the palates and throats of the villagers. In most cases these were easily removed by the use of vinegar, salt, tobacco, and other means. But in one the leech lay beyond the reach of these remedies, and the patient, a strong woman of forty, was so reduced by loss of blood that after tracheotomy had been thought of and abandoned it was decided to try the effect of various insecticides. Fragments of sulphur were accordingly thrown upon burning coals and the patient was placed so as to be compelled to breath the sulphurous vapour. After two or three inspirations a cough was provoked which brought up a large leech more dead than alive. The same remedy was afterwards frequently employed successfully, and one young man is said to have been relieved from an objectionable quantity of this form of albumenoid ammonia that had fastened upon his œsophagus, the inhalations of sulphur being caused to pass downwards to the stomach without creating any inconvenience.

In the Botanical Gardens at Regent's Park a new jelly fish, about half an inch in diameter, was discovered on June 10 by Mr. W. Sowerby, which has created no small stir among the zoological celebrities of the metropolis. It has already received two names, one from Professor Allmann and the other from Professor Ray Lankester, and has formed the subject of two papers, one at the Royal and the other at the Linnean Society. Hitherto no jelly fish has been found in fresh water, and therefore the discovery of this species is the more remarkable. Professor Lankester concludes that it is a tropical species, as it is active only at a temperature of 90° F., becoming sluggish at 60° F. It comes nearest to a Brazilian species, and one might therefore suspect that it came originally with the *Victoria regia*. As the tank is cleared out every year, and this water lily has been grown for several years from seeds ripened at the gardens, it seems singular that the animal should not have been observed before if such were its source. Professor Lankester thinks it may have been introduced from the West Indies.

At the meeting of the Academy of Sciences on the 24th of May a communication from M. Mouchut was read stating that he has definitely succeeded in his experiment in the industrial utilization of solar heat in Algeria. With mirrors of 0·80 m. he is able to carry on operations requiring not more than 400 to 500° C. of temperature, and he mentions among those that have been successful the fusion and calcination of alum, the preparation of benzoic acid, the purification of linseed oil, the concentration of syrups, the sublimation of sulphur, the distillation of sulphuric acid and the carbonization of wood. With his largest solar apparatus, in which the mirror has an insolation surface of 3·80 m., M. Mouchut distilled, even in mid-winter, on the 24th of December, 25 litres ($5\frac{1}{4}$ gallons) of wine in ninety-five minutes with a yield of 4 litres of eau-de-vie. Small alembics have also been perfected that can be used in the distillation of essential oils. But perhaps the most important success is the mechanical utilization of the solar heat in the driving of a horizontal engine under a pressure of $3\frac{1}{2}$ atmospheres. This result is said to be obtained constantly from 8 o'clock in the morning until 4 o'clock in the afternoon, and is not modified sensibly either by the strongest winds or passing clouds.

When Mr. Crookes delivered his celebrated lecture upon Radiant Matter, it became evident that his interpretation of the results of his investigation pointed to the existence of matter in a form that had not hitherto been recognized. He has now definitely put forward this theory, and in reply to a challenge from Dr. De la Rue has enunciated, in a letter addressed to the President of the Royal Society and read at the meeting on the 10th inst., his arguments in favour of there being "a fourth or ultra-gaseous state of matter." Curiously enough his arguments after all point rather to the paradoxical conclusion that matter—in the ordinary acceptation of the term—is not matter at all, but that all the so-called "forms" of it are really forms of motion, true matter being intangible, invisible, and possibly inconceivable. This is not altogether a new position, and, in fact, when Mr. Punch replied some time ago to the question "What is matter?" with the answer "No matter," he was only anticipating Mr. Crookes's conclusions. A brief epitome of the letter will be sufficient to justify this statement. True matter, according to Mr. Crookes, consists of individual disconnected molecules, built up of atoms and governed by the opposing forces of attraction and motion. In solids these molecules are separated by spaces, which are large relatively to their diameters, but nevertheless still so small that the force of attraction is preponderant, so that it prevents the molecules from travelling about irregularly and gives them cohesion and fixity of position about their centres of oscillation. In liquids the force of cohesion is relatively very much reduced, and the centres of oscillation have no fixity of position. When liquids are heated the force of motion preponderates as the temperature rises until at last cohesion is broken down, and, released from control, the molecules fly off into space with inconceivable velocity and in every conceivable direction, and then constitute gaseous matter. In this state, with enormous numbers of molecules still crowded together into a given space, collisions are infinitely numerous, and the mean free path of the molecules is exceedingly small as compared with the dimensions of a containing vessel. The gaseous state is therefore pre-eminently a state dependent on collisions. But when by great rarefaction the chance of collision is nearly extinguished and the free path of the molecules can consequently become so long as to be comparable to the dimensions of the containing vessel, or when by some extraneous force the molecules are reduced to order and coerced into a methodical rectilinear movement—akin to what takes place in the polarization of light—the molecules then, in Mr. Crookes's opinion, assume the fourth condition of "radiant matter." It therefore follows that what Mr. Crookes says of solidity may be said of liquidity, gaseity, and the radiant state, that they are merely the effect on our senses of the motion of the discrete molecules among themselves. If this inter-molecular movement were to stop, matter as known to us would cease to be, though the molecules might remain; but of their nature as little is known as of that of the interspaces through which they are supposed to travel.

The introduction of new remedial agents will necessarily create fresh difficulties for the dispenser, and in doing so will tax his resources to the utmost, and the same will equally apply to old remedies exhibited under a new aspect. These instances are not by any means rare. There is one striking illustration in the resuscitation of that very old and long disused drug, Chian turpentine. The pharmacy of this substance either alone or combined with sulphur, has brought forth numerous letters from advocates of the several modes of combining Chian turpentine to form an emulsion, presentable, and at the same time palatable, in fact, a suitable method of administering this very scarce, and consequently very valuable drug. Happy must that pharmacist feel, who, with a veneration for old pots and their contents, has preserved his genuine Chian turpentine for the benefit of suffering humanity and a considerable advance on its normal cost.

The question of extemporaneous pill coating has often occurred in these columns, and the apparatus for that purpose shown at the Exhibition and illustrated in the Journal may be studied with advantage by dispensers. Those appliances, if not perfect, may at least be considered a step in the right direction and an advance towards a solution of those difficulties which have hitherto presented themselves in connection with this subject.

The first prescription demanding notice is that of No. 412, where a mixture is prescribed with very clear directions in English, "two teaspoonfuls every six hours." The writer asks if that was the dose the physician intended the patient to take. It must be assumed that the physician did intend the patient to take just that quantity at each dose which he has ordered, and the dispenser must direct the medicine accordingly. The dose, if for an adult, is smaller than that usually prescribed, but if an error it is one in the right direction, that is, of the smaller dose. At the same time it may very properly create a doubt; but, unless the prescription can be referred to the writer, there is no alternative but to give the directions as written.

In reply to question No. 413, it may be stated that had a simple solution of morph. acet. been as suitable for hypodermic injection as the solution made according to the B.P. process, that formula would, in all probability, never have found its way into the Pharmacopœia. Mr. Baldock says that he has supplied it to a local physician, taking care that the solution is perfectly neutral. This is an important proviso, and requires careful attention. With this precaution the one may, in some instances, answer as well as the other, and may suit the requirements of one practitioner; but for the prescriptions of the medical profession generally such a deviation is not safe, and consequently not one that could be recommended for adoption.

The emulsion made from prescription No. 414 is not a perfect one; with mucil. of tragacanth, the result is not satisfactory. This mucilage is useful when the object is merely suspension, but when an emulsion is required it is not so suitable for the purpose as mucil. acaciæ. Tragacanth is not dissolved in water, but swells and is diffused, differing in this respect from gum arabic, the better qualities of which dissolve and make perfect emulsions with oil and other similar substances. The partially emulsified mixture very soon separates and presents an inelegant appearance, which may be obviated by the substitution of mucilage of acacia for that of tragacanth.

In prescription No. 415, the question is asked, should the "Oj" be dispensed as ℥xx or ℥xvi. A reference to the appendix of the B.P. will decide the question. Under "measures of capacity" the following will be found "1 pint O=20 ounces." In the *Pharmaceutical Journal*, February 22, 1879, p. 706, No. 264, the same question is found, and replied to in "The Month," of March 29, p. 797. It is there stated that physicians frequently write Oss. when they intend the mixture to be 8 ounces; but when nothing is known to the contrary the octarium should be dispensed as 20 ounces.

The combination of carbolic acid with an excipient so as to form pills has on previous occasions been referred to, but in those instances there were other ingredients besides the carbolic acid. In No. 416 the carbolic acid is alone, with pulv. acaciæ as an excipient. The carbolic acid of the Pharmacopœia is described as being crystalline; this carbolic acid, therefore, should always be used. Pulv. acaciæ is not a suitable excipient; but if ordinary wheaten flour be substituted, the 2 grains of carbolic acid with 1½ grain of flour can be formed into a firm solid pill, requiring careful manipulation, but giving a satisfactory result, and there being no addition to the ingredients of the prescription the pills are not larger than is absolutely necessary. When, therefore, carbolic acid is ordered in a pill it must be used in a solid condition, and as an excipient wheaten flour in about the proportion of three-quarter grain to every grain of the acid.

The mixture, No. 417, may be dispensed as indicated by Mr. Baldock. It varies in colour from a light grey to a chocolate, depending much on the condition of the tinct. guaiac. ammon. The mixture is a very satisfactory one with little tendency to separation.

In combining the ingredients of No. 418 there is a deposit, and probably it is that which Mr. Baldock says is also due to the cause stated by him, an insufficient quantity of acid. That change will take place if the ingredients be in those proportions, but a few drops of acid. hydroch. dil. will either prevent the deposit, or dissolve it when formed. When an opportunity offers that addition may be suggested to the writer, who will probably be unaware how unsightly the mixture is when made in strict adherence to his formula.

R. F. wishes, in No. 419, "to learn of a method of dispensing ol. sant. flav. so that it shall be tasteless."

So desirable a result has never been published; should he succeed, however, in discovering such a method, many others will be glad to know the process through the medium of this Journal.

In No. 420, F. G. requires the best mode of dispensing a pill of ferri sulph. and camphor with a few drops of oil of cinnamon. The glycerine of tragacanth has been so often recommended as a good general excipient, and a very special one for ferri sulph. and camphor, that it should not be necessary to repeat it in this instance. There is no excipient so generally useful as glycerine of tragacanth, for which a formula has been given in the earlier pages of this Journal, and it will combine many ingredients that with most other excipients are perfectly intractable.

Solutions of zinci chlor., B.P., are generally a little opaque. Zinci chlor. is described in the B.P. as being "almost entirely soluble in water." Flückiger, in his 'Pharm. Chemie,' gives the composition of the precipitate as $ZnCl_2$, 9 ZnO, 3 H_2O, an oxychloride of zinc soluble in hydrochloric acid. It should not be filtered, but there is no necessity to use a "Shake the bottle" label.

With regard to prescription No. 422, the question is asked how it should be dispensed. The difficulty that presents itself is with the Latin. This subject was explained in "The Month," June 28, 1879, p. 1058, No. 304, and it is only necessary here to refer "Bdfrd" to that number.

The dispenser, in No. 423, was not justified in adding sacch. lactis to the hydrarg. c. cretâ. With efficient dispensing scales, which demand more care and better treatment at the dispensing counter than they generally get, and which a dispenser should take pride in keeping in good condition, there would be little or no difficulty in weighing these powders without the addition of anything extra to the prescription. Now that the Weights and Measures Act is in force, pharmacists should look well to their scales and weights equally with their measures on the dispensing counter. Even with average care the former soon get out of order, but in careless hands the transition is very rapid; whilst the measures, which are not given to change, in too many instances were never more than an approximation to average correctness.

THE DIGESTIVE FERMENTS, AND THE PREPARATION AND USE OF ARTIFICIALLY DIGESTED FOOD.*

BY WILLIAM ROBERTS, M.D., F.R.C.P., F.R.S.

Lecture III.

(*Concluded from p.* 1000.)

Peptonized Gruel.—Gruel may be prepared from any of the numerous farinaceous articles which are in common use—wheaten flour, oatmeal, arrowroot, sago, pearl barley, pea or lentil flour. The gruel should be very well boiled and made thick and strong. It is then poured into a covered jug and allowed to cool to a temperature of about 140° F. Liquor pancreaticus is then added in the proportion of a tablespoonful to the pint of gruel and the jug is kept warm under a cosey, as before. At the end of a couple of hours the product is boiled and finally strained. The action of pancreatic extract on gruel is twofold: the starch of the meal is converted into sugar and the albuminoid matters are peptonized. The conversion of the starch causes the gruel, however thick it may have been at starting, to become quite thin and watery. The bitter flavour does not appear to be developed in the pancreatic digestion of vegetable proteids, and peptonized gruels are quite devoid of any unpleasant taste. It is difficult to say to what extent the proteids are peptonized in the process of digestion by pancreatic extract. The product, when filtered, gives an abundant reaction of peptone; but there is a considerable amount left of undissolved material. Most of this, no doubt, consists of insoluble vegetable tissue, but it also contains some unliberated amylaceous and albuminous matter. Peptonized gruel is not generally, by itself, an acceptable food for invalids, but in conjunction with peptonized milk (peptonized milk gruel), or as a basis for peptonized soups, jellies and blanc-manges it is likely to prove valuable.

Peptonized Milk Gruel.—This is the preparation of which I have had the most experience in the treatment of the sick and with which I have obtained the most satisfactory results. It may be regarded as an artificially digested bread and milk and as forming by itself a complete and highly nutritious food for weak digestions. It is very readily made and does not require the thermometer. First a good thick gruel is prepared from any of the farinaceous articles above mentioned. The gruel, while still boiling hot, is added to an equal quantity of cold milk. The mixture will have a temperature of about 125° F. (52° C.). To each pint (550 cubic centimetres) of this mixture two or three teaspoonfuls of liquor pancreaticus and twenty grains of bicarbonate of soda are added. It is then kept warm in a covered jug under a "cosey" for a couple of hours and then boiled for a few minutes and strained. The bitterness of the digested milk is almost completely covered in the peptonized milk-gruel, and invalids take this compound, if not with relish, without the least objection.

Peptonized Soups, Jellies and Blanc-manges.—I have sought to give variety to peptonized dishes by preparing soups, jellies and blanc-manges containing peptonized aliments. In this endeavour I have been assisted by a member of my family, who has succeeded beyond my expectations. She has been able to place on my table soups, jellies and blanc-manges containing a large amount of digested starch and digested proteids, possessing excellent flavour, and which the most delicate palate could not accuse of having been tampered with. Soups were prepared in two ways. The first way was to add what cooks call "stock" to an equal quantity of peptonized gruel or peptonized milk gruel. A second and better way was to use peptonized gruel, which is quite thin and watery, instead of simple water, for the purpose of extracting shins of beef and other materials employed for the preparation of soup. Jellies were prepared simply by adding the due quantity of gelatine or isinglass to hot peptonized gruel and flavouring the mixture according to taste. Blanc-manges were made by treating peptonized milk in the same way and then adding cream. In preparing all these dishes it is absolutely necessary to complete the operation of peptonizing the gruel or the milk, even to the final boiling, before adding the stiffening ingredient. For if pancreatic extract be allowed to act on the gelatin the gelatin itself undergoes a process of digestion and its power of setting on cooling is utterly abolished.

Peptonized Beef Tea.—Half a pound of finely minced lean beef is mixed with a pint of water and 20 grains of bicarbonate of soda. This is simmered for an hour and a half. When it has cooled down to about 140° F. (60° C.) a tablespoonful of the liquor pancreaticus is added. The mixture is then kept warm under a "cosey" for two hours and occasionally shaken. At the end of this time the liquid portions are decanted and boiled for five minutes. Beef tea prepared in this way is rich in peptone. It contains about 4·5 per cent. of organic

* The Lumleian Lectures, delivered before the Royal College of Physicians.

residue, of which more than three-fourths consist of peptone, so that its nutritive value in regard to nitrogenized materials is about equivalent to that of milk. When seasoned with salt it is scarcely distinguishable in taste from ordinary beef tea.

The extreme solubility of digested products, whether of starch or of proteids, detracts from their acceptability to the healthy. To them they appear thin and watery; they miss the sense of substance and solidity which is characteristic of their ordinary food. But to the weak invalid, without appetite, this sense of substance or thickening is generally an objection, and they take with more ease an aliment which they can drink like water. The jellies and blanc-manges, on the other hand, give to invalids of more power that sense of resistance and solidity which is desired by those of stronger appetite.

Nutritive Value of Peptonized Food.

At the outset of this inquiry we are met with the question, Is it certain that the ultimate products of digestion are of equal nutritive value to the mixed transitional products which are produced in succession, and probably absorbed as the food is gradually transformed in the alimentary canal. In other words, are maltose and peptones alone as valuable to the economy as a mixture of these substances with the several dextrines and hemipeptones which are presented to the absorbent surfaces in the course of natural digestion?

With regard to the products of starch digestion, no direct experiments have been made on the nutritive value of maltose, and we can do little more than conjecture that the intermediate dextrines have an usefulness of their own. That they are absorbed seems proved (as might have been expected from their known diffusibility), for they have been detected in the blood, and especially in the blood of the portal vein.

With regard to peptones, we have more information. It was naturally assumed by the earlier observers, who identified peptone as the chief ultimate product of digestion, that this was the form under which proteids were taken up by the absorbents and introduced into the blood for the nutrition of the tissues. But, ten years ago, doubts were cast on this conclusion. It was alleged by Brücke and Voit that the nutrition of the tissues was maintained, not by peptone, which was unfitted for this purpose, but by soluble albumen, which was absorbed in the undigested state from the *primæ viæ*; and that the office of peptone was a subordinate one, resembling that of gelatin, and consisted in aiding to preserve the tissue-albumen from too rapid destruction. Direct observations on the nutritive value of peptones have, however, shown this paradoxical view to be untenable. As the point is one of importance, I will endeavour to lay before you the proofs which have been already adduced of the food value of peptones, and I will supplement these by some observations by myself.

P. Plosz (Pflüger's *Archiv für die ges. Physiologie*, 1874, p. 323) was the first to put this question to the test of direct experiment. He fed a puppy dog weighing 1302 grams with an artificial compound made of fat and sugar, in imitation of milk, but in which the casein was replaced by artificially digested fibrin. In the course of eighteen days of this diet, the dog grew and increased 501 grams in weight.

R. Maly (*Ibid.*, p. 585) performed a similar experiment on a pigeon. He first fed the pigeon for several days on a regulated quantity of wheat, until he had ascertained the quantity requisite to keep the bird in a state of nutritive equilibrium, in which it neither gained nor lost weight. He then made an artificial corn from starch, fat, gum, salts and water, but in which the gluten was replaced by fibrin-peptone, and fed the pigeon on the same quantity of this artificial corn as he had before given of the natural corn. Under this novel diet, the bird, after a short apprenticeship, not only maintained its weight, but actually put on flesh. This experiment seemed to show that peptone was even superior to natural gluten as a nutriment.

It was, however, objected to these experiments that they did not rigorously prove that peptone could build up the tissues, inasmuch as the increase of weight might have been due to an excessive accumulation of fat or of water, and that there might have been not an increase, but a decrease of the structural elements which contained nitrogen.

To meet these objections, Plosz and Györgyai (Pflüger's *Archiv*, Band x., 1875, p. 536) instituted a third set of experiments on a dog weighing 2753 grams. He was first brought down by a diet of simple water to a weight of 2531 grams. He was then fed on a mixture composed of sugar, starch and fat, and containing, in addition, 5 per cent. of purified peptone. Of this mixture, about 400 grams were daily administered to the animal for a period of six days In these six days, the dog took in with his food 14·45 grams of nitrogen; but the total of the nitrogen excreted by the urine and fæces only amounted to 13·46 grams, so that nearly 1 gram of nitrogen had been retained in the body of the animal, which had increased in weight 259 grams. This experiment went to prove that peptone served to repair the wear and tear of the nitrogenized structural elements, and even contributed something to the increase of weight.

Adamkiewicz (*Natur und Nahrwerth des Peptons*, Berlin, 1877), by a still more rigorous method, in a laborious series of experiments on a dog which was fed on a diet wherein the only possible source of nitrogen was peptone prepared from blood-fibrin, arrived at the conclusion that peptone supplied nitrogen to the solid tissues, and that it possessed a nutritive value equal to albumen, or even slightly superior; and that, therefore, it could not be looked on as a bye-product of digestion, but as the chief resultant of the transformation of proteids in the alimentary canal.

The experiments above cited seem sufficient to settle definitely the question raised by Brücke and Voit, and to establish the nutritive value of peptone as a source of nitrogen to the tissues. It seemed, however, desirable to obtain direct proof of the nutritive value of peptonized milk, as compared with the natural article. My observations led me to the conclusion that it was far easier to get a supply of peptonized aliment suitable for invalids by the artificial digestion of milk by pancreatic extract, than by any other method; but, in so important a matter as the feeding of invalids, inference and conjecture seemed hardly a sufficient basis for actual practice.

The questions I proposed to myself were: 1. Is artificially digested or peptonized milk alone sufficient to sustain nutrition? and 2. Is it as efficient in this respect as natural milk? For the purpose of answering these questions, I procured four kittens, of the same brood, eight weeks old. Kittens at this age thrive perfectly on an exclusively milk diet. Two of the kittens were fed on natural milk, and the two others on milk previously digested by pancreatic extract. The digestion of the milk in the latter case was carried out to full completion—that is to say, until the milk became greyish and bitter, and no longer gave any precipitate with acetic acid, nor even with nitric acid. The animals were permitted to have as much of their respective foods as they could consume. The experiment was continued for a period of twenty days. The quantity consumed by each pair was as nearly as possible the same. All four continued in perfect health, and took their nutriment greedily. I was surprised to find that the pair fed on peptonized milk showed no repugnance to the bitter taste of their food, but appeared to relish it quite as well as their companions did their natural milk. The following table exhibits the gain in weight at the end of twenty days by each of the four kittens. The weights are given in grams, and in round numbers.

Diet.		Initial weight.	Weight at the end of 20 days.	Increase of weight.	Increase of weight percent.
Natural milk. .		No. 1—338	514	176	52
		„ 2—558	838	280	50
Fully peptonized milk		„ 3—403	626	223	55
		„ 4—371	562	188	50

The table shows that the percentage increase of weight was very nearly alike in all four animals. No difference could be perceived in the sleekness of their coats, nor in the vivacity of their gambols. The experiment proves that peptonizing the milk in no degree spoils its nutritive value. It also shows, as might have been expected, that in healthy animals, with abundance of digestive power, there is no advantage to be gained from the administration of food in a predigested state. The quantity of food which is taken and absorbed appears to be regulated not so much by the quantity which can be digested as by the quantity which can be assimilated. This experiment had an interesting sequel. After Nos. 3 and 4 had been fed on *fully* peptonized milk for a period of twenty days, they were fed for a period of ten days on *partially* peptonized milk. By using a less quantity of the pancreatic extract in proportion to the milk, and by allowing the process of artificial digestion to go on for not more than half the time allowed in the previous experiments, only a partial conversion of the casein was effected. As nearly as I could judge by the precipitate caused with acetic acid, the casein was digested to about the extent of one-half. In these circumstances, I certainly expected that Nos. 3 and 4 would gain weight as before, and would continue to thrive as well as Nos. 1 and 2. It might have been anticipated that, in these new conditions, the proper digestive powers of Nos. 3 and 4 would come into play and complete with ease the unfinished work of the artificial process; but events did not pass exactly as I anticipated. The annexed table shows the actual results. The weights, as before, are given in grams.

Diet.	Initial Weight.	Weight on 3rd day.	Weight on 5th day.	Weight on 7th day.	Weight on 10th day.
Natural Milk .	No. 1—514	551	570	593	618
		gain 37	gain 19	gain 23	gain 25
	2—838	900	936	993	1063
		gain 62	gain 36	gain 57	gain 70
Half-peptonized milk .	3—626	693	687	681	693
		gain 67	loss 6	loss 6	gain 12
	4—562	645	638	648	683
		gain 83	loss 7	gain 10	gain 35

No interval was allowed to elapse between the two sets of experiments, so that the initial weights in the second set were the same as the terminal weights in the first set. The abrupt alteration in the diet of Nos. 3 and 4 produced a marked disturbance in their nutrition; but there was no declension in their general wellbeing, and they continued to take their modified diet with the same avidity as before. In the first three days, Nos 3 and 4 showed an unusual increase of weight—an increase quite out of proportion to that of their companions. Then came a check; in the next four days, they not only showed no gain, but showed even a slight loss of weight. In the last three days, they began to gain weight again, and were evidently recovering from the temporary check caused by their change of diet. The explanation of this series of events which has presented itself to my mind is the following; but I by no means wish to lay stress on its accuracy. It seemed as if the enforced rest imposed on the digestive organs for a period of twenty days, during the use of fully predigested food, had temporarily diminished their natural vigour, just in the same way as the disuse of a limb diminishes for a time the strength of its muscles. During this first period, immediately following the change of diet, the unemployed digestive powers were suddenly called upon to resume their wonted activity; but, owing to their enfeeblement from disuse, they were unable to respond to the call with due promptness, and undigested materials accumulated in the intestine. This accumulation accounted for the unusual increase in weight during the first period. During the next period, the digestive embarrassment made itself felt, and gave a check to the processes of growth and nutrition, and the animals ceased to grow and gain weight. During the last period, the temporary enfeeblement of the digestive organs was passing away, in proportion as renewed exercise was restoring them to their original vigour, and growth and increase of weight again commenced.

Whether this explanation be trustworthy or not, the lesson indicated by it is probably a true one; namely, that, except in extreme cases, when the digestive power is wholly lost or in complete abeyance, it is more advantageous to use a food which has been subjected to partial artificial digestion than a food in which the process has been carried out to completion. If the patient possess any digestive power at all, it is better that that power should be kept in exercise, than that it should be permitted to deteriorate still further from total disuse. This is in agreement with the rule we apply in other cases of enfeebled function, according to which we endeavour to combine partial rest with moderate exercise.

Clinical Experience of Peptonized Food.—The extreme difficulty of arriving at reliable conclusions in regard to the effect of therapeutical agents is well known to every sober-minded inquirer. The difficulty is not less, but probably greater, in judging of the effects of dietetic means. I have now had a considerable experience, extending over a period of two years, of the use by invalids of peptonized milk and peptonized milk-gruel; and it would be an easy task for me to recite a string of cases in which improvement and recovery followed the use of these articles of diet. But evidence of this sort would be wholly delusive unless checked by such an analysis of the circumstances of each case as would enable me to isolate the influence of the dietetic means. In the immense majority of cases, such an analysis would be obviously impossible; the conditions to be taken into account would be too numerous, and their relative influence too difficult to determine. In a question of this kind, one is obliged in a large degree to fall back on general impressions, and on deductions based on physiological considerations. Nevertheless, there are certain cases—most of them cases of incurable disease—in which the conditions are sufficiently simple to permit direct trustworthy conclusions to be drawn.

I found that peptonized milk-gruel was generally preferred, as being more agreeable to the palate, to simple peptonized milk; and by far the larger number of my observations were made with the former preparation. I was also soon satisfied that, with most rare exceptions, peptonized milk-gruel was perfectly acceptable to the invalid's stomach; and that a diet composed exclusively of this article could be used for many consecutive weeks without the slightest sign of failure of nutrition.

The cases in which the use of peptonized aliment appeared to produce the most striking benefits were those in which complete anorexia prevailed, and those in which the stomach was intolerant of food and immediately rejected every form of nutriment. A brief review of the results obtained in cases of this kind will, I think, prove instructive.

Uræmic Vomiting.—In advanced Bright's disease, incessant vomiting is sometimes a distressing and intract able symptom. In some cases of this class, I have seen the vomiting at once and permanently allayed by the use of peptonized milk-gruel. The downward course of the disease may not have been a moment checked; but the relief to the dying patient was great.

Gastric Catarrh.—That form of gastric catarrh which is the Nemesis of alcoholic excess often yields immediately to the use of peptonized food. In the later periods of cirrhosis, there frequently prevails severe intolerance of every kind of food—the stomach rejecting even beef tea and diluted milk in the smallest quantities. The relief afforded by the use of peptonized milk-gruel in some of these cases is most striking; the vomiting ceases almost from the first, and the intolerable sense of distension diminishes.

Crises of Cardiac Disease.—Persons suffering from cardiac dilatation and valvular incompetency usually encounter one or more crises which are susceptible of relief, before finally succumbing to their disorder. These crises are marked by a general venous stagnation, with severe congestion of the lungs, liver, and kidneys, and rapidly rising dropsy. Associated with these symptoms, there is generally almost complete inability to take food, and sleeplessness. In this condition, I have seen marked relief follow the use of peptonized aliment. I have long observed, as I doubt not have many of you, that the condition here described is often alleviated in the most striking manner by the use of exclusively liquid nourishment—such as milk or milk-gruel, given in small portions subcontinuously, or sippingly, as it were, throughout the waking hours; the patient being never permitted to take a distinct meal, nor a particle of solid food. As my practice has been to direct, in cases of this class, the administration of the peptonized aliment in this sipping fashion, the gratifying results noted have been partly due to the mode of administration; but I have been convinced by more than one example, when the same liquid nourishment in the natural and in the predigested condition has been used in succession, that there was a distinct superiority in the predigested article.

Pernicious Anæmia.—In the earlier periods of this singular disorder, I am inclined to hope that predigested aliment may prove a valuable resource. In cases where the aliment, although fully declared, was still of comparatively recent origin, I have in the last eighteen months seen the disorder checked under the use of peptonized milk-gruel. In one case, owing to the irritability of the stomach, the milk-gruel was at first administered *per rectum* with pancreatic extract, but was afterwards tolerated by the stomach. In three of these cases, the amelioration went on to complete restoration. In cases of longer standing, I have failed by the same means to obtain the slightest improvement.

Gastric Ulcer.—The use of an exclusively liquid nourishment, given subcontinuously in the manner before indicated, is a well-known and most efficacious mode of treatment in these cases; but, since adopting the plan of giving peptonized milk-gruel, I think I have perceived that the results were distinctly better than before, especially in cases associated with epigastric pain. The almost absolute rest procured by this food for the ailing organ appeared to be an additional advantage. I may be permitted to mention one case. The patient had suffered from copious and repeated hæmatemesis, and from severe epigastric pain. The irritability of the stomach was such that the simplest nourishment, given in the smallest quantities, was immediately rejected. Peptonized milk-gruel was, however, tolerated at once; vomiting only occurred two or three times during the first two days of the treatment, and then ceased, as did likewise the epigastric pain. This patient used no other food for a period of six weeks, and took daily from two to three quarts, with steady recovery of flesh and strength.

Pyloric and Intestinal Obstruction.—Peptonized aliment would appear to be especially suitable for use in these cases; but, so far, I have been somewhat disappointed in the results. The vomiting has generally been effectually controlled; but I have not been able to convince myself, in cases of pyloric stricture, that the fatal event was delayed even a single day. When the obstruction has been temporary, and due to a removable cause, the results have been, of course, more satisfactory.

I should be glad to see a further trial made of peptonized, or partially peptonized, milk in the gastric and intestinal catarrh of infants. In one severe case of this class, a favourable result was immediately obtained; in another case, there was greater tolerance of food, and more comfort after it, than with the use of simply diluted milk. It would be interesting, also, to have experience of the use of peptonized aliment in typhoid fever and in old age. The greater variety which can now be given to this form of food by the preparation of peptonized soups, jellies, and blanc-manges, will obviate the monotony sometimes complained of under the continuous use of peptonized milk-gruel.

The Use of Pancreatic Extract as an Addition to Food shortly before it is eaten.

The administration of pancreatic extract with or immediately after a meal can, I think, have only a limited utility. On entering the stomach, the pancreatic ferments encounter the acid of the gastric juice; and, when this rises above a certain point, the activity of the ferments is destroyed. Still a not inconsiderable interval of time must elapse before this point is reached; and during this interval the pancreatic ferments can accomplish a certain amount of work. I have repeatedly administered pancreatic extract in this way; but I am unable to say positively that I have seen benefit from this mode of administration. There is, however, a modification of this plan, which I have lately put in practice, that promises better results. It is to add the extract to the food fifteen or twenty minutes before it is eaten. Certain dishes commonly used by invalids—farinaceous gruels, milk, bread and milk, milk flavoured with tea or coffee or cocoa, and soups strengthened with farinaceous matters or with milk—are suitable for this mode of treatment. A teaspoonful or two of the liquor pancreaticus should be stirred up with the warm food as soon as it comes to table. And such is the activity of the preparation that, even as the invalid is engaged in eating—if he eat leisurely, as an invalid should do—a change comes over the contents of the cup or basin; the gruel becomes thinner; the milk alters a shade in colour, or perhaps curdles softly; and the pieces of bread soften. The transformation thus begun goes on for a time in the stomach; and one may believe that, before the gastric acid puts a stop to the process, the work of digestion is already far advanced.

This mode of administering pancreatic preparations is simple and convenient. No addition of alkali is required, and of course no final boiling. The only precaution to be observed is that the temperature of the food, when the extract is added, should not exceed 150° F. (65° C.). This point is very easily ascertained; for no liquid can be tolerated in the mouth, even when taken in sips, which has a temperature above 140° F. (60° C.). If, therefore, the food is sufficiently cool to be borne in the mouth, the extract may be added to it without any risk of injuring the activity of the ferments.

Pancreatic Extract as an Addition to Nutritive Enemata.—Pancreatic extract is peculiarly adapted for administration with nutritive enemata. The enema may be prepared in the usual way with milk-gruel and beef tea; and a dessert-spoonful of liquor pancreaticus should be added to it just before administration. In the warm temperature of the bowel, the ferments find a favourable medium for their action on the nutritive materials with which they are mixed; and there is no acid secretion to interfere with the completion of the digestive process.

I have now had some experience in this method of alimentation, and have been satisfied with its success. In one case, a patient suffering from postpharyngeal abscess which entirely occluded the œsophagus, was nourished exclusively for a period of three weeks (until the abscess broke) on enemata of milk-gruel mixed with pancreatic extract.

METHODS FOR THE QUANTITATIVE DETERMINATION OF THE ALKALOIDS IN PLANTS.*

BY A. LOESCH.

A. Methods for the Determination of the Solid Alkaloids.—1. The method of Stas, perfected later by Erdmann and Uslar, Dragendorff and others, and used for chemico-legal investigations, consists in extraction with water acidulated with hydrochloric acid, addition of ammonia to alkaline reaction, repeated extraction with continually renewed portions of ether, chloroform, amylic alcohol or benzole, separation of the watery liquid from the solution of the alkaloid, extraction of the latter by shaking with acidulated water, and repetition of the treatment, until the solution of the alkaloid is colourless. It is then evaporated in a weighed vessel, and the residue dried at 100—110° C. Instead of treating the plant with acidulated water, the author treated it with 99 per cent. alcohol, acidulated with hydrochloric, oxalic, tartaric, phosphoric or sulphuric acids, and evaporation and re-solution in water, before treating with ammonia, etc. By this means, the mucus, starch, gum and albuminoids remained undissolved in the residue from the extraction with alcohol. While this method affords the alkaloids in a very pure state, it is attended with a large loss, and is, in the presence of certain viscid substances and albuminoids, both difficult and tedious.

2. The method of Claus† for the estimation of theine and quinine. In the first case, the tea leaves are extracted with ether, the latter removed, for the most part, by distillation, and the residue extracted with water acidulated with sulphuric acid, until it no longer tastes bitter. The acid liquid is mixed with excess of burnt magnesia, evaporated to dryness in the water-bath, the residue pulverized and extracted with ether. In the determination of the quinine, the pulverized bark is thoroughly exhausted with water acidulated with sulphuric acid, the extract evaporated to dryness with excess of burnt magnesia, and extracted with ether. This method gives satisfactory results and can, without doubt, be employed in the quantitative determination of all other solid alkaloids; it does not, however, yield the alkaloids in a pure condition.

3. The methods of R. Wagner, Sonnenschein,‡ Husemann, Marmé and Schultz, are based on the precipitation of the alkaloids by iodine and potassium iodide, phosphomolybdic and phosphotungstic acids, or potassiomercuric iodide, from the extract obtained with acidulated water. The precipitates, according to their nature, are decomposed with barium hydrate, hydrogen sulphide, or a mixture of stannous chloride and caustic alkali, and warming, and the alkaloids dissolved out with ether. These methods are not only attended with a large loss, but yield impure products.

4. F. J. Mayer recommends titration with a standard solution of potassiomercuric iodide. This method gives inexact results, owing to the necessity of decolorizing the solution, and consequent loss of substance, and to the difficulty of determining the end of the titration.

The method of the author is as follows:—the cut, or coarsely powdered, vegetable substances are twice warmed for three hours in the water-bath, with 90 per cent. alcohol acidulated with hydrochloric acid, then pressed and washed with 90 per cent. alcohol. The volume of the collective alcoholic liquids is then reduced, by distillation, to two-thirds, the cold residue filtered, washed with alcohol, and the filtrate concentrated on the water-bath to the consistence of an extract. The residue is warmed with twice the weight of the original substance of water acidulated with sulphuric acid, cooled and filtered. The filtrate is mixed with thrice its volume of cold, saturated solution of alum, ammonia added in slight excess (*i.e.*, more than necessary to precipitate the alumina), evaporated to dryness on the water-bath, the residue pulverized, and exhausted with the solvent suited to the alkaloid to be extracted, *e.g.*, quinine is extracted with ether, and then cinchonidia with 90 per cent. alcohol. The residue from the leaves and roots of *Atropa belladonna*, from the leaves and seeds of *Hyoscyamus niger*, and the leaves of *Aconitum Napellus*, with ether; that from rad. ipecac., with 90 per cent. alcohol, etc. The ethereal or alcoholic solutions of the alkaloids are evaporated to dryness, dried at 110° C., and weighed. The alkaloids are thus obtained as perfectly colourless crystals, leaving no residue when heated on platinum foil. The results obtained by the author, with the foregoing methods, are given in the following table:—

Material.	Alkaloid.	Percentage Extracted. Method I.	II.	III.	IV.	Method of the Author.
Peruvian Bark, *yellow*	Quinine	2·735	3·175	2·460	2·570	3·250
	Cinchonidine	0·194	0·250	0·187	0·175	0·285
,, ,, *red*	Quinine	1·105	1·195	1·085	1·005	1·235
	Cinchonidine	0·425	0·500	0·400	0·395	0 525
,, ,, *brown*	Quinine	0·895	0·950	0·825	0·800	0·975
	Cinchonidine	2·485	2·975	2·350	2·300	3·075
Leaves of Hyoscyamine	Hyoscamine	0·099	0·145	0·085	0·074	0·175
Seeds of ,,		0·197	0·225	0·180	0·100	0·285
Leaves of Atropa belladonna	Atropine	0·115	0·197	0·100	0·090	0·235
Roots of Atropa belladonna		0·300	0·325	0·275	0·225	0·375
R. Ipecac	Emetine	0·720	0·800	0·550	0·475	0·875
Folia Aconiti	Aconitine	0·300	0·395	0·265	0·220	0·425

In the case of substances of unknown nature, the residue of the evaporation with ammonia and alum must be successively treated with the different solvents, *i.e.*, first with ether, then with chloroform, then with amylic alcohol, and finally, with 90 per cent. alcohol. It is by this means not only possible to extract the entire amount of alkaloids, but also to effect a separation of those of different solubilities in cases where more than one are present.

The special precautions for the successful conduct of the foregoing method are: 1. The alcohol must be completely expelled from the alcoholic extract, by evaporation on the water-bath. 2. Both the alcoholic and aqueous liquids must be filtered cold. The author finds, as the result of numerous experiments, that the best solvent for the alkaloids, in general, is amylic alcohol; then follow ether, chloroform and benzole, which latter, except in a few cases, dissolves the smallest quantity.

B. Methods for the Determination of the Liquid Alkaloids.—In the methods hitherto in use the vegetable substances are either distilled with potassium or calcium hydrates, the distillate saturated with hydrochloric acid, evaporated to dryness on the water-bath, and the residue distilled with potassium hydrate; or they are exhausted with acidulated water, the filtered liquid evaporated, and then distilled with potassium or calcium hydrate. As all plants contain not only ammonia, but nitrogenous substances which evolve ammonia when warmed with alkalies, the distillate, after neutralization with hydrochloric acid, is evaporated to dryness, and the residue exhausted with strong alcohol; the ammonium chloride remains undissolved, the alcoholic solution is evaporated to dryness, and the residue exhausted by shaking with solution of potassium hydrate and ether. The ethereal solution is then evaporated, at first at ordinary temperatures, and then over calcium chloride, or hydrate, to remove the moisture. In quantitative estimations, the clean ethereal solution is shaken with a measured volume

* *Pharm. Zeitschr. f. Russland*, 18, 545. Reprinted from the *Journal of the American Chemical Society*.

† *Vierteljahresschrift f. prakt. Pharm.*, 13, 414.

‡ *Zeitschr. f. anal. Chem.*, 4, 387.

of standard hydrochloric acid, the ether evaporated off at the lowest possible temperature, and the excess of acid determined by titration. The disadvantages of the foregoing method are: 1. Ammonium chloride is not absolutely insoluble in strong alcohol. 2. A certain proportion of the hydrochloric acid volatilizes with the ether, at temperatures even below 50° C. The error of the method is, therefore, one of excess.

The following method of the author permits an easy and exact determination of the liquid alkaloids:—

A weighed quantity of the substance is boiled out with water acidulated with hydrochloric acid, the residue pressed, and washed with water. The collective solutions are evaporated to one-quarter, and the residue distilled with calcium hydrate (under careful cooling of the distillate). The distillation is continued until the last portions of the distillate gave no alkaline reaction with sensitive litmus paper. Potassium and sodium hydrates cannot be used, owing to their destructive effects on the alkaloids. The colourless distillate is exactly neutralized with sulphuric acid, evaporated to dryness in the water-bath, the residue pulverized and exhausted with 90 per cent. alcohol. The ammonium sulphate remains entirely undissolved, the alkaloid sulphates pass into solution. The solution is evaporated to dryness, the residue shaken out three times with ether and solution of potassium hydrate, the ethereal solution treated with a measured quantity of standard sulphuric acid, the ether distilled off, and the excess of sulphuric acid determined in the residue by titration.

The following determinations of coniine and nicotine were made by the foregoing methods:—

	Method with HCl. per cent.	Method of the author. per cent.
Leaves of *Nicotiana t.*	5·750	5·250
Plant of *Conium m.*	0·075	0·060

KOUMYS.*

BY L. WOLFF, M.D.

A very interesting article in the *American Journal of Pharmacy*, 1874, p. 570, from the *Pharmaceutical Journal and Transactions*, gives a very excellent description of the koumys cure, and the preparation of koumys, as practised by the Tartars on their native steppes, but it leaves the distant pharmacist at this side of the Atlantic, where no Tartar mares nor mares' milk can be had, at a loss as to how to reproduce it in this country.

H. and N. Schultz, of Berlin (*American Journal of Pharmacy*, 1875, p. 68), direct an addition of sugar of milk to cows' milk, and its fermentation by brewers' yeast; anyone that has tried has probably succeeded as little in making koumys according to their directions as I have. Schwalbe, in the same article contributed by Dr. A. W. Miller, uses condensed milk, dissolved in water, to which he adds lactic acid and rum, puts it in a Liebig's bottle, and charges the whole with carbonic acid gas, and sets it in a warm room until fit for use.

In another article of the Journal, 1875, p. 261, the Russian method of fermenting mares' milk by a home-made yeast is quoted, while still another one, 1875, p. 83, from the *Allgem. Med. Centralzeitung*, 1874, p. 1108, recommends milk, grape sugar and fresh beer yeast to be fermented together at a temperature of 88° F. until fermentation has set in, when it is to be bottled, and shaken every fifteen minutes for the next forty-eight hours (not a very pleasant job).

In 1876 I formed the acquaintance of a Russian gentleman, visiting Philadelphia, who had made koumys in his native country, and together we experimented, but with very indefinite results, until we imported, at considerable expense, some of the original ferment from Russia, and with it prepared koumys, which certainly effervesced very much, had a rich, creamy appearance, did not coagulate in heavy curd, was slightly acidulated, but possessed a rank, acrid taste, which I attributed to the ferment, whose odour was certainly not very inviting. The consequence was that the koumys, which had been made at a considerable outlay, never enjoyed the reputation it ought to have acquired, and the costly ferment was gradually left to die out.

As the demand for it again increased, I was sorely puzzled how to make a koumys that would be all that is required of it, and that would possess all its virtues and properties. I tried in vain all the above-given methods, but invariably obtained sour milk with a heavy curd as a result, indifferently effervescing, while the taste was enough to cure any hankering the patient may have had after the coveted milk wine.

When considering the nature of koumys and its peculiar features, it appears evident that its properties must be largely due to the nutritious quality of the milk, along with the alcohol produced by the fermentation of its sugar, while its rich effervescence makes it readily digestible even to weak and enfeebled stomachs. The cause of success in its manufacture from mares' milk is undoubtedly due to the large amount of sugar of milk contained therein, which is 80 parts in 1000 to 40·37 in cows' milk; while the albuminates in the former are but 16·41 to 54·04 in the latter (Ranke's 'Physiology'), so that the object in view seems to be to increase the amount of sugar in the milk while decreasing the albuminates, should the latter be required.

As the sugar of milk when added to milk is not directly induced to fermentation by ordinary yeast fungi, I was soon led to substitute grape sugar for it, into which the former has to be changed before undergoing vinous fermentation, and which, though not in the same quantities, yields by fermentation the same results—carbonic acid gas and alcohol. But still while following the directions of some of the above quoted authorities, I found my koumys soon to curd and sour—a most unsightly article, whose acetous odour forbade its use.

As I was inspecting, one day, the fermenting rooms of one of our larger breweries, I was struck by the low, icy temperature maintained there, and on inquiry was informed that if the temperature were allowed to rise the fermentation would be sure to prove wild, signifying sour or acetous fermentation. This showed me at once the reasons of my former failures, and when I applied the principle involved to my own koumys, I had the satisfaction of drawing from my bottles a rich creamy, homogeneous liquid, slightly acidulated, foaming like the choicest soda water, of an agreeable taste, such as I exhibit here a specimen of, and some of which has been used by many physicians in their practices with excellent results, proving a sustaining nutriment which was readily borne by even the weakest stomachs.

In concluding, I give the formula employed by me, by which I am certain every pharmacist can produce a good and reliable article, at a reasonable cost, which, with a remedy consumed in such quantities as this, is of no small importance, and I have no doubt that nothing would bar even its dispensing as a beverage at our soda fountains.

Take of grape sugar ½ an ounce, dissolve in 4 ounces of water. In about 2 ounces of milk dissolve 20 grains of Fleischman's compressed yeast, obtained at any grocery store, or else well-washed and pressed out brewers' yeast. Mix the two in a quart champagne bottle, which is to be filled with good cows' milk to within 2 inches of the top; cork well, and secure the cork with strings or wire, and place in an ice chest or cellar at a temperature of 50° F., or less, and agitate three times a day. At the expiration of three to four days at the latest, the koumys is ready for use, and should not then be kept longer than four or five days.

It should be drawn with a champagne syphon tap, so that the carbonic acid gas may be retained and the contents will not entirely escape on opening the bottle.

* From the *American Journal of Pharmacy*, June, 1880.

The Pharmaceutical Journal.

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THE REVISION OF THE PHARMACOPŒIA.

To any one about to attempt a novel or difficult task it is always a great assistance to be able to look round upon the proceedings of other persons who have undertaken similar things, and thus to gain from their experience and example a knowledge of what is most desirable to be kept in mind for ensuring success. It is for this reason that we have often referred to the circumstances connected with the revision of the United States Pharmacopœia, as having in this sense a peculiar interest for British pharmacists now that there is growing up among them a desire to take an active part in the work of revising their own Pharmacopœia.

The reasons why the requisite periodical revision of a Pharmacopœia should be carried out under the guidance or, at least, with the assistance of the pharmacists' special knowledge and practical experience have been frequently stated in the pages of this Journal, and it has further been urged that since pharmacists are subject to the law of the Pharmacopœia, they ought, in accordance with modern principles of government, to have through the representatives of their order a considerable voice in the determination of what that law is to be.

Though pharmacopœias were originally framed by Colleges of Physicians, they were at that period intended rather to indicate the particular kinds of drugs and chemicals which were regarded by the medical profession as being the most important medicinal agents. In this respect their preparation came especially within the province of medical men, and in regard to such pharmaceutical skill as was required in carrying out the various operations of compounding according to formulæ, medical men were then proportionately so much more conversant with pharmacy than is now generally the case that there was little reason to object to their preponderating influence in the construction of pharmacopœias.

But of late the practice of pharmacy has become so far separated from medical practice, and such considerable advance has been made in the art of preparing medicinal remedies, that there is need for the co-operation of practical pharmacists with medical men in the work of revision to which pharmacopœias must necessarily be submitted from time to time.

In the United States of America the need of such joint action of both classes has always been recognized, and the most cordial relations have existed between medical men and practical pharmacists in regard to their respective functions in the revision of their Pharmacopœia. By mutual and voluntary consent this work is performed by representatives of incorporated medical and pharmaceutical colleges and societies, and now that the time for carrying out the decennial revision of the Pharmacopœia of that country has arrived we find the work being conducted by a Convention that has recently met at the National Medical College in the city of Washington.

Having regard to the views put forward at various times in this Journal, as to the propriety of giving pharmaceutical representatives a position of equality with medical men in the body entrusted with the duty of revising the British Pharmacopœia, and bearing in mind Mr. Hampson's motion to that effect at the Council meeting of the Pharmaceutical Society last December, we now propose to draw the attention of our readers to an account of the constitution and proceedings of the American Convention, as being likely to furnish suggestions as to the mode in which a similar course might be adopted in this country.

At the meeting held last month of the Sixth Decennial Convention the business was commenced by the nomination and election of Dr. James E. Morgan to act as Chairman, as being the only surviving officer of the Fifth Decennial Convention. After he had, on behalf of the medical profession and pharmacists of the district of Columbia, welcomed the attendants at the Convention, a Committee was constituted for the purpose of examining the credentials of the delegates who had been deputed to respond to the call of the Convention. The test of eligibility to act as a delegate in conducting the work of revision appears to have rested upon the fact of the institutions sending delegates to the Convention being incorporated bodies teaching medicine or pharmacy. If that were proved the several institutions were entitled to full representation. In regard to this point a question was raised as to whether the Pennsylvania College of Pharmacy was an incorporated body, and it was stated on the authority of the Secretary of the Commonwealth of Pennsylvania that there was no such incorporated institution other than the Philadelphia College of Pharmacy; subsequently, however, it was shown by Mr. Roche, the delegate from this College, that it did possess a charter, and though this charter was originally granted to a "College of Mines," it had been granted with authority to change the name of the College, a privilege which had been acted upon by making it a College of Pharmacy. In the discussion of a similar question as to the Philadelphia County Medical Society, Professor H. C. Wood remarked that the U. S. Pharmacopœia originated in the city of Philadelphia, and on behalf of the Society in question said that it wished to do all it could to make the Pharmacopœia as good as possible; that they were not assembled to subserve the interests of any individual institution, but rising above petty jealousies and sectional feelings, to do what, in their opinion, was best for the profession throughout the entire country, not to represent Philadelphia or any local institution, but to try and raise the Pharmacopœia out of the slough into which it had fallen. Hence, he urged that if any society of good standing sent delegates in accordance with the spirit of the call it was their duty to receive them, since he believed the profession of the United States would hold them responsible if they narrowed their representation by the exclusion of delegates who came in good faith. The question was then put to the vote and carried by a considerable majority.

A committee, consisting of one member from each of the bodies entitled to representation, and consisting in all of thirty-eight members, twelve of whom were pharmacists, was then appointed for the purpose of considering and deciding as to the general principles to be recommended for adoption in the revision of the Pharmacopœia.

Its first business was to elect a president and the officers of the Convention, Dr. ROBERT AMORY, of Brooklyn, Mass., being chosen as President, Dr. BUSEY, of Washington, and Professor BEDFORD as Vice-Presidents, Dr. CASTLE, of New York, as Secretary, and Dr. KLEINSCHMIDT as Assistant-Secretary.

In the report consequently presented at a later sitting of the Convention various recommendations were offered, of which the following is a brief *résumé*:—

That all measures of capacity should be abandoned and quantities expressed only in parts by weight.

That the text of the U.S. Pharmacopœia should be written in the English language; but that the titles of officinal substances and preparations should be given as heretofore both in Latin and English.

That the present division into materia medica and preparations be abolished, and all articles arranged in a continuous alphabetical order, retaining such headings as Extracta, Decocta, Infusa, etc., wherever it may be found useful to give general directions applying to the whole class, but making all formulæ for the preparation of the single members of each class complete in themselves.

That the different headings be accompanied by a list of synonyms in common use and in a manner not interfering with the perspicuity of the text of the formulæ.

That at the end of each article a short paragraph be added, giving the names of all the preparations into which the substance or preparation treated of in the article enters.

That concise but complete descriptions of all crude drugs be given, sufficient to indicate distinctive characters visible to the naked eye, or, when necessary, under a lens magnifying about ten diameters. Where such description is insufficient to characterize properly a substance it should be further defined by physical and chemical properties. Botanical names of plants to be accompanied by the name of the author, but all therapeutical discussion to be omitted. All minerals or chemical preparations to be described and defined by concise tests of identity and purity, without giving processes, except where differences in process produce different results. Processes for preparation of morphia, quinia, etc., to be omitted, but the articles opium and cinchona to be accompanied with detailed processes of assay for the respective alkaloids.

That chemicals of definite composition have their primary rational formulæ added, according to the old and new notation, and distinguished by different type, together with their atomic or molecular weights.

That in case of chemical preparations where different processes yield different results the process to be followed be described in detail.

That all tinctures, wines, etc., in which slight variation of dose is of no importance, be made as nearly as possible of a uniform percentage strength, viz., 1 part of the drug in 5 or 10 parts tincture, as the case may be. For highly active preparations, the present strength to be retained as nearly as possible, but in the liquid opium preparations, except paregoric, the strength of 10 per cent. be adopted if found advisable.

That the quantities or parts by weight of the ingredients of a composition be expressed in the simplest possible terms, and whenever possible in centesimal ratio.

That temperature be expressed in degrees Fahrenheit and Centigrade.

That varieties and degrees of colour, consistence, transparency, fineness of powders, etc., be defined as closely as possible.

That a uniform method of taking specific gravities of liquids be prescribed.

That whenever it is necessary to employ definite expressions of weight, as for instance, when a pill mass is to be divided into pills containing a certain weight of one or more ingredients, that weight be expressed in metrical as well as apothecaries' weight.

That in the formulæ (for syrups, infusions, elixirs, etc.) in which fixed quantities of ingredients are directed to be combined under circumstances involving possible partial loss of ingredients, the weight of the intended finished product be specified, and when practicable brought up to 100 parts, as, for instance, where a variable amount of water may be lost by evaporation.

That all doses be omitted from the Pharmacopœia.

That the following tables be appended to the Pharmacopœia:—a list of new additions; a list of articles dropped from the last Pharmacopœia; a list of changes of Latin officinal names; a list of changes of English officinal names; tables of weights and measures; table of solubilities of official chemicals in water and alcohol at 15·5° C. (=60° F.), and at the boiling points; an alcoholometric table; acidimetrical tables according to specific gravity: a list of reagents, qualitative, quantitative and volumetric, of fixed strength, with a brief statement of their use; a table of elementary substances, with symbols, atomicity, atomic weight, etc.; a weight and volume table; and, to facilitate the use of parts by weight in compounding, prescribing and dispensing, a table exhibiting the relationship between weight and measure of a given volume of any liquid preparation, and containing all officinal liquids in alphabetical order; a table of specific gravities of officinal liquids for each degree between 10° and 25° C.; a table comparing the strength of powerful galenical preparations of foreign pharmacopœias with those of the U. S. Pharmacopœia; a table exhibiting differences in strength of preparations made according to the present and the new U. S. Pharmacopœia; a table of thermometric equivalents; an index of all the synonyms, with marks of accent to indicate pronunciation; a table of saturations.

The Committee which made the foregoing report was also authorized to appoint a permanent committee of revision and publication, having power to provide for the publication of the new Pharmacopœia, to employ skilled experts to make such trials and investigations as may be necessary to enable the Committee to pass intelligent judgment upon the details of the work before it, to publish a supplement after five years, or oftener if deemed expedient, and to turn over to the future Convention of 1890 all the papers relating to its proceedings when the time arrives for making another decennial revision of the Pharmacopœia.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

Meeting of Executive Committee.

June 17, 1880.

Present—W. Southall, Esq., President; Messrs. Benger, Brady, Carteighe, Ekin and Greenish, and Professors Attfield, Bentley and Redwood.

The minutes of the previous meeting were read and confirmed. These included a discussion on the advantages and disadvantages of continuing to hold the annual meetings in the same town as that at which the meetings of the British Association were held, and practically at the same time. The following is a summary of the remarks on the subject made at that and at the present meeting.

Mr. Carteighe alluded to the difficulties experienced by local officers who were on the organizing committees of both bodies, the inconveniences felt by members of the two bodies on the Conference excursion day, and the frequent failures to get adequate hotel accommodation, especially by members of the Conference who did not wish to remain in a town for the Association meetings after the Conference meetings were over.

Mr. Schacht thought that the time and town of meeting of the Conference had become to be so generally understood as the time and town of meeting of the British Association that the whole organization of the Conference would be much upset by a change. The simultaneous character of the gatherings was one of great convenience to many men, though it might be the opposite to others. It was not easy to work up local pharmaceutical enthusiasm, but even that was less difficult of accomplishment when a whole town had been fired with the idea of entertaining a big body like the British Association than in the absence of such an impetus.

Mr. Brady reminded the Committee that this matter had been brought before them in previous years by himself and by Mr. Hanbury. There was a great deal to be said on both sides. He thought that before the Swansea meeting was held the opinions of members should be invited through the medium of any Report of Committee proceedings that might be published.

Professor Attfield had made many inquiries on the subject and had corresponded with several former local secretaries and other gentlemen, including Messrs. Clark (Plymouth), Grose (Swansea), Groves (Weymouth), Hayes (Dublin), Kinninmont (Glasgow), Maleham (Sheffield), Pitman (Bristol), and Reynolds (Leeds). A few influential members preferred the existing practice, with all its disadvantages. Their meetings would probably suffer in point of number of members attending, both as regarded local and visiting members, if the meetings were held at times other than those just preceding and overlapping the times fixed for the meetings of the British Association, for many visiting members would not care to go twice to a town within a month or so, and local members preferred to have the Conference at the least busy times of the year, which were just the times selected for the visit of the British Association. They might, of course, meet at the same date or about the same date in a more or less distant town, but members wishing to economize time would object to such an arrangement, and there was the increased difficulty of exciting enthusiasm already mentioned by Mr. Schacht. Teachers contributed men and papers to the Conference and would probably only attend during August or September. At whatever time during either of those months the meetings were held it would fit in with the holiday arrangements of some men and clash with those of others.

The following resolution was proposed by Mr. Ekin, seconded by Mr. Brady, and carried:—"The Committee again having had under consideration the desirability of holding the annual meetings of the Conference at times other than those just preceding and overlapping the times of the meetings of the British Association, or of holding them in towns other than those visited by the British Association, and having received opinions on the subject from local secretaries and other members of the Conference, conclude that any immediate alteration of the existing practice as regards times and places of meetings is undesirable."

Professor Attfield reported that, in accordance with instructions from the Committee, he had obtained an estimate of the probable cost of converting the ten indexes of the published 'Year-Books' (1870 to 1879), into a single index, and of printing such a general index. The printers of the 'Year-Book' had put the price of compilation at £35, and of printing 2500 copies of a nearly 200 page index at £75; total, £110. If the general index of the six numbers of 'Proceedings' (1864 to 1869), compiled, printed and issued to members in 1869, were incorporated with such a general index of the 'Year-Books,' some person being employed to check and, if possible, amplify the whole, the total cost probably would not be less than £150. Postage, wrapping, addressing, etc., would cost an additional £40. Probably every member of the Conference could be supplied, gratis, with a good general index to the sixteen annual publications of the Conference for somewhat less than £200.

Mr. Brady thought that the issue of such a general index would redound to the credit of the Conference, especially if copies were freely distributed to all the public libraries to which 'Year-Books' were now annually presented.

Professor Bentley said that he had often wanted such an index.

The matter was fully discussed, but decision postponed.

A complete set of 'Year-Books' was ordered to be presented to the Pharmaceutical Society of Ireland.

The consideration of probable changes amongst the staff officers of the Conference, and of a list of officers to be recommended for election by the members at the approaching meeting at Swansea (August 24 and 25) was, on the motion of Mr. Ekin, seconded by Professor Attfield:—"Deputed to Messrs. Brady, Carteighe and Schacht, as a Sub-committee, with instructions to report to the next meeting of Committee."

Professor Attfield reported the work done since the previous meeting of Committee, including the publication and delivery to members of the 'Year-Book' for 1879; distribution of the list of subjects for research; collection of subscriptions, and arrangements for the approaching meeting at Swansea. The balance for the year of income over expenditure would, he estimated, be £150. The amount already standing in Consols from previous years was about £350, besides the Bell and Hills Library Fund.

The Editor reported that he was making good progress with the MS. of the 'Year-Book' for 1880.

Eighty-one candidates were elected to membership of the Conference.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, June 17, Professor H. E. Roscoe, President, in the chair.

The following certificate was read for the first time:—A. C. Hawkes.

During the evening a ballot was taken and the following gentlemen declared duly elected Fellows of the Society:—P. S. Brown, H. Brown, K. Lal Dey Rai Bahadour, G. H. Hughes, H. A. Lawrance, F. E. Mathews, E. Moritz, R. S. Marsden, E. A. Reilly, Tarapwsanna Roy, C. Rawson, B. Symons, T. Taylor, H. K. Tompkins, R. G. Watts and A. Wingham.

The following papers were read—

On Pentathionic Acid. By T. Takamatsu and Watson Smith.—The authors at the suggestion of Dr. Roscoe have examined the proofs for and against the existence of this substance advanced by Wackenroder, Spring, Stingl and Morawski, Kessler, etc. The acid was originally prepared by Wackenroder by passing hydrogen sulphide into a saturated solution of sulphurous acid. Spring obtained what he thought was the potassium salt of the acid in an alcohol-ether solution and proved it to be merely tetrathionate. Stingl and Morawski proved by qualitative and quantitative results that an acid containing more sulphur than tetrathionic acid exists in Wackenroder's solution. Spring also asserts that the alleged solution of pentathionic acid contains a mixture of tetrathionic and hyposulphurous acids. The authors have confirmed results obtained by Kessler in the investigation of the reaction of Wackenroder's solution with mercuric cyanide $H_2S_5O_6 + Hg(CN)_2 + 2H_2O = 2H_2SO_4 + HgS + 2HCN + 2S$ the ratios between the S in the sulphuric acid to that in the HgS to that existing in the free state were 2·01 : 1 : 2·08, whereas tetrathionic acid would give 2:1:1. They have also investigated the statement of Spring that the Wackenroder's solution is not decomposed by alkaline hydrates, but yields a solution containing tetrathionate without separation of sulphur. The authors prove that a decomposition really occurs, and that sulphur is separated, but its separation is masked, because as fast as it is precipitated it is redissolved by the alcohol-ether solution. They also prove that no hyposulphurous acid is present in the Wackenroder solution. They finally synthesized both tetrathionic and pentathionic acids by acting upon lead thiosulphate, in the first instance with a moderately strong solution of iodine in hydriodic acid, when tetrathionic acid was produced, and secondly by acting on lead thiosulphate by as strong a solution of iodine in hydriodic acid as could be obtained, when pentathionic acid was formed—$3(PbS_2O_3) + 2HI + 2I_2 = H_2S_5O_6 + 3PbI_2 + SO_3$. Analyses of the products are given. The authors conclude that pentathionic acid exists and recommend the reaction just given as a convenient and expeditious method of preparing it. They hope to be able to prepare some of the pentathionates, which under ordinary conditions are less stable than the acid. In conclusion they contrast the reactions of the thionic acids, pentathionic acid being distinguished by giving an immediate precipitate of sulphur with caustic potash, redissolving gradually on standing, and an almost immediate brown coloration, becoming black on warming with ammoniacal silver nitrate.

Preliminary Note on some Orcinol Derivatives. By J. Stenhouse and C. E. Groves.—Some years ago halogen derivatives containing 5 atoms of bromine and chlorine were described (*Proc. Roy. Soc.*, 20, 72), and it was found that both the hydrogen atoms in the HO groups were displaced, giving rise to the substance $C_6MeBr_3(OBr)_2$. The reaction was subsequently examined by Liebermann and Dittler who admitted the correctness of the above empirical formula, but regarded the corresponding resorcinol body as a compound formed by the addition of 2 atoms of bromine to tribromoresorquinone, $C_6HBr_3O_2$. If the tribromoresorquinone had the above constitution it seemed probable that it would be formed by oxidizing tribromresorcinol, $C_6HBr_3(HO)_2$. The reaction was investigated in the case of trichlororcinol, but the above compound was not obtained.

The authors conclude that in orcinol the CH_3 group occupies the meta position with respect to the two HO groups and that it has the constitutional formula HO : HO : Me :: 1 : 3 : 5.

On the Determination of Carbon in Soils. By R. Warington and W. A. Peake.—The authors have examined the various methods which have been proposed. Oxidation by chromic acid suggested by Wolff; this gives but 79 per cent. of the carbon present. Oxidation by permanganate; 10 grams of the soil with 5 grams KHO in 25 c.c. of water and solid permanganate are digested in a salt-bath for an hour. The mass is then treated with H_2SO_4 and the CO_2 evolved absorbed. This method gives 92 per cent. of the total carbon. The best method is that of combustion in oxygen with oxide of copper after treatment with sulphurous acid.

Note on Camphydrene. By H. E. Armstrong.—The author sharply criticized a recent paper by Dr. Letts, in the *Berlin Berichte*, in which Dr. Letts repeats an assertion, made some months ago at this Society, that the chief product of the action of sodium on the solid hydrochloride from turpentine oil is apparently homogeneous, as it has a constant boiling point and soon attains a constant melting point on recrystallization from alcohol, and that its formula is $C_{10}H_{17}$, the mean only of ten analyses being given, which corresponds closely with $C_{10}H_{17}$. Dr. Armstrong asked whether these ten analyses were the same as those brought before this Society and which were widely discordant. Dr. Armstrong has also repeated the experiments of Montgolfier and completely confirms his conclusions that a mixture of camphene, $C_{10}H_{16}$, and of the camphydrene, $C_{10}H_{18}$, is produced from this mixture; the latter substance can be isolated by agitation with 2:1 sulphuric acid and steam distillation, thus a larger yield of the hydrocarbon can be obtained than by Montgolfier's process.

On the Action of Nitric Acid upon Diparatolylguanidin. By A. G. Perkin.—This substance dissolves in strong nitric acid, specific gravity 1·5, with rise of temperature. From the product, ammonia, after dilution and filtration, precipitates a new base having the formula $C_{15}H_{15}N_5O_4$, dinitrodiparatolylguanidin, melting at 205°, soluble in cold alcohol, insoluble in water; it crystallizes in red prisms. Treatment with tin and hydrochloric acid yields a new base which is under investigation. By mixing an alcoholic solution of the nitrate of ditolylguanidin with its own volume of nitric acid specific gravity 1·4, and heating until chemical action ensued, another substance crystallizing in primrose needles was obtained which proved to be dinitrodiparatolylurea, melting with decomposition at about 233°. On boiling this substance with alcohol acidulated with hydrochloric acid and tin diamidodiparatolylurea was obtained in minute crystals. Orthoditolylguanidine when treated with fuming nitric acid also forms a nitrobase which the author is at present investigating.

On some Higher Oxides of Manganese and their Hydrates. By V. H. Veley.—In order to avoid any possible contamination with alkalies the author proceeded as follows— A solution of manganese chloride was precipitated with ammonium sulphide; after washing this was dissolved in acetic acid and diluted, and a current of chlorine passed for a limited time at 52° C. Black glistening scales were precipitated, which were air dried. This substance is a hydrate, $MnO,11MnO_2$. After heating to 200°—250°, it was found that the oxide did not lose weight even when heated for several hours, and that the loss of weight of the oxide did not agree with the gain in weight of the drying tube. The oxide dried for many hours at this temperature retained a small but constant quantity of water; this constant oxide was found to be a monohydrate of a high oxide, $MnO,11MnO_2$. The loss of water during the heating of the substance to 200° in dry air is simultaneous, but not necessarily dependent upon the absorption of oxygen. Experiments were made to determine the various hydrates of the oxide, and the lowest temperature at which oxidation begins in air and in oxygen. The oxide was heated in a slow current of air at intervals of 10° from 60°—210° and the loss of the water determined; each experiment lasting two hours. In air the principal standpoints were 60°—100° for $MnO,5MnO_2,2H_2O$; at 120°—130° 2 (Mn_6O_{11}), $3H_2O$; at 200° $Mn_{12}O_{23}H_2O$. On repeating the experiment with oxygen, instead of air, further oxidation took place, and an oxide $MnO,23MnO_2$ was obtained. In no case was the dioxide formed.

On a New Method of Preparing Dinitroethylic Acid. By E. Frankland and C. C. Graham.—This substance was first prepared by the action of zinc ethyl upon nitric oxide. The process was, however, difficult and inconvenient (*Phil. Trans.*, 147, 59). The authors have adopted the following plan, which works well:—100 grams of pure zinc ethyl are introduced into a tubulated distilling flask, and enough sodium added to convert all the zinc ethyl into the compound $ZnNaEt_3$, taking care to keep the temperature down. When all action has ceased 100 c.c. of benzene are added, and the nitric oxide passed over the solution, the flask being shaken from time to time. When the absorption has ceased, some commercial ether is added to the cooled contents. The zinc ethyl is thus gradually decomposed, and finally the decomposition is completed by adding first some alcohol and then water. The zinc is precipitated by carbonic anhydride, and the filtrate evaporated to dryness. On treating the residue with absolute alcohol the sodic dinitroethylate alone dissolves out. It is purified by conversion into the copper salt. In some cases a yield of 50 per cent. of pure copper salt was obtained. A further study of the reactions of this acid is promised.

On the Action of Organozinc Compounds upon Nitriles and their Analogues. III. Action of Zinc Ethyl on Phenylacetonitrile. By E. Frankland and H. K. Tompkins.—The phenylacetonitrile employed was prepared by digesting benzylic chloride with a solution of crude potassic cyanide in dilute alcohol. In one experiment, while preparing this substance on the large scale, 2000 grams of the chloride being used, a substance was observed to distil over above 300°. The distillation was stopped, the residue solidified on cooling, and was found to contain tribenzylamine. The authors were unable to obtain phenylacetonitrile perfectly pure, and they therefore employed the portion of the distillate boiling 200°–230°. On treating it with zinc ethyl a reaction immediately began, and had to be checked by cooling. Towards the end the temperature had to be raised to 130°. The product is decomposed by alcohol, and finally extracted with that liquid. The crystals thus obtained contained two substances, the least soluble fusing at 170°–171°, crystallizing in silky acicular tufts; the second fused at 150°, and crystallized in rhombohedra. The first substance has the same empirical formula as phenylacetonitrile, but differs from it in all its physical properties. From analogy its formula should probably be tripled. The authors propose to call it cyanbenzine. It is sparingly soluble in hot alcohol. Glacial acetic acid, benzene, and carbon disulphide dissolve it readily. Analyses of the second substance indicated the formula $C_{32}H_{27}N_3O$. The authors have named it benzacin; it is a neutral body. The mother liquor from these two bodies contained a high boiling point oil, which the authors have not yet succeeded in satisfactorily isolating and purifying.

On the Action of Benzoyl Chloride on Morphine. By C. R. A. Wright and E. H. Rennie.—The authors prove by various analyses and other quantitative measurements, that by heating benzoyl chloride and morphine in sealed tubes to 100°—110° for several hours, the end result is invariably dibenzoyl morphine $(C_{17}H_{17}NO)\ (OC_7H_5O)_2$, morphine being for simplicity's sake regarded as $C_{17}H_{19}NO_3$, and that the product thus formed is identical with that formed by the action of benzoic anhydride on morphine. The conclusion recently arrived at by Polstorff (*Chemical News*, May 27, 1880, p. 220), that a tribenzoylated base is formed is shown to be utterly without foundation, Polstorff's own analytical figures rather indicating that the substance examined by him was the dibenzoylated base, whilst no determination at all of the molecular weight or of the quantity of benzoic acid regenerated by saponification was made as a check. Morphine contains two-thirds of its oxygen in the form of hydroxyl and one-third functioning in some other way, as has been shown by C. R. A. Wright in conjunction with J. H. Beckett.

On an Examination of Terpenes for Cymene by means of the Ultra-Violet Spectrum. By W. N. Hartley.—In a previous paper (*Proc. Roy. Soc.*), the author and Professor Huntington have shown that cymene gives a well marked absorption spectrum, which is not entirely obliterated by dilution with 5000 volumes of alcohol, if a layer of 15 mm. in thickness be used. The author has in this way tested samples of orange oil, French turpentine and Russian turpentine, received from Dr. Armstrong, for cymene. The first two substances contained no cymene, the Russian turpentine contained less than 4 per cent. The author concludes that the cymene found in these oils by Dr. Armstrong was formed by the chemical treatment to which they were subjected. The author examined the so-called terebene, which is also free from cymene.

Notes on the Purple of the Ancients. By F. Schunck.—The author has examined a sample of cotton recently dyed with the juice of a species of shell fish, *Purpura patula*, obtained through Herr Von Stralendorff, from the east coast of Nicaragua, where this method of dyeing is still practised by the natives. The purple was dull and not so brilliant as was expected; it was dissolved out of the fabric by boiling anilin, and was found to have all the properties of the punicin previously obtained by the author from the *Purpura lapillus* of the British coasts. It is characterized by its extreme stability, especially with regard to powerful oxidizing agents. It dissolves in concentrated sulphuric acid, yielding a dull purple solution, having an absorption band between D and E; on heating this solution and allowing it to stand the colour changes to a bright green, and the band disappears. This green solution gives with water a purple precipitate.

The Society then adjourned over the summer recess.

SOCIETY OF ARTS.

The Chemistry of Bread-Making.*

BY PROFESSOR GRAHAM, D.SC.

Lecture II.

(*Continued from page* 1029.)

I pass now, then, to the consideration of the albuminoids. Their general composition is given in this table:—

Average Composition of Albuminoids.

Carbon	53·3
Hydrogen	7·1
Nitrogen	15·7
Oxygen	22·1
Sulphur	1·8
	100

Hypothetical formula, $C_{72}H_{112}N_{18}SO_{22}$.

If you consult various works on the subject you will find some slight discrepancies from the numbers given here, but this will fairly indicate the general nature of the albuminoid bodies:—Carbon, 53·3; hydrogen, 7·1; nitrogen, 15·7; oxygen, 22·1; sulphur, 1·8. Now, these are the analytical results given by the chemist, Lieberkühn, and he converts the centesimal ratios of these elements and gives us this hypothetical formula, $C_{72}H_{112}N_{18}SO_{22}$. I say hypothetical, because if starch has hitherto been too difficult for us to elucidate clearly the exact composition of its molecule, I need hardly say that the albuminoids are even more difficult.

The albuminoids of wheat flour differ very much from those of the other starches. We have on the table the composition of the various flours.

On looking at the table, you will see that of albuminoids 10·9 is given to old wheat, 13 to barley, 16 to oats, 8 to rye, 8·9 to maize, 7·2 to rice. Oats

* Cantor Lectures: Delivered November and December, 1879. Reprinted from the *Journal of the Society of Arts*.

and barley are very rich in albuminoids, and probably most of you have considered that wheat is preeminently rich in the protein bodies, as they were called by Mülder, and that the value of any given sample of wheat flour would depend entirely on the total quantity of albuminoids in the wheat. I think I shall be able to demonstrate to you that such analyses as are given in this table, where all the albuminoids are put together under

Average Composition of Cereals. (*Flour.*)

	Old Wheat.	Barley.	Oats.	Rye.	Maize.	Rice.
Water . .	11·1	12·0	14·2	14·3	11·5	10·8
Starch . .	62·3	52·7	56·1	54·9	54·8	78·8
Fat . . .	1·2	2·6	4·6	2·0	4·7	0·1
Cellulose .	8·3	11·5	1·0	6·4	14·9	0·2
Gum and Sugar. .	3·8	4·2	5·7	11·3	2·9	1·6
Albuminoids	10·9	13·2	16·0	8·8	8·9	7·2
Ash . . .	1·6	2·8	2·2	1·8	1·6	0·9
Loss, etc. .	0·8	1·0	0·2	0·5	0·7	0·4
	100·0	100·0	100·0	100·0	100·0	100·0

one head, are utterly useless, and give us no idea whatever as to the value of a given sample of flour for the purpose of making bread. If you take good wheat flour and knead it with water—you all know the experiment—you will gradually get rid of the starch and the gluten will cohere in a sticky adhesive mass. Of course, if you wash it sufficiently long you get rid of the whole of the starch, and what remains is called crude gluten. The crude gluten, when moistened with water, coheres—its particles join together with considerable force. Here is a sample, and you will notice the peculiar tenacity of the elastic tough mass.

The value in bread-making of this peculiar property is no doubt manifest to all of you. If you have a body of such an elastic nature it will entangle the carbonic acid produced by the action of the yeast on the starch, and the carbonic acid, being entangled in this way, will raise the whole mass. An abundance of these albuminoids is, therefore, necessary to good bread-making.

Crude gluten consists of four-fifths of fibrin and one-fifth of an albuminoid body called glutin, spelt with an "i," in order to indicate the difference between that and the whole mass, which is called gluten. These are left in the kneading process, and such a paste as you have just seen consists of the fibrin and glutin. On the other hand, in kneading flour and water there passes into the solution, along with the starch, an albuminoid body, that has been called sometimes casein and sometimes legumin. Now, if we take this gluten, we shall find that when it is freed from water it has no taste, and in addition to having no taste it is translucent. These biscuits, buns or loaves, which you see before you, have been made with the gluten of flour, and I would like you to examine them after the lecture. I am indebted to Mr. Bonthron, of Regent Street, for the different samples I have on the table here. He prepares the flour in such a way that he can separate all the starch on the one hand from the crude gluten on the other. In this bag on the table there is the crude gluten containing very little starch. In this other bag there is pure starch, and in this third bag the flour from which these two products are obtained.

This kind of bread is used for diabetic patients, when the object of the physician is to restrain as much as possible the use of starch in the food. Formerly, this diabetic bread came from Vienna. There is one sample, a pleasant soft bread, not intended to last a very long time, I suppose about ten days or a fortnight; so that patients living in different parts of England can readily obtain this kind of bread; whereas this other sample, dry, glistening, porous biscuit, will keep an indefinite length of time, doubtless for many years. I said just now that gluten was tasteless. I see Mr. Bonthron has also supplied me with some little cakes, something like gingerbread. They are flavoured a little with ginger, in order that for lunch one may not always be driven to eat this tasteless mass. Some of these are prepared with almonds and others with various flavouring materials, that the patients can have a little variety in their diet.

I ought to mention that one reason I have for bringing this before your notice is that these particular kinds of glutinous bread are made at about one-fourth or one-sixth the price of what they are sold at when brought all the way from Vienna.

Crude gluten is, then, a dry, tasteless, translucent body, where free from water; and we have seen that the crude gluten may be conveniently divided into glutin and fibrin. Glutin is slightly soluble in cold water and much more so in hot water. Glutin dissolves in spirit of wine. I say spirit of wine, because if you were to take this product of Mr. Bonthron's and act upon it with absolute alcohol it would fail to dissolve out the glutin; but if you use spirit of wine it would dissolve out all the glutin in time. Having thoroughly digested this crude gluten in spirit of wine, we have nothing left but the fibrin, and this fibrin is manifestly, therefore, not soluble in alcohol. Although fibrin is insoluble in water and in alcohol, yet, if we were to take fibrin and mix it with water and allow it to be acted on at the ordinary temperature for a little time it would gradually undergo putrefactive decomposition and ultimately produce offensive products; but long before that occurred, in undergoing putrefactive fermentation, the complex nature of the fibrin would be broken down and some soluble albuminoids would be formed. This degrading action takes place when grain or flour has been damaged by water and this kind of fermentation process occurs; and, instead of obtaining the powerful elastic gluten we have a material that has very little tenacity.

The soluble albuminoid bodies are the legumin and albumen. I prefer to call it legumin rather than casein, because legumin is found mainly in the seeds of the *Leguminosæ:* beans, peas, tares and such like seeds. It is soluble in water and in alcohol; it is precipitated by acetic acid, but the aqueous solution of legumin is not precipitated on boiling.

The next member that is soluble in water is the albumin. Albumin is precipitated by alcohol and also upon boiling a solution containing it. You all know that occurs also with ordinary animal albumen—that a solution of albumen, when heated, coagulates, as occurs when you boil an egg for some little time. One of the most delicate reactions to distinguish a small quantity of albumen, whether vegetable or animal, in solution, is to add to it some ferrocyanide of potassium and acetic acid. While Mr. Lewis is performing that experiment, I will pass on to the consideration of the last of the albuminoids to which I wish to draw your attention.

In the husk of wheat, that which one separates under the name of bran, occurs another albuminoid body called cerealin. Now cerealin has a very marked action upon starch; in other words, it acts as the so-called diastase. It acts like malt infusion, and the object of its being there, gathered together mainly in the bran, is for the purpose of enabling the young germinating plumule to obtain a large supply of nutriment, not entirely from the starch, but to a great extent from the cellulose structure of the outward layers of the corn. The cerealin, like many of the albuminoids, is precipitated by alcohol and also by acids. Now these soluble bodies, legumin, albumin and cerealin, one or more of them, occur in all seeds, and the reason that they occur in seeds is that they thereby present, under the germinating process, precisely what all chemists use in the researches upon starch, a material that has the power to convert the starch, and even the cellulose, into soluble materials, because you will remember that starch and cellulose are insoluble in water, whereas when converted into various sugar bodies they dissolve, and can be absorbed by the cells of the young growing plant. Now, the amount of this is somewhat increased by the process of sprouting or germination. I have here an analysis of the albuminous substances found in barley and malt.

Albuminous Substances.

	Barley.	Malt.
Glutin (soluble in alcohol)	0·28	0·34
Coagulable by heat	0·28	0·45
Non-coagulable	1·55	2·08
Insoluble albumin	7·59	6·23
	9·70	9·10

In the case of barley, it is 9·7, and in malt 9·1, but there has been a considerable reduction in the amount of the insoluble albuminous bodies. They were 7·5 in barley, but they are only 6·2 in the case of malt, with, of course, a corresponding increase in the quantity of the soluble albuminoid bodies. Sprouting increases, first of all, the quantity of the soluble albuminoid bodies; but, while that is noticeable enough, it is by no means so remarkable as the peculiar change that has taken place. Ordinary soluble albuminoids, in a well germinated and well garnered barley or wheat corn, are not very active in their action upon starch, whereas if sprouting has taken place at all, in other words, if the germinating process has taken place, then there is a very marked increase of action.

I find time is passing so rapidly, that I must defer some matters to our next meeting, and I will just draw your attention to the character of the albuminoid bodies in the other cereals. Passing to barley flour, the chief difference in barley flour, as compared with wheat, is not in the amount of the albuminoid bodies, but in their character. If you take barley flour and knead it with water, as one often does, with flour, you would, after washing for some time, find that there was a very small quantity of this crude gluten left, and that barley flour would be a very inappropriate material to form a good loaf with. Of course, I know that barley flour has been used for ages, but if anyone present has been in the habit of eating barley bread, he will know to what I refer—it is a heavy, sticky, doughy sort of mass. It is more like wheat treated by the boiling process than by the oven process.

Rye flour, very rich in the total quantity of albuminoids, is so deficient in crude gluten that when you knead it with water there is practically nothing left, the whole of it passes away along with the starch; not that it is soluble, but it is not coherent, and therefore does not form that tough, elastic mass, which is so characteristic of wheat under the same conditions.

Precisely the same may be said of oat flour. I do not know whether anyone present has ever seen oat flour fermented with yeast in the ordinary way; but it is a heavy mass, and practically the same may be said of maize. Now rye flour is very much used in the North of Europe for the purpose of making bread; and it is with rye flour chiefly that the leaven process is employed, and those who have travelled in the northern parts of Europe will remember perfectly well the dark kind of bread that rye, fermented by leaven, gives. To a great extent the same remarks as to the want of cohering elastic gluten would apply to oats or barley, or any other cereal than wheat.

Wheat, then, is pre-eminently fitted for the purpose of making bread by the fermentation process, since it is so rich in this tough elastic gluten, which holds in the carbonic acid and enables you to have a light, aerated bread.

(*To be continued.*)

Parliamentary and Law Proceedings.

THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN *v.* WRIGHT.

This action, which was for the recovery of penalties under the 15th section of the Pharmacy Act, was tried before the judge of the Liverpool County Court on Monday the 21st instant, and resulted in a verdict for the Society for £5 and costs.

The defendant applied for leave to appeal, but the judge refused to grant it.

Dispensing Memoranda.

In order to assist as much as possible our younger brethren, for whose sake partly this column was established, considerable latitude is allowed, according to promise, in the propounding of supposed difficulties. But the right will be exercised of excluding too trivial questions, or repetitions of those that have been previously discussed in principle. And we would suggest that those who meet with difficulties should before sending them search previous numbers of the Journal to see if they can obtain the required information.

Replies.

[415]. The symbol O signifies a pint, 20 fluid ounces. Therefore a pint mixture or lotion should invariably be dispensed in a 20-ounce bottle.

SAMUEL LAWRENCE.

[419]. A very good mixture of ol. santal. flav. is made as follows:—

℞ Ol. Sant. Flav.		ʒvj.
Mucilag. Acac.		℥j.
Syrup. Simp.		℥j.
Tr. Aurantii		ʒvj.
Aq. Cinnam.	ad	℥vj.

M. ft. mist. ℥ss ter die sumend.

EMBRYO.

[420]. I think F. G. will find the best way of dispensing his pills as follows:—

Rub the camphor in dry with the ferri sulph., previously powdered; pulv. acaciæ, gr. xxiv.; conf. sennæ, gr. xx. Mass altogether along with the ol. cinnam. This makes a very nice pill mass. If it breaks in rolling, mass in warm hands.

W. F. W. KEENE.

[421]. In the evaporation of solution of zinc chloride for the production of the solid compound used in pharmacy, an uncertain quantity of hydric chloride is driven off, the result being that the solid contains a certain though variable amount of zinc oxychloride. When it is attempted to redissolve the solid in water, for the preparation of lotions, etc., part is always found to be insoluble, the proportion depending on the amount of oxychloride present. This insoluble matter is readily dissolved by a few drops of dilute hydric chloride, though of course in dispensing this must not be done. The solution should either be left as it is or filtered. The quantity, if collected and dried, is in any case but small and may be practically disregarded. "Tyro" will find some information in Gmelin's 'Handbook,' vol. v., p. 31.

South Norwood, S.E. J. H. BALDOCK.

[422]. I should have had no hesitation in dispensing four powders each containing 15 grains sulphate of zinc, the dose of which is 1 to 3 grains as a tonic and 10 to 30 grains as an emetic. Probably the powders were intended for the latter purpose, or for dissolving in water to form a lotion or injection. It was quite unnecessary of "Bdfrd" to label "poison."

SAMUEL LAWRENCE.

Notes and Queries.

[657]. LIQ. AMMON. ACET. CONC.—Page D. Woodcock finds it will not do to bring his old formulæ into the light of modern chemistry. He took the ℞ from his old working book of forty years since. He then had the superintendence of a wholesale warehouse, and that was the way it was done. By using the very strongest ordinary acid, in the manner indicated, a solution of very nearly 1 to 7 was obtained. P. D. W. is not sorry he gave the ℞ as it has led to the discussion of a very valuable medicine.

[657]. LIQ. AMMON. CONC.—In regard to liq. amm. acet. conc., what objection would there be to use liq. ammon. fort. in place of ammon. conc.? One of the difficulties in getting a neutral sol. is the quantity of carb. acid in the sol., and difficulty of applying sufficient neutral to drain it off.

Many years ago, Dr. Pereira suggested the use of liq. am. in his lectures, which I have adopted with fair results with aid of ice.

AN OLD STUDENT.

[658]. COMPOUND TINCTURE OF MYRRH.—In the reply printed on p. 1032 as having been sent by Mr. R. Parkinson, of Liverpool, some errors crept in through a misreading of the copy, which were overlooked. The recipe should have been:—

Myrrh	2 oz.
Barb. Aloes	2 oz,
S. V. R.	Ojss.
Aquæ	Oss.

Digest fourteen days and filter.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

VIVIPAROUS PLANTS.

Sir,—Mr. Dodd's letter in last week's issue, called my attention to that paragraph in "The Month" on viviparous plants.

I have what I believe to be a specimen of the *Polystichum angulare*. Two fronds seem by some means to have become suddenly interrupted in their growth, so as to present an abruptly pinnate appearance, and from the extremity of the rachis, a small fleshy protuberance is formed, from which a young frond is produced. At the bases of other fronds, there are similar growths, one on either side of the rachis from which young plants are produced. Young plants are formed, too, on the stumps from which old fronds have been cut.

It is our practice to propagate this fern by means of these young plants produced in this viviparous manner, and I was not aware this fern bore sori at all, till on examination I found the oldest frond covered with sori with a peltate indusium.

I have also an asplenium which is viviparous; but in this case the young plants are produced on the upper surface at the base of the pinnules. This latter species is now presenting several small excrescences of a lighter colour than the other parts of the frond, from which in a short time young plants will be produced.

Having several plants of the polystichum, I shall be most happy to supply Mr. Dodd, or any other botanist who may be desirous of pursuing the subject, with specimens of this fern in its extraordinary growth, on written or personal application.

82, Cricketfield Road, Lower Clapton, E. WALL.

CLAY'S TURPENTINE MIXTURE.

Sir,—Having to dispense this mixture very frequently, I find the following method answer very satisfactorily:—

The sulphur having first been reduced to a very fine powder is rubbed down smoothly in a mortar with half the mucilage of tragacanth, water is then added and the mixture put into a bottle. A separate emulsion of the Chian turpentine is then prepared by adding the ethereal solution of the turpentine gradually to the remainder of the mucilage in another bottle, shaking well after each addition of the turpentine solution, then adding the syrup and water. The sulphur mixture is then gradually added to the emulsion, shaking thoroughly after each addition.

Take of—

Sublimed Sulphur	20 grains.
Mucilage of Tragacanth	1 ounce.
Distilled Water	3 ounces.

Mix.

And add this to the following emulsion:—

Ethereal solution of Chian Turpentine	2 drachms.
Mucilage of Tragacanth	1 ounce.
Syrup	½ ounce.
Distilled Water	to make 4 ounces.

If any separation of resin takes place the mucilage should be increased.

Middlesex Hospital. S. R. CHALLICE.

THE COUNCIL ELECTIONS.

Sir,—I can vouch for one error Mr. Hall made, that although I nominated Mr. Symes (too late, for someone had done it before me) I did not plump, but gave, I trust, an intelligent vote for the major part of the present Council, who (whether metropolitan or provincial) have done their work loyally, so as justly to evoke well-merited eulogy.

Liverpool. J. A. J.

Sir,—I would just like to point out that the statement of Mr. Hall's, as reported in the Journal of May 22, page 945, to the effect "that all the Liverpool members of the Pharmaceutical Society 'plumped' for one candidate at last year's election of Council," is simply incorrect. I, as a voter, certainly did no such childish thing, and I firmly believe that it is in my power to name others who did not. For my own part I voted for the full number required (14), and my intention has on each occasion been to do the same.

Liverpool: RICH. PARKINSON.

E. J. Cox.—No insect could be discovered in the extract when it was received.

"*Euretes.*"—(1) A public analyst is not required to pass a series of examinations. The Act provides that he must be of "competent knowle[illegible], skill and experience," and the Local Government may require satisfactory proof of such competence. (2) [illegible]ply to the Secretary of the Statistical Society.

"*Country Chemist.*"—Blaine's 'Outlines of the Veterinary Art.'

A. P. B.—There is a Pharmacy Act for the Colony of Victoria, the board of examiners under which are empowered to receive the certificates of the Pharmaceutical Society of Great Britain in lieu of an examination (see vol. viii, p. 589. Up to the latest advices this is the only legislation of the kind that exists in the Australian Colonies.

E. Coleman.—(1) *Sagina procumbens.* (2) *Alchemilla vulgaris.*

A. B. Macfarlane.—The sticky fly papers, according to Cooley, are made by covering paper with a factitious bird lime, prepared by boiling linseed oil, either with or without a little resin, until it forms a viscid stringy paste when cold.

G. D. R. Robinson.—Bunsen's work is the best on the subject; but if this be not available, consult the article on gas analysis in Watts's Dictionary.

Associate.—The solution should be a clear one.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Tunley, Brown, Bisset, Williams, Stone, Minor, Jacque, Square, A. A. F.

Several correspondents have failed to comply with the regulation as to anonymous communications.

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