THE CHEMIST AND DRUGGIST

Editorial Notes.

THE Executive Committee of the General Medical Council give notice that, whereas there are certain chemists who are still in the habit of compounding and dispensing medicines according to the directions and formulæ contained in the *London Pharmacopœia*, all such persons should know that the BRITISH PHARMACOPŒIA, as last amended and published by the Medical Council in 1867, is now the only Pharmacopœia authorised by law. And further, that any chemist or other person who, without the sanction of a legally-qualified medical practitioner, should compound and dispense medicines, otherwise than according to the authorised Pharmacopœia, would certainly be held criminally responsible if the effect of his so compounding and dispensing should prove injurious to the health, or affect the life of the person taking or using such medicines.

IN another column we give particulars of the wreck of a chemist's shop at Nottingham by an explosion, and of the investigation which its deplorable consequences necessitated. The explosion was, doubtless, caused by a slight deviation from a prescribed duty, attributable to boyish officiousness, and the brothers FLETCHER must be held blameless. Happily the occurrence is unprecedented, andf the remark of one of the jury, respecting the danger o living near a chemist and druggist's shop, is not likely to disturb the peace of the public. Still it must be admitted that the preparation of pyrotechnic mixtures is attended with much danger, unless certain precautions be taken; and we regret that the Messrs. FLETCHER did not describe minutely their method of mixing the ingredients of the red fire composition. Though chemists and druggists are not "artists in fireworks," the preparation of the powders used for producing coloured fires at places of amusement comes within their legitimate province, and they ought to understand fully the conditions under which such powders can be prepared with safety. The formula adopted by the Messrs. FLETCHER for their red fire mixture was apparently one in which *nitrate of strontium, chlorate of potassium, sulphide of antimony*, and *sulphur*, were the prescribed materials, notwithstanding the declaration of an imaginative scribe in the *Nottingham Daily Guardian*, to the effect that the strong smell after the explosion indicated the use of *benzine, glycerine, and other powerful ingredients!* The sources of danger in preparing a mixture of the substances named are pointed out in the following paragraph taken from the article "Chlorates" in *Watts's Dictionary of Chemistry*:—

"Chlorate of potassium is a powerful oxidising agent, and detonates violently when mixed with certain combustible bodies, and struck or heated. Triturated in a mortar with *flowers of sulphur*, it produces a series of sharp detonations. A mixture of the salt with *sulphide of antimony* takes fire when triturated, sometimes with explosion. A small quantity of the chlorate mixed with *phosphorus*, and struck with a hammer, detonates with a loud report. These combustions are attended with great danger, when large quantities are used."

The rule observed by professed pyrotechnists, never to grind different materials together in a mortar, cannot be transgressed without great risk, when one of the materials is chlorate of potassium. The materials having been thoroughly dried, should be pulverized *separately* in a perfectly clean mortar. The powders should then be mixed lightly on a wooden tray with a horn spatula. Finally, the whole should be passed once or twice through a sieve. If these precautions be adopted, and if small quantities be operated upon, the preparation of pyrotechnic mixtures may be safely undertaken by chemists and druggists.

THE unprofessional advertisements that are occasionally issued by surgeons and physicians are mercilessly exposed by the medical press, in accordance with the consideration that titles implying educational qualifications should be borne with becoming dignity, and not flaunted before the eyes of the public to attract custom. Advertisements which tend to degrade the Pharmaceutical title are equally contemptible, and cannot be too strongly condemned. Such a one has just been brought under our notice by an esteemed correspondent, and we trust that its publication in these columns will call forth an official protest against the misuse of the title:—

"HENRY R. BROWNE, pharmaceutical chemist (*late Manager of the Prescription Department, Apothecaries' Hall, London*), begs to thank the Gentry and Inhabitants of Eastbourne for the kind support he has received from them, and would take the present opportunity of stating that ALL PRESCRIPTIONS dispensed at his Establishment are prepared by himself ALONE.

"As *the only Pharmaceutical Chemist in Eastbourne*, Mr. BROWNE would respectfully remind Visitors and others that this distinctive title is the only security afforded to the public of the fitness of those who prepare Medicines for the important duties they undertake, *every Pharmaceutical Chemist being compelled by law to undergo a strict examination* before he is permitted to assume the name.

"1, Cornfield-road, Eastbourne."

As Mr. BROWNE's membership in the Pharmaceutical Society has only been of two years' duration, we conclude that he is a young hand in the business, or that before 1866 he practised as a chemist and druggist without his present distinctive title. In either case, his fellow-tradesmen in Eastbourne can afford to smile at his petty device to catch "visitors and others."

WE are very much pleased with the signs of earnest study apparent in our "Corner for Students," and we shall not grudge the time and trouble expended on this department while we continue to receive from the rising generation of chemists and druggists such satisfactory evidences of the utility of our work. The problems we offer for solution are adapted to exercise the student's mental powers, and to show him the practical significance of mathematical, chemical, and physical knowledge. Each problem solved by the student is a brick laid in the rising edifice of scientific pharmacy. In the daily work of every apprentice, there are many spare intervals that may be profitably and pleasantly filled up by intellectual exercise, and however irksome such exercise may be at first, it soon becomes a never-failing source of delight. The powers of the mind rust quickly, unless some pains be taken to keep them polished; and it is vain to suppose that studies neglected in youth may be easily taken up in manhood. "Nothing is more precious than time," says an old philosopher; "and those who misspend it are the greatest of all prodigals."

THE following letter, on the Supply of Drugs to Private Persons by Wholesale Druggists, has been addressed to the editors of the *Pharmaceutical Journal*:—

"SIRS,—I wish to call the attention of all London chemists to a practice which exists to a considerable extent, and which

I have reason to believe is increasing. The evil I refer to is, wholesale houses supplying private persons with drugs and chemicals. In confirmation of this, I will mention that some time ago, I had an assistant, who had lived twelve months with one of our leading wholesale druggists, and he assured me that the business they did in this way was very considerable, so much so, that the time of one assistant in each department was nearly occupied in what they termed 'casual work,' and that precisely the same prices were charged to private persons as to chemists. I have made inquiries, and find that other houses are doing the same thing. An assistant in one wholesale establishment told me that he had been engaged all the day in putting up pints and quarts of cod-liver oil for 'casuals.' A few days ago, we required a chemical preparation immediately, and, as I was going to the City, I called at my wholesale druggist's to get it, and, while waiting, a person came in (a postman), and asked for a quart of cod-liver oil, and on it being given to him, he inquired the price; the gentlemen said, '2s. 2d., there are just 2 lbs.' I could mention other cases, but I will only name one more. One of my own customers told me that he could get cod-liver oil and quinine at the same price as I paid, but just wanted a little to go on with. I inquired where, and he immediately mentioned one of our best firms.

"Now, sir, I think the remedy is within our reach. Wholesale druggists who will discontinue and discountenance this "casual work," and will intimate the same in your journal, should have patronage and support.

"I am, sirs,
"Yours faithfully,
"J. B."

The annexed paragraph has lately appeared in most of the English medical journals:—

"The Philadelphia *Journal of Pharmacy* contains a formula for a preparation which is likely to prove valuable for external use. Four parts, by weight, of yolk of egg are to be rubbed in a mortar with five parts of glycerine. The compound has the consistence of honey, and is unctuous like fatty substances, over which it has the advantage of being easily removed by water. It is unalterable, a specimen having laid exposed to the air for three years unchanged. Applied to the skin, it forms a varnish which effectually prevents the action of air. These properties render it serviceable for broken surfaces of all kinds, particularly erysipelas and sore nipples, and for cutaneous affections, of which it allays the itching. In the latter case, its harmlessness prevents any interference with suckling."

Our old subscribers need scarcely be reminded that this formula, translated from a foreign journal, was brought under their notice in these columns some years ago.

The Council of the Pharmaceutical Society offer a silver medal for the best Herbarium collected in any part of the United Kingdom between the 1st of May, 1868, and the 1st of June, 1869; and should there be more than one collection possessing such an amount of merit as to entitle the collector to reward, a second prize, consisting of a bronze medal, and also certificates of merit, will be given. The collections are to consist of phanerogamous plants and ferns, arranged according to the natural system of De Candolle, or any other natural method in common use; and to be accompanied by lists, arranged according to the same method, with the species numbered. Some work on British Botany (such as Babbington's or Hooker and Arnott's) must be followed by the collector, who, on sending in his collection, will state which work he adopts. The name of each plant, its habitat, and the date of its collection must be stated on the paper on which it is preserved. In estimating the merits of the collection, the number of specimens, their rarity, and the manner in which they are preserved, will be taken into account. Should a specimen be wrongly named, it will be erased from the list. Each collection is to be accompanied by a declaration to the effect that the plants were collected between the 1st of May, 1868, and the 1st of June, 1869, and were named and arranged without any assistance but that derived from books, and by the collector himself. The collections must be forwarded to the Secretary of the Society, 17, Bloomsbury-square, on or before the 1st of July, 1869, indorsed "Herbarium for Competition for the Botanical Prizes." It is stipulated that no candidate will be allowed to compete, unless he be an associate, registered apprentice, or a student of the Society, or if his age exceeds twenty-one years.

Mr. John Tuck, of Oxford, in the *Pharmaceutical Journal*, states that chemists and druggists are being systematically fleeced by some disreputable fellows prowling about the country with a so-called "vermin killer" for sale. He thinks it his duty to expose the "dodge," and thus put others on their guard. The plan adopted, and by which they often effectually succeed in "taking in" the unwary chemist and druggist, is to offer him the vermin killer, tied up in packets, at a cheaper rate than usual. The bait generally takes, but after he has sold two or three from the top of the packet, he finds the remainder to consist of blank envelopes, without name or printing of any description on them, and, of course, quite useless for the purpose of sale. The powder itself is of no effect at all as a "vermin killer," for, although coloured to imitate "Battle's," it contains neither strychnine nor arsenic, and in some cases the envelopes contain nothing but a piece of folded newspaper!

A course of six lectures on Spectrum Analysis, and its application to scientific investigation, is to be delivered at the Apothecaries' Hall, by Professor Roscoe, F.R.S., of Owen's College, Manchester. The first lecture will be delivered at two p.m., on May 2nd, and the remaining five on May 9th, 16th, 23rd, 30th, and June 6th, at the same hour. On April 23rd, Professor Odling, F.R.S., commences a course of four lectures on Chemical Combination at the Royal Institution. The other dates are April 25th and 30th, and May 2nd; the hour 3 p.m.

Dr. Richardson, to whom we are indebted for so many new remedies, has just called the attention of the Medical Society of London to a preparation of iodide of methyl, which he regards as the best form in which to administer iodine.

In our last, we erroneously ascribed the discovery of iodoquinine sulphate, or Herapathite, to the late Mr. William Herapath, of Bristol. The credit of this discovery is due to his son, Dr. W. B. Herapath, F.R.S.

In consequence of the illness of our reporter, we are compelled to defer the publication of the continuation of the Report on the Classes connected with the Drug Trade until next month.

ON THE TEACHING OF CHEMISTRY IN MEDICAL SCHOOLS.

A SCHEME of Medical Tuition, which seems to us to be based on a perfect understanding of the requirements of students intended for general practice, is unfolded by Dr. Parkes, F.R.S., a member of the General Council of Medical Education, in the columns of the *Lancet*, of April 4, for the consideration especially of the Association of the London Teachers of Medicine. The suggestions relating to the teach-

ing of chemistry are particularly valuable, and may be usefully reproduced here.

"In chemistry," says Dr. PARKES, "a winter of formal lectures is followed by a summer of practical work. Although the teachers are the first chemists of the day, the results as regards the mass of students are certainly not satisfactory. I do not speak now of the best men, to whom most teachers almost instinctively turn as showing the effect of their teaching, but of the average body of students who go up to the English licensing bodies. The amount of knowledge is not great, and it is almost always book learning. The practical course appears to be in most schools ineffective, while in some it must be looked upon merely as a form. I believe that this is the first point of the educational course the Association should consider.

"I would suggest that the leading chemical teachers should be invited to form a committee for the purpose of advising the Association. I think it possible such a committee would reverse the order of teaching, and commence with the practical work. What appears, indeed, to be the best way of gradually initiating these young men (who are all ignorant of chemistry) into what is in its early stages a difficult subject? Would it not be much better to begin at once with practical teaching, making every student perform the experiments which would lead him on step by step, and give him sure ground at every point; and then, when he had some idea of elementary points, to explain in a few clear lectures the generalisations which bind together and explain the scattered facts he has practically learnt?

"What would be wanted for such a course? Laboratories, which are supposed already to exist; apparatus and tests, which would not be costly; a carefully prepared official text-book, current in all schools, arranged with daily lessons so as to form a series of steps; some simple directions given at the commencement of each day's work, and a general superintendence which would be easy on the part of the teacher and his assistants. If a winter session lasted for five months, and if two hours daily were given to the laboratory work, a sound chemical foundation would be laid which a student would never forget, for he would have made every fact his own. At a certain period in this course, say after three months had elapsed, a formal lecture by the teacher for five days in the week, during two months, would perhaps be sufficient in the present state of chemistry to give the student a clear though brief epitome of the philosophy of the science.

"Apart from the comparative ease of learning the subject in this way, two points would be gained. There would be no difficulty in the teacher assuring himself that the work had been done. A glance almost would show him how the student was spending his time in the laboratory; and if one day per week out of the six were assigned for a practical examination of the week's work, the progress of no student could escape being measured. A compulsory written examination at the end of each month's formal lectures would test the attainments of that part of the course, and would not be too great labour for the teacher. The second gain would be that uniformity would be introduced into the teaching; that every student would know exactly what he had to do, and every examining body would see the limits within which their examination must fall. I know, however, that this last point, which to me appears such a gain, would be differently viewed by others, who would object that a selection of study and a limitation of examination must be bars to progress. On this point I shall have to remark hereafter.

"If some scheme like this were adopted the student in his first winter session would work first two, and then for the last two months three hours daily at chemistry. He would have in all (examinations being reckoned) 110 to 120 practical lessons, and his progress would have been tested at every step."

According to Dr. PARKES's scheme, the first winter session would be devoted to the two important subjects, Chemistry and Anatomy. In the first summer session the students would go through four subjects, viz., Practical Toxicological Chemistry (chemical examination for poisons), Materia Medica, Botany, and Physics. With regard to the second of these subjects Dr. PARKES justly remarks:—"The present course of Materia Medica and Therapeutics should be divided. Materia Medica—that is simply the account of the drugs and preparations named in the Pharmacopœia, or supposed to be worthy of being included—should, like anatomy, be taught tutorially. I have had some experience in this matter, and believe that if every student has the drugs placed in his hands, is made to observe them carefully so as to recognise them at once, and is then obliged to read out of his text-book their origin, place of supply, chief preparations, doses, etc., the whole of this usually dry subject could be even agreeably learnt in four months, by a daily lecture of one hour and a half. There should be little formal lecturing, but constant questioning by the teacher, and replies by the student. Three or four drugs and their preparations could easily be got over every day; and if the work was not satisfactory, the same drugs could be afterwards returned to. The weekly practical examination would test the student's progress. For such a course as this a large quantity of some drugs and preparations would be necessary; but this would entail little expense. All therapeutical discussion should be avoided."

The second winter session, the writer conceives, should be entirely given up to Surgical and Medical Anatomy and to Physiology; and in the second summer session he suggests that the study of Physiology should be continued, especially in its relation to medicine. During this summer session he proposes that three hours a day should be spent by the student in Practical Pharmacy and Dispensing. He says—"In practical pharmacy (which is the supplement to the course on materia medica), not only the chief pharmacopœial preparations should be made, but the rules for the purity and strength of drugs should be practically worked out, and, in fact, a course gone through very similar to that conducted at the Pharmacentical Society. The actual dispensing would be a more difficult matter to arrange for, but as practice during three or four weeks would probably be enough, it would not perhaps be impossible to arrange for the attendance of a certain number of students daily in the hospital dispensaries."

In the last two years, according to this well-devised scheme, the student would have to study Medicine, Surgery, Midwifery, Therapeutics, and State Medicine.

Not the least important feature in Dr. PARKES's plan is the proposal that authorised official text-books for chemistry, physics, and botany, be used in all medical schools.

DELETERIOUS, BUT PROFITABLE.

On the 29th of March, 1699, there was a grand ceremony at the Paris School of Medicine. Under the presidency of Fagon, first physician of the king, the *bachelier*, Claude Bergr, maintained a thesis on this subject—*Does the frequent use of tobacco shorten life? (An tabaci usu vitæ summa brevior?)* Yes! yes! was the answer from all sides. And a hundred years afterwards, says the *Union Médicale*, this deleterious weed produced annually to the government more than 60,000,000 *francs*.—*British Medical Journal.*

Science.

Dentistry.

ANÆSTHESIA BY NITROUS OXIDE IN DENTISTRY.

SIXTY years have elapsed since Davy called attention to the remarkable physiological effects produced by the inhalation of nitrous oxide or laughing gas, and though the knowledge that complete insensibility occasionally followed, such inhalation was the starting-point of the research which led Morton to the discovery of practical anæsthesia, the gas itself has, up to a recent period, been omitted from the list of useful anæsthetics. The demonstrations given by Dr. Thomas W. Evans, of Paris, at the Dental Hospital, Soho-square, have, however, convinced the leading members of the dental profession that pure nitrous oxide gas, as administered by Dr. Evans, is an anæsthetic possessing most remarkable and very valuable properties. According to the interesting records of these demonstrations, published in the *British Medical Journal* (April 4), in a considerable number of cases, unconsciousness was induced in less than three-quarters of a minute; and what is most remarkable about the effects of this agent is, that the consciousness returns almost instantly after the extraction is performed; that there is no headache, sickness, prostration, or other of the considerable and serious drawbacks which make the administration of chloroform always a far more tedious and troublesome process than the extraction, and which frequently involves some distress to the patient for some hours, or perhaps days, after the inhalation. In many of these cases, the whole proceeding of inhalation, extraction, and recovery, occupied less than two minutes; and twelve or fifteen extractions were performed in succession within a very short time. Several very intelligent persons, members of the dental and medical profession, voluntarily submitted to the operation, "taking advantage of the opportunity." Within three minutes of the time that they were standing by the chair expressing that wish, they were again standing there detailing their sensations, having meantime been reduced to complete unconsciousness, and the tooth having been extracted.

The able writers who communicate to our contemporary their impressions of these remarkable demonstrations, admit that they cannot share Dr. Evans's feeling of security in using this gas, and earnestly counsel their readers not to attempt to administer it without proper tutoring. They point to one common sign of unconsciousness, which would be very much dreaded in the case of chloroform anæsthesia, namely a marked blueness and pallor of the face. This, according to present notions, must indicate a condition of the heart and lungs that could not be maintained without peril. They acknowledge, however, that Dr. Evans has with great care and conscientious anxiety, investigated the whole of the accumulated facts prior to forming any opinion of this agent, in favour of which he is now warmly predisposed. The first who applied this agent extensively was Dr. Colton, of America, and he became firmly convinced "by thousands of cases" of the superiority of the protoxide of nitrogen over other anæsthetics in dental surgery. Dr. Evans believes himself to be in a position to state, upon authentic data, that as many as twenty-five thousand dental operations have been performed under the influence of this agent, without any serious or regretable misadventure having occurred. He has employed it now very extensively in his practice for some time, and feels great security and confidence in using it.

The gas is administered by Dr. Evans absolutely pure, and unmixed with air. It is stored in a small gasometer, and drawn off into bags. The bags are furnished with tubes, to which is attached a tube-mouthpiece with inspiratory and expiratory valve. The tube is introduced between the lips, the teeth being kept apart, for the purpose of subsequent operation, by a small piece of wood, and the lips are pressed by the fingers of the operator tightly around the tube, and the nostrils compressed. Thus the patient, breathing through the tube, inhales pure and unmixed gas. If air be admitted with the gas, the results are said to be unsatisfactory; the sensations are unpleasant; and excitement may be produced, instead of unconsciousness. The ordinary quantity of gas inhaled is said to be about two gallons. For more protracted operations, it may go on to ten or fifteen gallons.

The results of the trials made at the Dental Hospital in a great number of cases have been most satisfactory, and the members of the dental profession feel much indebted to Dr. Evans for having taken such pains to bring the new agent under their notice. Several operations on the eye have also been successfully performed on patients under the influence of this anæsthetic at the Central London Opthalmic Hospital.

Chemistry.

ON THE ANALYSIS OF POTABLE WATERS.*

BY E. FRANKLAND, F.R.S., AND H. E. ARMSTRONG, ESQ.

(Concluded from page 156.)

V. *Estimation of Ammonia.*—The determination of ammonia in potable waters is usually made by rendering the water alkaline either by baric hydrate or sodic carbonate, and then distilling off about one-fourth of its volume. In the distillate, the ammonia is then estimated either by neutralisation with a standard solution of dilute acid, or by Hadow's modification of Nessler's reaction. In its application to waters recently contaminated with sewage, this process is liable to considerable inaccuracy, owing to the gradual production of ammonia when an alkaline solution of urea is boiled. Thus the ammonia found exceeds that originally contained in the water. This error has already been pointed out by Mr. Chapman, who recommends that the ammonia determination should be made by the application of Nessler's solution directly to the water. We find, however, that the yellowish colour of many potable waters presents a formidable obstacle to success, unless the water be first decolorised as we recommend below; besides, waters containing chalk in solution become turbid on the addition of the Nessler test, and any turbidity is utterly fatal to accuracy in this determination.

Having thus pointed out the inaccuracies which attach themselves to the usual determinations in a water analysis, we will now describe the processes which we propose as substitutes for, or modifications of, those which have been hitherto employed. They may be thus enumerated:—

1. Estimation of total solid constituents.
2. Estimation of the carbon and nitrogen contained in the organic portion of the solid constituents (organic carbon and nitrogen).
3. Estimation of nitrogen in the form of nitrates and nitrites.
4. Estimation of ammonia.

1. *Estimation of Total Solid Constituents.*—Half a litre of water is evaporated to dryness as rapidly as possible in a weighed platinum capsule on a steam or water-bath: after drying the residue at 100° C., the capsule is again weighed.

* From *Journ. Chem. Soc.*, March, 1868.

We have already given our reasons for the non-addition of sodic carbonate to the water before evaporation, and also for drying the residue at 100° instead of 120°—130° C. As we propose to abolish altogether the fallacious estimation of "loss on ignition," the retention of the elements of water in this residue is of no moment; they always exist there in the solid condition, and are hence quite legitimately included amongst the solid constituents.

2. *Estimation of Organic Carbon and Nitrogen.*—No process has yet been devised by which the amount of organic matter in water can be even approximately estimated, but we have now to describe a method by which the two most important elements—carbon and nitrogen—can be determined with considerable accuracy.

The estimation of the organic carbon in a water containing both carbonates and carbonic anhydride in solution is, as might be anticipated, an operation of more than ordinary difficulty. It is obviously necessary, in the first place, to expel both combined and dissolved carbonic anhydride, and this must be done in such a manner as to prevent the organic matter from being subject to the oxidising action which would necessarily result from the liberation of nitric and nitrous acids, which are probably never entirely absent from potable waters. We endeavoured to effect this by the addition of boric acid to the water during evaporation. Bloxam has shown* that for the expulsion of one molecule of carbonic anhydride from alkaline carbonates, six molecules of boric acid are necessary. Approximately this appears to be true also of the carbonates of the alkaline earths; nevertheless, after the addition of six molecules of boric acid to each molecule of combined carbonic anhydride, we still found an amount of carbonate in the residue, which, though small, was sufficient seriously to vitiate the result of the subsequent determination of organic carbon. After many abortive attempts to overcome this difficulty, we found in sulphurous acid a reagent, which not only completely expels carbonic anhydride from the water, but also permits of the simultaneous determination of organic nitrogen with great accuracy by completely removing, during evaporation, every trace of the nitrogen existing in the form of nitrates and nitrites, and thus leaving in the dry residue the organic nitrogen associated only with one remaining nitrogenous body—viz., ammonia. For the successful application of sulphurous acid to this purpose, it is not sufficient to add an excess of this acid to the potable water and then evaporate to dryness, since under these circumstances traces of carbonates are always found in the residue. It is, in fact, necessary after the addition of excess of sulphurous acid, to boil the water for two minutes in order to insure the complete expulsion of carbonic anhydride before evaporation on the steam-bath begins. If this precaution be observed, numerous experiments have shown that no trace of carbonic anhydride is evolved on adding hydrochloric acid to the dry residue. By availing ourselves of that admirable instrument the Sprengel-pump, we are able to combine in one operation the determination of carbon and nitrogen in a water residue, by an analytical process of such simplicity and extreme delicacy, that we believe it will be found generally useful in the analysis of all organic compounds containing nitrogen, which are not volatile at ordinary temperatures. By this process ·000001 grm. of nitrogen and ·0000005 grm. of carbon are distinctly measurable quantities.

The following is the mode of conducting this operation:—As soon as possible after the collection of the sample of water, 2 litres are poured into a convenient stoppered bottle, and 60 c.c. of a recently prepared saturated solution of sulphurous acid are added. Should the water contain oxidisable or putrescible organic matter, this addition of sulphurous acid promptly arrests any further change, and the remaining operations may now be conducted at leisure. One-half of this sulphurised water is now boiled for two or three minutes,† and unless it contained a considerable amount of carbonates, 2 grm. of sodic sulphite is to be added during the boiling, so as to secure the saturation of the sulphuric acid formed during the subsequent evaporation. To secure the expulsion of the nitrogen existing as nitrates, it is also desirable to add a couple of drops of solution of ferrous or ferric chloride. The boiled water is then evaporated to dryness in a hemispherical glass capsule, of about 100 c.c. capacity, upon a steam or water-bath, care being taken to keep the capsule well covered with a disc of filter paper stretched over a light cane hoop, and also to preserve the atmosphere of the room in which the operation is performed as free from ammonia as possible. If the first-mentioned precaution be neglected, the access of floating particles of dust during the evaporation will introduce a considerable error into both carbon and nitrogen determinations. At one period of our investigations we feared that it would be necessary to perform the evaporation *in vacuo*, but we prove below that this would be an unnecessary precaution, for if the evaporation be conducted under paper, the amount of nitrogen introduced by atmospheric dust and ammonia (and this in the worst of all possible localities, the middle of London) only amounts to a maximum of ·00002 grm. per litre of water evaporated: consequently when this is deducted from the amount of nitrogen actually obtained by combustion the residual error is almost a vanishing quantity. The process of evaporation under a paper cover fitting tightly upon the edge of a glass dish *without a lip*, is in fact one of diffusion, in which the atmospheric air, constantly being exchanged for aqueous vapour is filtered through a porous diaphragm.

The evaporation being completed, and the glass capsule placed upon a sheet of glazed paper, a few grammes of powdered plumbic chromate are to be introduced, and gently triturated with the dry residue by means of an agate or glass pestle. When the mixture has been made as perfect as possible, the contents of the capsule are to be transferred to a combustion tube, about sixteen inches long and sealed at one end, the capsule is then rinsed two or three times with fresh quantities of chromate, which are also transferred to the combustion tube. The latter is then charged in the usual manner, with granulated cupric oxide, and about three inches of bright copper turnings. The open end must now be drawn out before the blow pipe, as shown in Fig. 1, and the tube being laid in a combustion-furnace

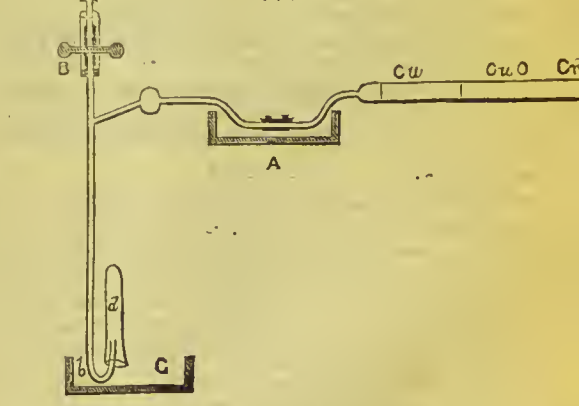


FIG. 1

the drawn out extremity is to be connected with a Sprengel pump by means of a piece of india-rubber tubing, care being taken that the extremities of the two glass tubes touch each other, or nearly so, within the caoutchouc connector. The latter being then plunged beneath water in the vessel A, and the furnace around the front part of the combustion tube lighted, the pump is to be worked until the tube is exhausted as completely as possible, an operation which requires from five to ten minutes.* The flow of mercury is then stopped.

* *Journ. Chem. Soc.*, vol. xii., p. 177.

† In operating with waters strongly contaminated with sewage, it is desirable that the flask in which this operation is performed should be furnished with an inverted Liebig's condenser, in order to prevent the loss of volatile organic constituents and ammonia. With all ordinary waters this precaution is unnecessary.

* As it is obviously necessary that the leakage of atmospheric air in the pump should be rendered impossible, the caoutchouc pinch-cock, B, should be enclosed in a wide piece of vulcanized tube, the annular space between the two tubes being filled with glycerine. The clamp

The recurved delivery end of the pump, *b*, dips into a mercurial trough, C, and an inverted tube, *d*, filled with mercury is placed over it in a convenient position for receiving the gaseous products of the ignition. The combustion must now be conducted in the usual manner, care being taken that, when the organic matter begins to burn, the operation proceeds very slowly until the vacuum becomes considerably impaired; otherwise traces of carbolic oxide may be produced. A combustion usually lasts from three-quarters of an hour to an hour; at its conclusion, unless the water-residue contained much organic matter, no gas will have passed into the inverted tube. The pump is again set to work, and in from five to ten minutes the whole of the gases will be transferred into the vessel placed for their reception. Unless the heat of the furnace be excessive, the combustion-tube will rarely collapse; but if it should do so, the metallic copper and granulated cupric oxide support the glass and prevent any obstruction to the passage of the gases. In many scores of combustions made by this process, no single instance of vitiated result has occurred from this cause. The gases collected consist of carbonic anhydride, nitric oxide, and nitrogen. The separation and determination of these, by well-known methods, is exceedingly simple, and in a manometric gas apparatus, such as that described by one of us,* is the work of a few minutes only.

A simplified form of this apparatus, designed especially for the examination of all gaseous mixtures incident to water analysis, is described in another memoir, where the method of analysing these mixtures is also given. The weights of carbon and nitrogen contained in the carbonic anhydride, nitric oxide, and nitrogen gases, having been deduced from the respective volumes of these gases, the numbers so obtained are expressed in parts of these elements contained in 100,000 parts of the water. The nitrogen thus found may have been present in the water, first as a constituent of organic matter (organic nitrogen), and secondly as a constituent of ammonia. The latter, if present, is determined in the original water by Nessler's test, as described below, and the nitrogen existing in this form being deducted from that obtained on combustion, gives the amount, if any, of organic nitrogen present.

It is obvious that the accuracy of this method of combustion will depend in a great measure upon the perfection of the vacuum obtained by the Sprengel pump. In order to ascertain the error due to this cause, the following experiments were made:—

I. ·01 grm. sugar was burnt in the same way as a water residue. After absorption of carbonic anhydride, there remained ·019 c.c. of nitrogen at 0° C., and 760 mm. pressure.

II. ·01 grm. sugar similarly treated gave ·013 c.c. of nitrogen at 0° C., and 760 mm. pressure.

If these numbers be referred to the residue of one litre of water (the quantity usually operated upon) the excess of nitrogen due to the imperfection of the Sprengel vacuum would be—

I. ·0024 part of nitrogen in 100,000 parts of water.

II. ·0016 part of nitrogen in 100,000 parts of water.

It will be seen that this error, which includes also any nitrogen retained or occluded in the cupric oxide, etc., is very insignificant; nevertheless it would be necessary to allow for it, if it were not included in another correction, which consists in evaporating a litre of distilled water,† acidified as usual with 15 c.c. of sulphurous acid, and containing about ·1 grm. of recently ignited sodic chloride. The residue from this water must now be burnt *in vacuo* in the usual manner, and the carbon and nitrogen deducted from the amount of these elements obtained from the residues of other waters submitted to analysis.

It is advisable that each analyst should perform several blank operations of this kind, so as to be able accurately to correct for the combined errors of his own manipulation and apparatus. In our own case we find these errors on the average of four blank analyses to amount to—

Carbon ·00032 grm. in 1 litre of water.
Nitrogen ·000045 grm. in 1 litre of water.

It is scarcely necessary to add that, to insure a minimum in these errors, it is of the utmost importance, carefully to guard against every access of organic matter, and especially of nitrogenous compounds, to the water and the substances used in the analysis. Cupric oxide prepared from the nitrate should on no account be used, since, even after being actually fused, it evolves considerable quantities both of carbonic anhydride and nitrogen when ignited *in vacuo*. The oxide must be made by igniting sheet copper in a current of air, in a muffle or other convenient apparatus. This oxide, in a coarsely granular or scaly condition, should be at once transferred to a stoppered bottle, over the neck of which a small beaker is inverted to protect it from dust. The fused plumbic chromate should be heated to redness with frequent stirring for a couple of hours, and then carefully transferred to another bottle similarly protected. As these substances do not require to be either dried or ignited again before use, they should be transferred as required, from their respective bottles, direct to the capsules or combustion tubes, and any portion of them once removed from the bottle should on no account be returned there without being first ignited for two hours.

The extent to which this method can be depended upon for the determination of the minute amounts of carbon and nitrogen contained in a water residue was tested by the following experiments:—

I. ·0352 grm. sugar was dissolved in one litre of distilled water, together with about ·5 grm. of sodic carbonate, previously converted into sulphite, 15 c.c. of a saturated solution of sulphurous acid were then added, and the liquid boiled for three minutes. The residue left after evaporation to dryness on the steam-bath gave, on combustion, an amount of carbonic anhydride corresponding to ·01463 grm. carbon.

II. ·0347 grm. sugar similarly treated gave ·01386 grm. carbon.

III. ·0114 grm. sugar similarly treated gave ·00404 grm. carbon.

IV. ·0122 grm. sugar similarly treated gave ·00530 grm. carbon.

V. ·0115 grm. sugar ·0094 grm. ammonic chloride, and ·8 grm. sodic carbonate (previously converted into sulphite) treated in like manner, gave ·004344 grm. carbon, and ·0025415 grm. nitrogen.

VI. ·010 grm. urea, and ·8 grm. sodic carbonate similarly treated gave ·0017704 grm. carbon, and ·00463 grm. nitrogen.

VII. ·01025 grm. urea and ·8 grm. sodic carbonate treated as before gave ·00211 grm. carbon, and ·00357 grm. nitrogen.

VIII. ·0104 grm urea and ·8 grm. sodic carbonate similarly treated gave ·0023865 grm. carbon, and ·004675 grm. nitrogen.

IX. ·0202 grm. urea, and one litre of solution of dihydric calcic dicarbonate boiled with 15 c.c. of sulphurous acid solution, and evaporated gave ·00452 grm. carbon and ·00887 grm. nitrogen.

X. ·025 grm. hippuric acid and ·5 grm. sodic carbonate (converted into sulphite) dissolved in one litre of water, boiled with 10 c.c. of sulphurous acid solution, and evaporated to dryness gave ·01386 grm. carbon, and ·00203 grm. nitrogen.

Expressed in parts per 100,000 of water evaporated, the following are the results of these experiments:—

		Calculated.	Found.
No. I.	Organic carbon	1·482	1·463
No. II.	,, ,, ...	1·460	1·386
No. III.	,, ,, ...	·480	·440
No. IV.	,, ,, ...	·514	·530
No. V.	,, ,, ...	·484	·434
	Nitrogen	·246	·254
No. VI.	Organic carbon.....	·200	·177
	,, nitrogen.....	·466	·463

placed outside both tubes. The wide piece of tube is fastened upon the glass tube below the pinch-cock, by the aid of an India-rubber cork, whilst it terminates considerably above the joint; the interior caoutchouc-joint is, therefore, entirely immersed in glycerine, and all possibility of leakage of air entirely prevented. We find, in fact, that by this arrangement the vacuum is still perfect after the lapse of several days. The calibre of the pump-tube, which we prefer, is one millimetre, and it is advisable to allow the mercury to flow very slowly until the exhaustion is nearly complete, when a rapid stream is necessary to expel the remaining traces of air or gas.

* Journ. Chem. Soc., vol. vi, p. 197.

† This distilled water should be previously purified by boiling, for 24 hours, with alkaline potassic permanganate. It should then be distilled, the first portions of the distillate being rejected so long as they show any reaction with Nessler's test. Finally, this distillate should be slightly acidified with sulphuric acid and rectified.

No. VII.	Organic carbon	·205	·211
	,, nitrogen	·478	·357
No. VIII.	,, carbon	·208	·239
	,, nitrogen	·484	·468
No. IX.	,, carbon	·404	·452
	,, nitrogen	·942	·887
No. X.	,, carbon	1·508	1·386
	,, nitrogen	·205	·203

When it is considered that these results were obtained from very minute amounts of the respective organic matters, which were first dissolved in a large quantity of water, and then recovered by evaporation, and, further, that some of the organic substances experimented upon are exceedingly prone to change, the correspondence of the experimental with the calculated numbers is as close as could be anticipated. The following results, obtained with actual waters, also tend to inspire confidence in this method of analysis :—

XI. Two litres of the same sample of water were successively analysed five days apart. They gave the following amounts of organic carbon and nitrogen in 100,000 parts .—

Organic carbon	1·030	1·010
Organic nitrogen	·198	·207

XII. Three mixtures of sewage and distilled water were made in such proportions that 1 litre contained respectively 100 c.c., 10 c.c., and 1 c.c. of sewage. Some solution of dihydric calcic dicarbonate was added to the second and third to form a tangible residue. They were then treated with sulphurous acid in the manner above described, and evaporated to dryness. Their residues gave, on combustion, the following results per 100,000 parts of water evaporated :—

	100 c.c. sewage. 900 c.c. water.	10 c.c. sewage. 990 c.c. water.	1 c.c. sewage. 999 c.c. water.
Organic carbon in 100,000 parts of the mixture.	·302	·033	·005
Organic nitrogen and nitrogen of ammonia.	·330	·033	·004

It has been already stated that the nitrogen obtained on the combustion of a water residue is made up of the organic nitrogen plus the nitrogen of any ammonia that may have been contained in the water, but that it includes no trace of the nitrogen which may have been present in the form of nitrates and nitrites, the latter having been completely destroyed during the evaporation with excess of sulphurous acid. Such an expulsion of the nitrogen of nitrates and nitrites is a remarkable reaction, and could scarcely have been predicted; indeed, it takes place to a very partial extent only when a nitrate is dissolved in water, and evaporated with excess of sulphurous acid, in imitation of a natural water; neither is the result very different when sodic chloride or calcic or magnesic carbonate is added. Thus the residue from half a litre of distilled water, to which had been added ·05 grm. potassic nitrate (= ·007 grm. nitrogen), ·0001 grm. ammonia, ·1 grm. sodic chloride, and 15 c.c. of a saturated solution of sulphurous acid, yielded ·00161 grm. nitrogen.

One litre of distilled water, containing ·1 grm. sodic chloride, ·1 grm. potassic nitrate (= ·014 grm. nitrogen), one drop of a strong solution of soluble glass, and 15 c.c. of a saturated solution of sulphurous acid, treated like a natural water, yielded, on combustion, ·00222 grm. nitrogen.

One litre of distilled water, containing ·1 grm. sodic chloride, ·1 grm. potassic nitrate, and 15 c.c. sulphurous acid solution, similarly treated, gave ·00259 grm. nitrogen.

The presence of a minute amount of iron, or of a phosphate, reduces to zero the amount of nitrogen retained from nitrates. Thus 1 litre of distilled water, ·1 grm. sodic chloride, ·1 grm. potassic nitrate (= ·014 grm. N.), 2 drops of a moderately concentrated solution of hydric sodic phosphate, and 15 c.c. of sulphurous acid solution, gave no nitrogen on combustion of the solid residue.

Half a litre of distilled water, containing ·1 grm. potassic nitrate, and 2 drops of a solution of ferric chloride, evaporated with 10 c.c. of sodic sulphite solution, and 15 c.c. of a saturated solution of sulphurous acid, gave no nitrogen on combustion.

One litre of distilled water containing ·1 grm. sodic chloride, ·1 grm. potassic nitrate, 1 drop of solution of ferric chloride, and 15 c.c. of sulphurous acid solution, gave no trace of nitrogen on combustion, and the same result was obtained in a duplicate experiment. Three drops of a solution of ferric chloride also removed all traces of nitrates from half a litre of a natural water when evaporated *in vacuo* although the water contained not less than 2·466 parts of nitrogen as nitrates and nitrites in 100,000 parts.

The nitrogen was also completely expelled during the evaporation of an artificial water, to which the following ingredients were added:—·01 grm. magnesia, ·1 grm. calcic carbonate, ·1 grm. sodic chloride, ·01 grm. potassic chloride, 1 drop of solution of soluble glass, 1 drop of solution of ferric chloride, 2 drops of solution of hydric sodic phosphate, ·1 grm. potassic nitrate, and 15 c.c. of sulphurous acid solution.

There is probably no natural water containing an appreciable quantity of nitrates or nitrites which does not also contain either iron or phosphoric acid; nevertheless, it is advisable to add one or two drops of ferrous or ferric chloride to the portion of water which is evaporated for combustion, in order to place beyond the possibility of doubt the complete expulsion of the nitrogen of nitrates and nitrites.

Since we began to use this process for the estimation of organic carbon and nitrogen in waters, Messrs. Wanklyn, Chapman, and Smith, have proposed a new method for the determination of the latter element in potable waters, Their process is founded upon a highly remarkable change which albumin and some other organic substances undergo during prolonged ebullition with an alkaline solution of potassic permanganate, by which their nitrogen is converted into ammonia. Unfortunately, however, this conversion is never complete; neither is there any guarantee that all the different forms of nitrogenous organic substances in water will thus yield up their nitrogen in the form of ammonia. That some such substances do not thus evolve their nitrogen when submitted to this process is evident from the following results, obtained with three bodies taken at random from a collection of chemicals:—

I. ·01 grm. strychnine, dissolved in one litre of distilled water (not previously purified), and distilled nearly to dryness with caustic potash and potassic permanganate, gave ·00032 grm. ammonia.

II. ·02 grm. narcotine, similarly treated, gave ·000312 grm. ammonia.

III. ·02 grm. quinine sulphate gave ·000728 grm. ammonia.

The following comparison of the amounts of ammonia actually obtained, with those which ought to be yielded by the weights of the respective substances operated upon, shows that in each case a large proportion of nitrogen was not evolved as ammonia :—

	Ammonia evolved. Calculated.	Found.
Strychnine	·00101 grm.	·00032 grm.
Narcotine	·00068 ,,	·000312 ,,
Quinine sulphate	·00128 ,,	·000728 ,,

We have also tested the permanganate process by applying it to a form of nitrogenous organic matter which is very frequently met with in natural waters, viz., peaty matter.

Some peat, collected by one of us from Leyland moss at a depth of three feet below the surface, and placed immediately in a well-corked glass vessel, was digested at 100° C. for a couple of hours in distilled water, rendered slightly alkaline by caustic soda. 100 c.c. of the dark-coloured liquid so obtained was made up to one litre with distilled water, and after the determination of ammonia by ebullition with sodic carbonate, was submitted to the permanganate process so long as ammonia was evolved. Another 100 c.c. of the same liquid was acidified with sulphurous acid, boiled for two minutes, then evaporated to dryness *in vacuo*, and the dry residue submitted to combustion *in vacuo*. The following amounts of *organic* nitrogen per 100,000 parts of liquid were obtained:—

Permanganate Process.	Combustion Process.
·308	1·015

Another portion of the same liquid was acidified with dilute sulphuric acid; the copious brown precipitate which

separated was collected on a filter, and, after being dried at 100° C., was reduced to fine powder. Two separate centigrms. of this precipitate were respectively submitted to the permanganate and combustion processes. Two equal volumes (100 c.c.) of the filtered liquid were also respectively treated by the two processes, the portion used for combustion being evaporated under paper upon a steam-bath. The ammonia was determined in this liquid as usual. The following are the amounts of *organic* nitrogen obtained:—

	Permanganate process.	Combustion process.
·01 grm. of peat precipitate yielded of organic nitrogen.	·000052 grm.	·0001138 grm. N.
100,000 parts of filtrate from peat precipitate gave of organic nitrogen:	·108	·291

200 c.c. of another sample of peat solution, treated by the two processes, yielded the following amounts of organic nitrogen per 100,000 parts of liquid:—

Permanganate process.	Combustion process.
·422	1·175

Two separate litres of an artificial water, made by diffusing some peat in distilled water for several days (without the addition of alkali), and then filtering, were treated by the two processes, and yielded the following amounts of organic nitrogen per 100,000 parts of water;—

Permanganate process.	Combustion process.
·022	·076

The extension of this comparison of the two processes to natural waters confirms, in a large majority of cases, the conclusion which is forced upon us by the above experiments viz., that nitrogenous organic substances do not uniformly yield up the whole, or nearly the whole of their nitrogen in the form of ammonia when boiled with alkaline potassic permanganate; indeed, Wanklyn has recently discovered that, even in regard to albumen itself, his first statement in reference to this point requires modification, and he now states* "The 'albuminoid ammonia' is not the total amount of ammonia which the albumen is capable of giving, but appears to be two-thirds of the total quantity, being at any rate a constant fraction of the total quantity." Neither the above nor the following results show, either that two-thirds of the total nitrogen is evolved in the shape of ammonia, or that the fraction of the total nitrogen evolved in the permanganate process is a constant one. We have tested the two processes side by side upon more than 100 different samples of natural waters, and we find that as a rule, to which, however, there are some exceptions, the permanganate process gives results considerably below those obtained by combustion, as in the following cases:—

Organic nitrogen in 100,000 parts of water. By permanganate process.	By combustion.	Organic nitrogen in 100,000 parts of water. By permanganate process.	By combustion.
·006	·010	·002	·010
·006	·011	·002	·008
·006	·010	·003	·008
·002	·011	·016	·068
·016	·042	·003	·006
·002	·009	·001	·012
·006	·022	·002	·011
·000	·007	·000	·007
·013	·043	·011	·058
·012	·027	·024	·061
·006	·031	·030	·062

In some cases where, as a rule, the amount of organic nitrogen was very small, the two processes yielded accordant results, as in the following cases:—

Organic nitrogen in 100,000 parts of water. By permanganate process.	By combustion.	Organic nitrogen in 100,000 parts of water. By permanganate process.	By combustion.
·001	·001	·004	·004
·001	·001	·003	·004
·004	·004	·002	·001
·010	·009	·003	·004
·012	·012	·002	·001
·001	·001	·002	·002

* *Journ. Chem. Soc.*, vol. xx., p. 593.

In a few other cases, however, the amount of organic nitrogen obtained by the permanganate process was higher than that yielded by combustion, as for instance—

Organic nitrogen in 100,000 parts of water. By permanganate process.	By combustion.	Organic nitrogen in 100,000 parts of water. By permanganate process.	By combustion.
·010	·007	·004	·000
·009	·005	·002	·000
·005	·000	·003	·000

These last results are to some extent explained by the fact, that distilled water purified by boiling with alkaline potassic permanganate, for a long time after ammonia has ceased to be evolved, always yields ammonia when again treated with alkaline, potassic permanganate. Thus in four experiments made with such purified water, the following quantities of ammonia per 100,000 parts of water were obtained:—

No. I.	·002 part	No. III.	·002 part.
No. II.	·001 „	No. IV.	·002 „

3. *Estimation of Nitrogen in the form of Nitrates and Nitrites.*

This determination can be made with very great accuracy by a modification of a process proposed twenty years ago by Walter Crum, for the refraction of nitre.* It consists in agitating with mercury a concentrated solution of the nitrate or nitrite, with a large excess of concentrated sulphuric acid, when the whole of the nitrogen is evolved as nitric oxide. We find that, for the success of this process, it is absolutely necessary that no chlorides should be present, and also that the mixed liquids should be *violently* agitated with mercury, so as to break up the latter into minute globules.

The following determinations show the accuracy of this process:—

I. ·02 grm. of nitre gave 75·48 c.c. nitric oxide at 49 mm. mercurial pressure, and 16°·4 C.

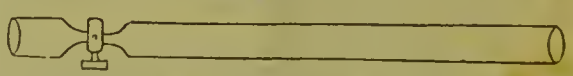
II. ·01 grm. of nitre. dissolved in a saturated solution of sodic sulphate, gave 75·48 c.c. of nitric oxide at 24·2 mm. mercurial pressure, and 17°·8 C.

	Weight of nitrogen. Calculated.	Found.
No. I.	·002772	·002897
No. II.	·001386	·001424

It was ascertained that uric acid, hippuric acid, urea, and creatin when agitated with concentrated sulphuric acid and mercury gave no trace of gas.

The following is the mode in which this process is applied to the estimation of nitrogen existing as nitrates and nitrites in potable waters. The solid residue from the half litre of water used for determination No. 1 (estimation of total solid constituents)† is treated with a small quantity of distilled water, a very slight excess of argentic sulphate is added to convert the chlorides present into sulphates, and the filtered liquid is then concentrated by evaporation in a small beaker until it is reduced in bulk to two or three cubic centimetres. The liquid must now be transferred to a glass tube, Fig. 2,

Fig. 2.



and furnished at its upper extremity with a cup and stopcock previously filled with mercury at the mercurial trough, the beaker being rinsed out once or twice with a very small volume of recently boiled distilled water, and finally with pure and concentrated sulphuric acid in somewhat greater volume than that of the concentrated solution and rinsings previously introduced into the tube. By a little dexterity it is easy to introduce successively the concentrated liquid, rinsings, and sulphuric acid into the tube by means of the cup and stopcock, without the admission of any trace of air. Should, however, air

* *Phil. Mag.*, xxx., 426.

† If the water contain nitrites, a separate half litre should be taken for this determination, otherwise there is a risk of loss of nitrogen during evaporation. The nitrites in this half litre of water must be transformed into nitrates by the cautious addition of potassic permanganate to the slightly acidified water before the evaporation is commenced. Immediately after the action of the permanganate the water must, of course, be again rendered slightly alkaline.

inadvertently gain admittance, it is easily removed by depressing the tube in the mercury trough, and then momentarily opening the stopcock. If this be done within a minute or two after the introduction of the sulphuric acid, no fear need be entertained of the loss of nitric oxide, as the evolution of this gas does not begin until a minute or so after the violent agitation of the contents of the tube.

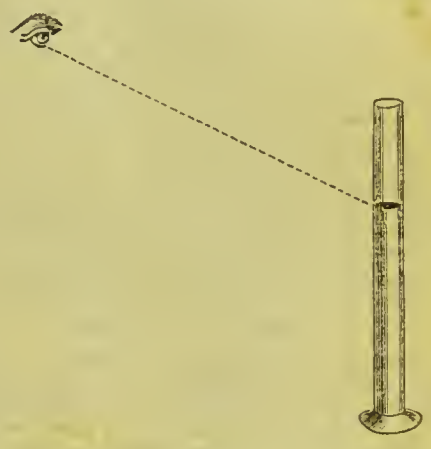
The acid mixture being thus introduced, the lower extremity of the tube is to be firmly closed by the thumb, and the contents violently agitated by a simultaneous vertical and lateral movement, in such a manner that there is always an unbroken column of mercury, at least an inch long, between the acid liquid and the thumb. From the description, this manipulation may appear difficult, but in practice it is extremely simple, the acid liquid never coming in contact with the thumb. In about a minute from the commencement of the agitation a strong pressure begins to be felt against the thumb of the operator, and mercury spurts out in minute streams, as nitric oxide gas is evolved. The escape of the metal should be gently resisted, so as to maintain a considerable excess of pressure inside the tube, and thus prevent the possibility of air gaining access to the interior during the shaking. In from three to five minutes the reaction is completed, and the nitric oxide may then be transferred to a suitable measuring apparatus, where its volume is to be determined over mercury. As half a litre of water is used for the determination, and as nitric oxide occupies exactly double the volume of the nitrogen which it contains, the volume of nitric oxide read off expresses the volume of nitrogen existing as nitrates and nitrites in one litre of the water. From the number so obtained, the weight of nitrogen in these forms in 100,000 parts of water is easily calculated.

4. *Estimation of Ammonia.*

Unless the amount of ammonia obtained by distillation alone, or with sodic carbonate, be considerable (above ·01 part in 100,000 parts of water), Hadow's modification of Nessler's process is all that could be desired for its accurate determination. But if a larger proportion than this be obtained, the presence of urea may be suspected, and it becomes necessary to make the Nessler ammonia determination directly, in the original water, without the intervention of distillation. For this purpose, however, the water should be colourless, and free from calcic and magnesic carbonates. Any tint which is appreciable in a stratum 6 or 8 inches thick would obviously vitiate the result of a colour-test; whilst if calcic or magnesic carbonate be present, the addition of the Nessler solution will infallibly produce turbidity; moreover, we find that the slightest opalescence in the water, under these circumstances, is absolutely incompatible with an accurate determination. Both these difficulties might be effectually removed by adding to the water, first a few drops either of ferric chloride or aluminic chloride in solution, and then a few drops of a solution of sodic carbonate so as to precipitate ferric hydrate or aluminic hydrate. The precipitate completely decolorises the water, and no turbidity is caused by the subsequent addition of the Nessler solution; but unfortunately, the precipitate carries down with it an amount of ammonia which, in the case of the ferric hydrate, sometimes amounts to one-third of the total quantity present. Remembering the beautiful blue-green tint—the natural colour of absolutely pure water—which is presented by a reservoir of water that has been softened by Clark's process, we tried, upon peaty water, the effect of precipitating in it calcic carbonate, and found that the decolorisation was as complete as could be desired, and that no appreciable amount of ammonia was carried down with the precipitate. The amount of calcic carbonate present in a coloured water is rarely sufficient to enable the operator to carry out this reaction with sufficient rapidity and completeness; it is therefore best in all cases to add a few drops of a concentrated solution of calcic chloride, to half a litre of the water. The subsequent addition of a slight excess of sodic carbonate then produces a copious precipitate of calcic carbonate, which should be allowed to subside for half an hour before filtration. 100 c.c. of the filtrate is a convenient quantity to take for the direct Nessler determination of ammonia. To this volume of the filtrate 1 c.c. of the Nessler solution is added, and the colour observed in the usual manner (see Miller on the Analysis of Potable Waters. Journ. Chem. Soc., vol. xviii, p. 125). By this direct process the ammonia in fresh urine can be readily estimated, for this purpose 5 c.c. of the urine should be diluted with 95 c.c. of water free from ammonia. We have ascertained that known quantities of ammonia, added in the form of ammonic chloride to urine, can be determined with great accuracy.

The colour observations of the Nessler determination are best made in narrow glass cylinders of such a diameter that 100 c.c. of the water to be tested form a stratum about seven inch deep. The depth of tint is best observed by placing these cylinders upon a sheet of white paper near a window, and looking at the *surface* of the liquid obliquely; thus, Fig. 3.

Fig. 3.



The nitrogen existing as nitrates, nitrites, and ammonia, in potable waters, is derived partly from the atmosphere and partly from the decomposition of nitrogenous organic matters previously existing, either in the water, or in the soil with which the water has been in contact. In view of the opinions now very generally entertained, with regard to the propagation of certain forms of disease by means of spores or germs contained in excrementitious matters, the search for nitrates, nitrites, and ammonia, is second only in importance to that for actual sewage contamination; because, although these substances are in themselves innocuous, unless present in excessive quantity, yet, when contained in a water in more than a certain proportion, they betray previous contamination by sewage or by manured land. The nitrogenous organic matters contained in sewage or manure, undergo slow oxidation and conversion into mineral compounds when mixed with water; their carbon is converted into carbonic anhydride, and their hydrogen into water. These mineral products can no longer be identified in the aërated waters of a river, spring, or lake, but the nitrogen is transformed into ammonia, nitrous acid, and nitric acid; the two latter combine with the bases contained in most waters, and, together with the ammonia, constitute a record of the sewage or other analogous contamination from which the water has suffered. With certain corrections, mentioned below, the determination of the nitrogen contained in these mineral compounds proclaims the previous history of the water as regards its contact with decomposing nitrogenous organic matters. We propose to employ this determination for the expression of the previous sewage contamination of a water, in terms of average filtered London sewage, which, if thus oxidised, would yield a like amount of nitrogen in the form of ammonia, nitrites, and nitrates. For this purpose average filtered London sewage may be assumed to contain 10 parts of combined nitrogen in 100,000 parts, as deduced from the numerous analyses of Hofmann and Witt, and of Way and Odling.

The number so obtained as the previous sewage contamination of a water requires, however, a correction, since rain water itself contains combined nitrogen as ammonia, nitrite of ammonia, and nitrate of ammonia. The amount of these substances present in the rain which falls at Rothampstead has been determined by a series of monthly analyses made independently, on the one hand, by Messrs. Lawes and

Gilbert, and on the other by Mr. Way, and extending over two years. The results of these chemists give, as the average amount of combined nitrogen, ·0985 part in 100,000 parts of rain water. But as only a very small proportion of the rain water which supplies a river falls directly into the stream, and as rain water is very rapidly deprived of its ammonia, and to some extent also of its nitrites and nitrates, by contact with vegetation, this number, as representing the amount of combined nitrogen, conveyed into a river from aërial sources must obviously be too high; indeed, the experience gained in the examination of fifty samples of water collected near the source of streams, proves this to be the case, for the maximum amount of nitrogen as ammonia contained in any of these samples was only ·008 part in 100,000, whilst the average amount of nitrogen in the form of nitrous and nitric acids observed by Messrs. Lawes, Gilbert, and Way, and this in thunder rain only, but was ·024 part in 100,000. It may, therefore, be safely assumed that the maximum amount of combined nitrogen, derived by natural waters from aërial sources, does not exceed ·024 + ·008 = ·032 part in 100,000; and we, therefore, propose to deduct this amount from the quantity of nitrogen present in a water in the form of ammonia and of nitrites and nitrates, and to employ the remainder, if any, for the calculation of the previous sewage contamination, on the basis that 10 parts of nitrogen correspond to 100,000 parts of such contamination. If we represent the nitrogen existing in 100,000 parts of water as nitrates and nitrites by N, and the nitrogen present as ammonia in the same quantity of water by N′, the previous sewage contamination of 100,000 parts of the water is denoted by the following expression:—

$$10{,}000\ (N + N' - \cdot032).$$

Thus a water which contains in 100,000 parts ·339 part of nitrogen as nitrates and nitrites, and ·001 part of ammonia, has a previous sewage contamination of 3080 parts; that is, 100,000 parts of the water have been previously contaminated with sewage or manure matter equivalent to 3080 parts of average filtered London sewage. *Previous* must not be confounded with *actual* or *present* sewage contamination; the latter is caused by unchanged or unoxidized sewage, whilst the former denotes sewage completely resolved, so far as its dead and unorganised organic constituents are concerned, into perfectly or comparitively innocuous mineral compounds. But although this change has been effected at the time the sample of water was collected for analysis, it by no means follows that it will be equally complete under future altered conditions as regards temperature, exposure to air or vegetation, and comparative volume of pure water. Previous sewage contamination must, therefore, to some extent be regarded as possible actual sewage contamination at some future time, at the place where the sample was taken. There is also another aspect in which the previous sewage contamination of a water assumes a high degree of importance; if the shell of an egg were broken, and its contents beaten up with water and thrown into the Thames at Oxford, the albumen would probably be entirely converted into mineral compounds before it reached Teddington; but no such destruction of the nitrogenous organic matter would ensue if the egg were carried down the stream unbroken for the same distance; the egg would even retain its vitality under circumstances which would break up and destroy dead or unorganized organic matter. Now, excrementitious matters certainly, sometimes, if not always, contain the germs or ova of organised beings; and as many of these can doubtless retain their vitality for a long time in water, it follows that they can resist the oxidizing influences which destroy the excrementitious matters associated with them. Hence great previous sewage contamination in a water means great risk of the presence of these germs, which on account of their sparseness and minute size, utterly elude the most delicate determinations of chemical analysis.

These considerations respecting the import of the previous sewage contamination of a water, lead us to regard, from a sanitary point of view, the accurate determination of the nitrogen in the form of nitrates, nitrites, and ammonia, as being next to the organic carbon and nitrogen determinations—by far the most important datum in water analysis.

In illustration of our mode of expressing the results of water analyses, the following table is subjoined. The degrees of hardness which we employ express the number of parts of calcic carbonate, or its equivalent of other hardening salts in 100,000 parts of water; they harmonise better than Clark's with the decimal arrangement of the rest of the analytical results, and, if it be desired, they are readily converted into Clark's degrees by multiplying by ·7. The numbers opposite Thames water are the means of analyses of the water delivered by the Chelsea, West Middlesex, Southwark, Grand Junction, and Lambeth Companies on the 21st of January last. The New River, East London, and Kent Companies' waters were collected about the same time. The lake waters were analysed for the Royal Commission on Water supply by Dr. Odling and one of us. The results yielded by the Caterham Company's water are interesting, as an example of the great improvement effected in a chalk water by the application of Clark's process. Unfortunately, this last sample was not taken under our supervision, and we cannot, therefore, vouch for its authenticity.

Names of Waters.	Total solid impurity in 100,000 parts.	Organic carbon.	Organic nitrogen.	Nitrogen as nitrates and nitrites.	Ammonia.	Total combined nitrogen.	Previous sewage contamination.	Hardness.
Thames water as delivered in London	30·94	·399	·018	·346	·001	·395	3150	17·3
River Lea water, as delivered by New River Company	30·20	·115	·014	·361	·001	·376	3300	20·5
Ditto, delivered by the East London Company	36·00	·147	·024	·307	·001	·332	2760	22·8
Chalk water, delivered by the Kent Company	44·80	·064	·013	·408	·001	·422	3770	26·2
Ditto, delivered by the South Essex Company	37·98	·164	·000	·848	·006	·852	8205	21·6
Ditto, supplied by Caterham Water Works	12·60	·064	·007	·000	·009	·014	0	7·0
Ditto, supplied to Worthing	36·70	·162	·000	·426	·000	·426	3940	23·8
Glasgow, from Loch Katrine	3·28	·256	·008	·031	·002	·041	0	·3
Manchester, from Derbyshire Hills	6·80	·242	·026	·001	·001	·028	0	2·7
Lancaster, from Bleasdale Fells	3·54	·157	·081	·036	·001	·038	50	·1
Preston, from Longridge Fells	14·70	·515	·040	·001	·003	·044	0	6·7
Leicester, waterworks supply	23·70	·506	·020	·001	·001	·022	0	13·4
Bala Lake	2·73	·227	·001	·000	·001	·002	0	·4
Ulswater Lake	8·63	·067	·000	·005	·003	·007	0	1·9
Thirlmere Lake	2·66	·194	·004	·002	·003	·008	0	·7
Haweswater Lake	3·56	·158	·004	·000	·004	·007	0	1·3
Well water, from Leyland, near Preston, Lancashire	54·40	·325	·056	2·466	·003	2·524	24360	17·5
Ditto, from Ledbury	65·30	·145	·030	1·575	·001	1·606	15440	25·1
Ditto, from Rodhill	43·60	·234	·021	1·446	·002	1·469	14160	25·1

[Since the publication of this important memoir, Messrs. Wanklyn, Chapman, and Smith have minutely criticised that portion that relates to the determination of organic nitrogen. We shall probably notice this criticism in our next.]

TOILET SOAPS.*

THE soaps consist either of very pure ordinary curd-soap, or of soaps prepared by the cold process with lard, beef-marrow, or sweet-almond oil, and perfumed in either case with various essential oils. To refine an ordinary soap—which should, of course, be as free as possible from colour and impurity—for toilet purposes, it is reduced to shavings, and melted over a water-bath with rose and orange flower water and salt, 24 lbs. soap being thus mixed with 4 pints of rosewater, 4 pints of orange-flower water, and two large handfuls of salt. The next day, if entirely cooled, the soap is cut up into small bars and dried in a shady place, then melted anew in the same quantities of rose and orange-flower water, and strained; afterwards cooled and dried again. This done, the soap will be free from bad odour. It must be powdered, and exposed for several days to the air, but protected from dust. It is then ready to receive the

* From the article on "Soap" in Mr. Watts' *Dictionary of Chemistry*. (Longmans.)

intended perfume, and to be moulded and pressed into the desired forms.

Another method is to melt 6 lbs. of best white soap in 3 pints of water, and when liquid, to strain it through a linen cloth. It is then placed in a kettle with a pint of water and a tablespoonful of salt; a brisk fire is kindled under it; and the contents are whipped or stirred to make them foam and froth. The fire is then put out; the balling continued till the mass is sufficiently inflated; the fire again kindled, and the kettle kept on till its contents swell and foam. It is then emptied into the cooling frames, and after solidification, taken out, cut into cakes, and pressed.

The perfumes used are chiefly volatile oils, viz., the oils of roses, bergamot, mallow, lavender, thyme, rosemary, lemon, verbena, vanilla, bitter-almond; nitrobenzene is also used instead of the last-mentioned oil.

Toilet soaps are coloured blue with ultramarine, red with vermillion, brown with an alkaline solution of burnt sugar. A peach-blossom tint is said to be produced by adding a little cream of tartar to soap which has been perfumed with bitter-almond oil.

Toilet Soft Soap or *Shaving Cream*, is made by gradually beating 50 lbs. of lard with 75 lbs. of caustic potash-ley marking 17° Bm. [Sp. gr. 1.126.]

Glycerin Soap, which is used as a toilet soap for softening the skin, is made by mixing glycerin with ordinary soap when transferred to the frames.

Light or *Flotant Soap*.—This soap is prepared by threshing or agitating a solution of soap, to which one-fifth or one-sixth part of water has been added, with a rouser or paddle-wheel, until the latter has risen to twice the height of the soap solution, and then transferring it to the moulds. A soap is thus obtained inflated with air, which gives it sufficient buoyancy to float on water.

Transparent Soap is prepared by drying ordinary soap in a stove, dissolving it in hot alcohol, leaving the solution at rest to allow the impurities to settle down, or removing them by filtration, the filter being supported on a funnel surrounded with hot water, then distilling off the alcohol till the residue acquires such a consistence as to solidify when cooled in metallic moulds.

Pharmacy and Therapeutics.

STRYCHNINE OR QUININE WITH TINCTURE OF IODINE.

THE following communication from Dr. FULLER, the Senior Physician to St. George's Hospital appeared in a recent number of the *Lancet*:—

"In the course of my practice it has often occurred to me to prescribe a mixture containing quinine or strychnine, together with tincture of iodine. No chemist to whom I have spoken on the subject has been aware of any incongruity in the mixture, and few have reported any difficulty in dispensing it. Last summer, however, Messrs. Twinberrow called my attention to the fact that it is impossible to dispense a mixture containing quinine and tincture of iodine without an immediate deposit of an insoluble iodide of quinine, which is precipitated—according to the degree of concentration of the mixture, and to the sequence in which the ingredients are mixed—either as a fine brown powder, or in large flakes of a dark brown colour. More recently, while seeing a patient in consultation with Dr. Williamson, of Muldway-park, I suggested the administration of a mixture containing a drachm of the liquor strychniæ, two drachms of dilute hydrochloric acid, and two drachms of tinctura iodi. Mr. Young, the chemist of Ball's-pond-road, to whom the prescription was sent, observed that a dark flaky precipitate was formed on the addition of the tincture of iodine, and wrote to me, saying: 'In whatever sequence the ingredients are mixed, I find that the whole of the strychnine is precipitated by the tinctura iodi; indeed, so strong is the affinity between these two ingredients, that the two fluid drachms of tinctura iodi are capable of decomposing six fluid drachms of the liquor strychniæ, producing an insoluble compound of iodine and strychnine.'

"With a view to test the accuracy of this statement I have repeated Mr. Young's experiment, and I find it in every respect strictly correct. If one drachm of tinctura iodi is added to a solution of three drachms of liquor strychniæ in four ounces of water, the mixture speedily becomes colourless and almost loses its bitterness, and at the same time a dark-brown flaky precipitate of iodide of strychnia takes place. The addition of iodide of potassium, or a large quantity of spirit, will not serve to prevent the precipitation.

"Now it is obvious that, for medicinal purposes, a mixture in which such a precipitate occurs must be almost valueless, The patient not only loses the benefit of the quinine or strychnine, but of the iodine also. It is not unreasonable, therefore, to lay down as a rule, that tincture of iodine ought not to be prescribed in a mixture containing either of the above-named alkaloids. Probably a similar reaction would take place with other alkaloids, but of these I have no experience.

"Another question of practical importance arises out of this observation: May not a dilute solution of iodine be advantageously given as an antidote in cases of poisoning by strychnine? Neither in Dr. Taylor's work on Poisons, nor in any other work which I have had the opportunity of consulting, do I find the slightest reference to iodine as an antidote to strychnine; but if a drachm of the tincture of iodine of the Pharmacopœia suffices to precipitate and render insoluble no less than a grain and a half of strychnine (three drachms of the liquor strychniæ), it is difficult to resist the conclusion that, if cautiously administered, iodine may prove a valuable and efficient remedy in cases of poisoning by strychnine."

[From the correspondence which the publication of this article has called forth, it appears that iodine has previously been proposed as an antidote to strychnine.]

THERAPEUTIC MEMORANDA.

BY JOHN ADDINGTON SYMONDS, M.D., F.R.S.E.*

THE MOUTH.—For the little follicular ulcers on the inside of the lips and cheeks, and on the tip of the tongue (extremely worrying to the subject of them), the best application is that of a crystal of sulphate of copper once or twice a day. This, with careful diet and the internal use of an occasional mercurial pill and an alkaline mixture (nothing better than solution of magnesia, or lime-water, with prussic acid), will in most cases soon remove these troubles.

I hardly know whether it is worth while to remark that, for the aphthæ which occur in the advanced stage of acute diseases, and also in chronic diseases, a weak solution of nitrate of silver (gr. x. to ℥j), applied with a brush once or twice a day, will obviate the necessity for gargles. Should the latter be used, there are none that surpass infusion of catechu.

For ulceration of the gums in sickly ill-fed children, the application of crystalline sulphate of copper is an excellent local remedy; but I can add my testimony to the general experience of the profession in favour of the free internal use of chlorate of potass, whether alone or in combination with bark.

There is a sore erythematous condition of the tongue, occasionally met with in chronic cases, for which I have found a good paliative in a combination of bismuth, glycerine, and rose or elder-flower water. I was led to the employment of it in these cases by my observation of its efficacy in such cutaneous affections as eczema and psoriasis. Here is a formula.

℞ Bismuthi subnitr. ℈j; glycerini ℥j; aquæ rosæ vel sambuci ℥vij.

M. Fiat lotio.

There is a morbid sensibility of the tongue occasionally, rather rarely, met with, unaccompanied by any appearance

* Contributed to the *British Medical Journal*. We are compelled to omit the writer's admirable preliminary remarks.

of inflammatory or other change on the surface, but causing much vexation to the subject of it, and rendering any pungent articles of food unbearable. It is much soothed by a weak solution of bromide of potassium (ʒss or ʒj to ʒvj); but, being only a symptom of disorder of the stomach, the latter must be treated. An entire change of diet is often the best remedy—for instance, the adoption of one in which milk is a large ingredient. I have known such irritation alternate with analogous irritation of the other extremity of the alimentary tube.

The Throat.—Of common remedies of angina, none surpass the use of ice, whether in lumps or in iced drinks. When it cannot be obtained, cold thick gruel is a good substitute. Instead of gargles, which are fatiguing, I prefer directing the use of a mixture of mucilage containing nitrate of potass or borate of soda, and a small quantity of syrup of poppy, or Battley's opium, or prussic acid: a spoonful, large or small, to be frequently, but slowly swallowed. Care must be taken that no more than a definite quantity shall be consumed in a certain time, for which the amount of narcotic ingredient must be calculated. But there is one application which I have found very efficacious in a great variety of sore throats. I use it in many cases for which I formerly employed a solution of nitrate of silver. It is a combination of oil of turpentine and glycerine in equal parts, and it is applied with a soft brush two or three times in a day. Whether the throat be red and puffed, or pale and œdematous, or studded with superficial ulcers or opaque yellow patches of epithelium, this combination is at once curative and comforting. I first used it in a case of obstinate ulceration of a tonsil, which every day was deepening, in spite of nitrate of silver and constitutional remedies. Having often tested the value of oil of turpentine in ointments applied to cutaneous ulcerations, I applied it in this case; and its efficacy in arresting the destructive process and promoting reparation was unquestionable.

For stubborn chronic ulcers of the throat I rely on applications of copper or iodine. In cases of syphilitic taint a lotion containing liquor hydrargyri bichloridi is sometimes beneficial.

Diphteria.—In the treatment of this formidable malady nothing is more important than an almost unlimited administration of wine and brandy. It might seem easy enough to give a glass of wine or a table-spoonful of brandy at intervals of an hour or half an hour; but it requires a great amount of faithfulness and tact on the part of the nurses to get these quantities down, in addition to other nourishment and medicine. The best medicines I have found to be quinine and tincture of perchloride of iron, used interchangeably with chlorate of potass and cinchona (exorbitant polypharmacy, but we can make no abatement). The local applications need to be frequently changed. At the beginning, or in a slight case, we may be content with brushing the throat with the mixture of turpentine and glycerine just mentioned; but in ordinary cases we shall soon have to apply the tincture of perchloride of iron, strengthened by an addition of undiluted hydrochloric acid (forty or fifty minims to an ounce). This, again, when the false membrane has been cast off, and the ulcerated surface looks grey and sluggish, may be changed with advantage for a combination of creasote and glycerine (a drachm to an ounce), or for the tincture of iodine. The assiduous swallowing or holding in the mouth of small lumps of ice gives relief by lessening the general engorgement of the tissues. The worse peril of this disease comes when it has advanced within the larynx. Then the first thing to do is to charge the atmosphere with steam, either by a steam-kettle with tube extending to the bedside and within the curtains, or by a steaming urn and lamp. But the remedy which may soon become needful, and at a moment's warning, and by which I think I have seen several lives just saved, is a quickly acting emetic. The speediest and least exhausting and most certain in my experience has been sulphate of copper, from ten to twenty grains in an ounce of water. Such draughts should be kept in the sick-room ready for the emergency. In one case the stomach failed to answer to this potent substance, though it had been successful in three several administrations in the same case. It was changed for ipecacuanha with carbonate of ammonia, and the patient ultimately recovered. After this dangerous crisis has passed the patient may still remain in jeopardy from two causes—first, the extension of plastic matter into the lower division of the trachea and the bronchi; secondly, from the general debility. For the former an occasional emetic may still be required. There is sometimes a deceitful abatement of bad symptoms. The distress in the throat is all but gone; the skin is cool; the pulse quiet and soft, and steady; but the patient may die suddenly, whether from fibrinous concretions in the heart or large vessels, or from mere cardiac asthenia. Recumbence should be continued for some days after the danger has apparently passed away.

ON THE USE OF METHYLATED SPIRIT IN PHARMACY.*

The following paper is a condensed translation of a report made to the Medical Council of the province of North Holland, by six of its members, among whom was Prof. Dr. J. Gunning. In accordance with the excellent laws which, since January, 1866, regulate in the Netherlands all matters relating to medicine in its more extended sense, there is in every province [county] of the kingdom a medical council composed of medical men, pharmaceutists, and lawyers. As regards the free use of methylated spirit by pharmaceutists, the committee just alluded to is of opinion that it would be manifestly unfair to pharmaceutical chemists who are in the habit of preparing, or manufacturing, for instance, such substances as quinine and other alkaloids, to require that such articles should, as far as such is required, be made by them with alcohol, whereas the wholesale maker would use, and quite justly so, methylated spirit. The committee, however, distinctly desire it to be understood that the use of methylated spirit cannot be allowed in the preparation of medicinal tinctures, for although it is true that the methyl-alcohol, as it is met with in ordinary wood-spirit, bears the greatest analogy to ethyl-alcohol, there occur beside in wood-spirit, acetate of methyl and acetone, both of which, in their solvent power, more resemble ether, and, consequently, influence and alter the real constituents of tinctures to be prepared with alcohol; the same, of course, applies to alcoholic extracts. The committee also disapproves of the manufacture of ether and chloroform for medicinal use from methylated spirit. Since the inspection of chemists' shops in the Netherlands, and the testing of the divers pharmaceutical preparations is a duty of the Medical Councils, it was necessary to find ready tests to ascertain whether or not methylated spirits have been unlawfully applied. The following are the results of some experiments instituted on purpose by the members of the above-named Committee. It is quite possible to recognise, even in tinctures which contain strongly-scented substances, the wood-spirit, if methylated spirit was used in the preparation thereof; the smell is even detected three months after the tinctures have been made, but if a doubt arises, it is best to mix the tincture in question with double its bulk of boiling water. Tinctures containing free ammonia beside must be first rendered neutral. Another test is the following:—The alcoholic fluid in question is mixed with twice its bulk of strong ammonia.

Next there is added, while the fluid under examination is well stirred up, a few drops of a solution of 10 grs. of iodine and 20 grs. of iodide of potassium, in half a fluid ounce of distilled water. In case the fluid under examination does *not* contain methylated spirit, there will soon be observed a finely-divided precipitate of a black substance (iodine?), giving to the fluid a dark bluish appearance; if, on the other hand wood spirit or methylated spirit is present, the fluid remains clear, assumes a brownish yellow, but rapidly vanishing hue; after the fluid has become quite colourless again, there will distinctly be perceived, on smelling it, an odour of saffron, while shortly after, also very frequently, crystals of iodoform are deposited. This test and reaction were discovered by Mr. J. Polak. Tincture of iodine made with methylated spirit may be detected, since, on addition of liquid ammonia it becomes readily, and without application of heat, discoloured, the saffronaceous odour will be

* From the *Chemical News*, March 27.

smelt, and crystals of iodoform deposited. The above-named test is not disturbed by the presence of essential oils, camphor, compound ethers, etc. It is best, however, that, as regards the application of this test to tinctures, the latter should be submitted to distillation, and the distillate tried by the reagent. From a series of interesting experiments instituted by the committee, in order to test in how far methylated spirits might change the constitution of alcoholic extracts made with methylated spirit instead of with pure alcohol, it appears that methylated spirit dissolves out from 2 to 7 per cent. more from vegetables than alcohol does, while in the case of extracts of cicuta and belladonna the amount was from 13 to 14 per cent. more if methylated spirit instead of pure alcohol was applied. The following are the results of experiments instituted with ether, æther muriaticus alcoholicus, æther aceticus, æther nitricus alcoholicus, and chloroform made with pure alcohol and methylated spirit.

Ether from methylated spirit cannot be detected by the smell, but easily by the following test:—Pour carefully some strong sulphuric acid in a test tube, hold it then as slantingly as possible, and then pour in as carefully as possible some of the ether; if the latter is obtained from methylated spirit, it will be seen that at the place of contact of the two fluids, a dark brownish yellow colouration ensues, which, if the ether were obtained from pure alcohol, and submitted to a similar experiment, will be found absent, or at least hardly perceptible. Æther muriaticus alcoholicus, and æther nitricus alcoholicus can at once be detected by the iodine test spoken of before, if they have been prepared with methylated spirit.

Æther aceticus, prepared either with pure alcohol or with methylated spirit, is not recognised by the smell, but the iodine test detects the origin from methylated spirit at once, and it hence follows that acetic ether obtained from methylated spirit contains acetate of methyl and also acetone.

Chloroform, if prepared with methylated spirit, may be recognised by the smell, which is different from that of chloroform obtained from pure alcohol; beside this, the discolouration with sulphuric acid takes place with chloroform as with ether made from methylated spirit.

Toxicology.

A CASE OF POISONING WITH THE RHUS TOXICODENDRON.*

THE following case is reported in the *Edinburgh Medical Journal* for February, by Dr. W. R. Sanders, one of the physicians to the Royal Infirmary of Edinburgh:—

The patient was a gardener, and admitted into the infirmary, under Dr. Sanders's care, on the 25th July, 1867. He was a strong, healthy man, twenty-six years of age. About three weeks before his admission he had been employed in gathering the shoots of the Rhus toxicodendron in a nursery garden, for the purpose of supplying a homœopathic druggist. He plucked off the young shoots, and in so doing his hand came in frequent contact with the juice of the plant. The juice, white and milky when fresh, became dark on exposure, and concreted on the palms and wrists, forming dark scales, which adhered so closely as to be with difficulty removed by rubbing off the superficial layer of cutiele. No inconvenience was felt at the time, but four days afterwards two blisters were noticed, each about the size of a threepenny piece, on the flexor surface of the right wrist. There was some redness around the vesications, but no pain. Four or five days subsequently, the other wrist became similarly affected, and about the same time the redness began to spread slowly up both forearms. On the seventeenth day from the time of exposure he was compelled to give up working in consequence of the swelling and stiffness of the forearms, accompanied by severe numbing and stinging pains. On the next day, July 25th, he was admitted into the infirmary. Dr. Sanders gives the following description of his condition at this time:—

"On examining the patient, I found the skin on the flexor surface of both forearms swollen, and of a florid red colour, like that of erysipelas; and the red surface was covered with small transparent vesicles, each about the size of a pin's head, closely set together. These vesicles resembled those of eczema, or the minute inflammatory vesications produced by the application of turpentine. Both forearms were considerably swollen, and felt stiff to the patient. Some of the black spots, formed by the dried acrid juice, were still seen on the palms of the hands and on the adjoining parts of the wrists. The skin of the (upper) arms was natural. The face, though less affected than the forearms, and not vesicated, was swollen and erythematous, the eyelids being puffy and partially closed. The trunk of the body was untouched, but the skin of the penis and scrotum was red, œdematous, and painful, and there were scattered spots of inflamed and slightly elevated skin on the inner surface of both thighs. The inflamed portions of skin were the seat of pain, sometimes of a numbing character, sometimes stinging like the irritation of nettles. The pain was worse at night, owing to the heat, but it was not severe anywhere, except in the forearms.

"It was remarkable that these symptoms were unaccompanied by constitutional disturbance; the pulse was quiet and the appetite good. The tongue was somewhat furred and dry, but this was owing to constipation, which was easily relieved. During the course of the following day (26th), the red patches extended up the arms, and also down the thighs as far as the knees, while some scattered spots appeared over the pubes. Next day (27th), the swelling and redness of both the face and arms were diminishing, and the vesicles on the forearms were drying up into scabs, but the erythematous eruption on the thighs continued to spread downwards to the legs, and upwards on the trunk of the body. On the 29th, at noon, the abdomen was found covered with irregularly-shaped patches of inflamed skin, which had extended from the pubes upwards, as far as the hypochondria. At the margins of the large patches there were numerous detached small reddish spots, like the eruption at the outset of measles, the larger patches resembling the continuous rash of scarlet fever. On the 31st, the redness had extended to the back, while anteriorly the skin, from the pubes to the clavicles, was marked with inflamed patches and spots, the region of the sternum alone being unaffected. The legs were almost entirely covered with eruption. There was no vesication on any of these parts. But while the eruption was thus spreading on the lower half of the body, the upper half was recovering. Thus, the forearms were now nearly well; the redness and swelling were gone, only a few small vesicles remaining on the backs of the hands and between the fingers. The face had nearly the natural appearance, very slight desquamation being observable.

"At evening visit, Doig complained of stiffness and rheumatic pains in the knees and elbows, but no swelling of the joints was present. These pains were ascribed by the patient to sitting up in a cold sideroom, and they were quite gone next day. Doig still presented no constitutional disturbance; with the exception of a tendency to constipation, all the functions were normal. On the 1st August, the eruption ceased to spread on the trunk, and soon began to fade. It had now completely disappeared on the face, arms, scrotum, and other parts first affected. There was very slight desquamation, the skin returning nearly to its natural state. On 2nd August, Doig left to go to the country, having been eight days in the infirmary."

This admirably reported case is a valuable addition to the records we already possess of the physiological action of Rhus. There is perhaps no form of disease in which, guided by the law of similars, the homœopathic physician has prescribed *Rhus* with greater confidence than in vesicular eruptions of an erysipelatous character. While in erysipelas of a non-vesicular type, where there is intense redness of the skin, with swelling, but no eczema, and sharp pyrexia, *belladonna* is the more exact similar. It is corrobative of the truth of the homœopathic law, that while valuable as are Rhus and Belladonna in the form of erysipelas, the like of which they respectively produce, they are valueless in that to which their physiological action is dissimilar.

* From *Monthly Homœopathic Review*.

Corner for Students.

The chemical formulæ employed in this section are based upon the new system of atomic weights, unless the use of the older system is specially indicated. In the *British Pharmacopœia* the symbols corresponding to those adopted here are printed in heavy Clarendon type.

QUESTIONS.

Liq. Calcis saccharatus, *B.P.*—1. Why is sugar used in the prepararation of this solution?

2. Give the number, with three decimal places, showing how many times stronger in lime this solution is than the simple lime water, Liquor Calcis, *B.P.*—*J. Y.*

Acidum Hydrochloricum, *B.P.*—State the weight of chlorine (in grains) contained in 10 fl. oz. of the officinal hydrochloric acid, sp. gr. 1·16; also the weight of sodic chloride, NaCl, required for its production.—*W.F.*

Volumetric Analysis.—1. What weight of crystallised ferrous sulphate, $FeSO_4.7H_2O$ will 972 grain measures of the "volumetric solution of bichromate of potash" oxidise?

2. A sample of diluted hydrocyanic acid weighing 140 grains, having been rendered alkaline by the addition of solution of soda, requires 778 grain measures of the "volumetric solution of nitrate of silver" to be added before a permanent precipitate begins to form. How much per cent. of real hydrocyanic acid does the sample contain?—*W.F.*

Ferrum redactum, *B.P.*—Calculate the theoretical yield (in grains, with three decimal places) of reduced iron in the officinal process, also the weight of hydrogen required for the reduction.

Specific Gravity.—1. A small flask is filled with water and the weight of the whole is found to be 814·2 grains. Several globules of gold amounting to 38·95 grains are dropped in, and of course, a certain quantity of water overflows. After carefully wiping the flask, and again weighing it, the weight of 851·15 grains is obtained. What is the sp. gr. of the gold?

2. A test-tube has a scale marked upon it, indicating grains of water, commencing about an inch from the bottom. Water is dropped into this tube until it exactly reaches the zero of the scale. A little rod of cadmium weighing 17·93 grains is now dropped into the tube, and the level of the water is thereby raised two grain-divisions. What is the sp. gr. of the cadmium?

ANSWERS.

Acidum Nitricum, *B.P.* (March, p. 158).—This preparation contains 70 per cent. by weight of nitric acid HNO_3, and may be regarded as a definite sesquihydrate represented by the formula $2HNO_3.3H_2O$, corresponding to the weight 180 (= acid 126 + water 54); for the proportion

$$180 : 100 :: 126 : x$$

gives 70. the indicated per-centage of HNO_3.

Answered correctly by *J. Gregory*, Stockton-on-Tees; *J. C. Kite*, Lincoln. From the discordant results obtained by our clever correspondents *W. F.*, *J. Young*, *A. Nicholls*, and *I. Tansley*, we conclude that the purport of our question was not expressed with sufficient clearness.

Alumen, *B.P.* (March, p. 158).—The weight of aluminium in one pound of crystallised ammonia alum is 424·476 grains, for, according to the symbolic formula, $NH_4Al(SO_4)_2.12H_2O$, 453·5 grains of the salt correspond to 27·5 grains of aluminium, and

$$453·5 : 7000 :: 27·5 : x;\ \therefore\ x = 424·476 \text{ grains.}$$

Answered correctly by *R. S. Crossby*, Grantham; *J. Gregory*, Stockton-on-Tees; *J. C. Kite*, Lincoln; *A. Nicholls*, Penzance; *J. Watts*, Attercliffe; *J. Young*, Leicester. An error in calculation has affected the decimal fraction in the result obtained by *W. F.* In *H. Habgood's* result there is an error of 27·4 grains.

Argenti Nitras, *B.P.* (March, p. 158).—The molecular weight of $AgNO_3$ is 170, and the weight of Ag is 108, consequently the weight of nitrate obtainable from 3 ounces of silver (1312·5 grains) may be found by the proportion

$$108 : 1312·5 :: 170 : x;\ \therefore\ x = 2065·972 \text{ grains.}$$

Answered correctly by *J. C. Kite*, Lincoln; *J. Watts*, Attercliffe; *J. Young*, Leicester: to the first place of decimals, by *J. Gregory*, Stockton-on-Tees; *A. Nicholls*, Penzance. *R. S. Crossby's* result is far from correct. *W. F.* has been misled by incorrect formulæ, and his answer involves a very large error.

Calcis Carbonas præcip., *B.P.* (March, p. 158).—The molecular weights of $CaCl_2$ and $CaCO_3$ are respectively 111 and 100; and as the weight of the former salt ordered in the officinal form is five ounces (2187·5 grains), the weight of the carbonate produced may be found by the proportion

$$111 : 2187·5 :: 100 : x;\ \therefore\ x = 1970·721 \text{ grains.}$$

Answered correctly by *W. F.*; *J. Young*, Leicester. *R. S. Crossby's* result shows a deficiency of about 90 grains; *J. Gregory's*, an excess of over 39 grains.

Hydrargyri Chlorina, *B.P.* (March, p. 158).—The percentages of mercury and chlorine in Hydrargyi Perchloridum, $HgCl_2$, and in Hydrargyri Subchloridum, HgCl, may be thus expressed—

	Hydrarg. Perchlor.	Hydrarg. Subchlor.
Mercury	73·801	84·926
Chlorine	26·199	15·074
	100·000	100·000

Answered correctly by *W. F.*; *J. Gregory*, Stockton-on-Tees; *H. Habgood*, Wells; *J. C. Kite*, Lincoln; *A. Nicholls*, Penzance; *J. Watt*, Attercliff; *J. Young*, Leicester; with approximate correctness, by *R. S. Crossby*, Grantham.

Specific Gravity (March, p. 158).—1. By the terms of the question the loss on immersion due to the wax is found to be 103·2 grains, and as the weight of the wax in air is 100 grains.

$$\therefore\ \frac{100}{103·2} = 0·969, \text{ sp. gr. of wax.}$$

2. The loss on immersion due to the ashwood is found to be 30·02 grains; the weight of the wood in air is 25·35 grs.,

$$\therefore\ \frac{25·35}{30·02} = 0·844, \text{ sp. gr. of ashwood.}$$

Both questions answered correctly by *R. S. Crossby*, Grantham; *W. F.*; *J. Gregory*, Stockton-on-Tees; *H. Habgood*, Wells; *W. Higginson*, Cork; *J. Robinson*, Chester-le-street; *J. Watts*, Attercliffe; *J. Young*, Leicester. The results obtained by *A. Nicholls* and *I. Tansley* are erroneous.

TO CORRESPONDENTS.

*** All questions forwarded to us for publication in this "Corner for Students" should be accompanied by the answers which the propounders believe to be correct. As a rule, numerical results should be worked out to three decimal places. Communications should reach us at least ten days before the date of publication.

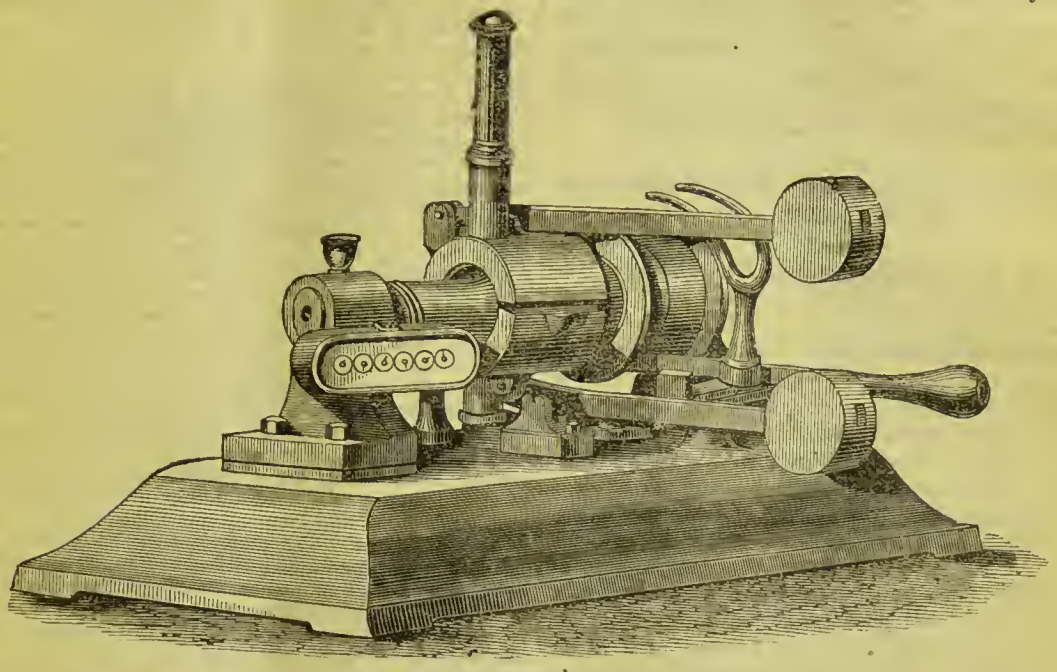
J. Y.—We have adopted your first question, but must direct your attention to the fact that the officinal lime water contains 11·2 grains of lime to the pint, not 11½ grains. The answer to your second question is defective, for lithium, cæsium, rubidium, thallium, barium, strontium, and calcium, have been overlooked. The solubilities upon which your third question is based do not accord with those given by the best authorities.

W. F.—Please forward the answers to your questions, in order that we may compare them with the results of our own calculations.

MECHANICAL OIL TESTER.

THE accompanying wood-cut represents an instrument introduced by Messrs. John Bailey and Co., of the Albion Brass Works, Salford, for testing lubricants. The invention is an interesting application of the great truth upon which the modern dynamical theory of heat is based, namely, that the mechanical energy wasted in overcoming friction is transformed into heat. In all machines there is a certain loss of power, that is to say, the work performed by a machine never represents the full mechanical equivalent of the power needed to drive it. That portion of the mechanical energy supplied to the machine which is wasted, so far as the performance of useful work is concerned, is expended in overcoming the passive resistances by which the motion of the machine is opposed; such, for instance, as friction between contiguous surfaces not moving with the same velocity. But whenever motion is produced in opposition to friction, heat is generated; the mechanical energy expended in overcoming the friction is lost to the purposes of the machine, but the heat evolved is its representative. On the other hand, heat is constantly producing motion, and when this motion is concentrated in a given solid body, and a definite direc-

tion is given to it, as in the steam-engine, heat becomes by far the most important artificial source of mechanical power that we possess. We may therefore say that heat and work are mutually convertible, heat being produced by the expenditure of mechanical work, and work being effected by the expenditure of heat. To reduce the friction in machines, and thus prevent the excessive waste of mechanical energy in the form of heat, lubricating substances are applied to the contiguous surfaces. The instrument under notice is intended to afford direct indications of the lubricating qualities of oils. The patentees, Messrs. Ingram and Staffers, knowing that the specific gravity of an oil is an untrustworthy indication of its lubricating value, wisely determined to construct a machine by means of which, this mechanical quality could be readily subjected to an adequate mechanical test, and they simply ask those who use their oil tester to admit the almost self-evident truth, that the best lubricating oil is that which allows the greatest number of revolutions to be performed by a shaft, with the lowest possible increase of the temperature of the bearings.



INGRAM AND STAFFERS' PATENT OIL TESTER.

The machine consists of a substantial bed-plate, with two strong pedestals supporting a shaft, which is driven by a pulley and strap. The number of revolutions made by the shaft are registered on the dial plate shown on the left of the figure. To produce the required amount of friction, two semi-cylindrical brass bearings are pressed against the shaft by means of weighted levers, and the temperature produced by the friction is indicated by a thermometer connected with the bearings. A loose pulley is placed beside the pulley which drives the shaft, so that by means of the strap-fork and handle, the motion of the shaft can be instantly arrested.

The relative values of oils are thus determined:—Suppose a sample, A, on the machine allows the temperature to rise to 200° while the shaft makes 10,000 revolutions, and another sample, B, allows the temperature to rise 200° in 7,500 revolutions, B has 25 per cent. less value than A. In addition to this direct test, the machine may be driven to a higher temperature to ascertain which oil produces the worst residuum.

Though this admirable contrivance scarcely falls within the sphere of investigation open to the majority of our readers, we are quite sure that the scientific chemists, oil-refiners, and merchants, included in the body of our supporters, will thank us for bringing it under their notice. By its aid new oils and various mixtures can be examined with reference to their lubricating quality at various speeds for light or heavy machinery. We should mention, that oils intended for heavy bearings should be tested by driving the machine slowly with the regulating weights at the ends of the levers, and that in testing those intended for quick machinery these conditions should be reversed.

SODA WATER CUPS AND TUMBLER HOLDERS.

The annexed cuts represent two articles introduced by Messrs. Dows, Clark, and Van Winkle, for serving soda-water. The moustache cup, which is made of white metal, heavily plated,

MOUSTACHE CUP.

TUMBLER HOLDER.

is intended to obviate the inconveniences attending rapid drinking, when the thirsty soul wears a luxurious moustache. The tumbler holder is also made of plated German silver, and is tastefully designed. Other patterns are adopted for these convenient articles.

BLUNDELL, SPENCE, AND CO.'S LINEN BLUE.

The new "blue" which Messrs. Blundell, Spence, and Co. have introduced for laundry purposes cannot fail to give

general satisfaction. It is formed into inch cubes, and the brilliancy and purity of its colour lead us to believe that it is composed of starch and ultramarine. If such be the case, we have here a striking illustration of the results of modern chemical industry. The pigment that at one time cost five guineas an ounce is now used for "blueing" our linen! However, the fact that Germany alone is at present producing annually about 1,000 tons of artificial ultramarine justifies our conjecture. We have placed the "blue" in the hands, or rather in the wash-tubs, of competent judges, and have received very favourable reports upon its qualities. It is said to impart a very delicate tint to linen, without spots or clouds, and to be a most manageable article.

BOURNE AND TAYLOR'S GLASS LACTOMETER, OR MILK TESTER.

With the aid of this handy instrument, a sample of the mixture commonly sold as milk can be tested in a minute, and the relative proportions of the milk and the water present approximately determined. The indications of this lactometer are based on specific gravity; in fact, the instrument is simply a well-constructed hydrometer, adapted for liquids of specific gravity between that of pure water and that of pure milk, or 1·00 and about 1·35. A strong glass testing-jar is supplied with the lactometer, and the latter is packed in a suitable case, The method of using the instrument is thus described by the makers:—"Fill the jar with the milk to be tried, allow it to cool to the temperature of 60 degrees (or the ordinary temperature out of doors on a mild day), then immerse the lactometer, and notice the mark on the scale that is level with the surface of the milk, which will show the quality." The mark M indicates pure milk; the figures 3, 2, and 1 indicate respectively mixtures of three parts milk with one part water, half milk and half water, and one part milk with three parts water; while the mark W represents pure water. Chemists and druggists, by bringing this simple instrument under the notice of their customers, may materially influence the flow from the cow with the iron tail.

RICHARDSON AND CO.'S NEW TOILET SOAPS.

Although the fanciful names given to the two varieties of toilet soap just introduced by Messrs. Richardson and Co. are of the "Lime Juice and Glycerine" stamp, and probably not intended to reveal their true composition, we can assure our readers that the "Alumine and Glycerine" and "New Milk and Glycerine" soaps are eligible compounds, nicely scented, of a good consistence, and pleasant to use. It may be perfectly true that "alumine is the most healthy and beneficial substance which has been employed," and that its combination with glycerine is strongly urged," but we can only say that "alumine" and "glycerine," as understood by Messrs. Richardson and Co., make a very good toilet soap, of a light yellow colour. It may be equally true that the delicately perfumed white soap, introduced as "New Milk and Glycerine" soap, is produced from "concentrated Milanese cream" and "glycerine," but we can only bear testimony to its good qualities, and confess that there are more things in the soap manufacture than are dreamt of in our philosophy.

Dr. Mayer, of Berlin, states that he has traced six cases of lead colic and paralysis to the use of leaden tobacco-boxes. M. Chevalier has also found that tobacco wrapped in lead foil becomes impregnated in the course of time with acetate of lead.

OUR LIBRARY TABLE.

The Ship Captain's Medical Guide. Compiled by Harry Leach, Resident Medical Officer Hospital-ship "Dreadnought;" Inspector of Limejuice for the Port of London. London: A. M. Walker, 75, Fleet-street. 1s.

This excellent compilation, intended for the use of masters and mates at sea, is issued "by authority," the Board of Trade having sanctioned it in the following words:—"Whereas it is provided by the 'Merchant Shipping Act, 1867,' as follows, viz.: The Board of Trade shall from time to time issue and cause to be published scales of medicine and medical stores, suitable for different ships and voyages, and shall also prepare or sanction a book or books, containing instructions for dispensing the same: The owners of every ship navigating between the United Kingdom and any place out of the same, shall provide and cause to be kept on board such ship a supply of medicines and medical stores, in accordance with the scale appropriate to the said ship, and also the said book, or one of the said books, containing instructions: Now, therefore, in pursuance of the powers vested in them by provisions above recited, the Board of Trade hereby sanction a Book of Instructions, for dispensing the medicines and medical stores provided and kept on board ship, intituled 'The Ship Captain's Medical Guide,' price one shilling, compiled by Harry Leach, resident medical officer of the 'Dreadnought' hospital-ship, and inspector of lime and lemon-juice, appointed by the Board of Trade for the port of London." The difficult task undertaken by Mr. Leach has been performed with consummate skill, the result being the most direct and practical guide to the treatment of common diseases and accidents that has yet been offered to the non-professional man. We are informed that the chapters that treat of accidents and surgical diseases are, for the most part, the work of Dr. H. T. L. Rooke, surgeon to the "Dreadnought," and that Dr. W. Dickson, R.N., has given valuable assistance in the revision of the book. The aim of the compilation is indicated in the closing paragraphs of the introductory chapter. "It is now a duty," says Mr. Leach, "to tell the reader that the following pages are written with the object of showing not only what to *do* in cases of accident and sickness, but what to *avoid*. Doctors have lately learnt much on this head, and will tell you that in the practice of their own profession, much harm may be done to the body by meddling and muddling. It is very important that this fact should be widely known, and so, acting thereupon, let the reader remember, and apply the following rules:—1. Follow out strictly all the recommendations enjoined in this book. 2. Do not take with you or use any medicines other than those inserted in the official scale. 3. When in doubt as to the nature of a disease, wait and watch. Struggle hard and actively to *prevent* disease, but when you are called upon to *cure*, adopt the directions given here, meagre as they may appear, and believe (as you may most assuredly do) that your own humble efforts to restore health and prolong life will receive safe and splendid backing from the wonderful hand of nature." The contents of the book are thus divided: General Remarks, Prevention of Disease, Accidents, Poisons, Diseases, Scale of Medicines, Directions for the Use of Medicines, Receipts for Medicines, Acts of Parliament, Forms of Certificates of Birth and Death. All directions are given in the plainest possible language, and, when necessary, illustrated with good wood-cuts. We can recommend the book as a guide for emigrants, travellers, and others who may find themselves beyond the reach of professional aid, and suggest that chemists and druggists in seaports provide themselves with copies for sale.

Dean's Trade Reference Catalogue. Seventh Edition. March, 1868. Dean and Son, Ludgate-hill.

As many of our country subscribers deal largely in stationery and fancy goods, we feel we ought to call their attention to the publication of this useful compilation, in which innumerable articles are described, priced, and illustrated. The

volume consists of 529 pages, exclusive of special advertisements, and its contents refer more or less directly to almost every trade.

Ice Cream Soda Water Apparatus. A pamphlet has just been issued by Messrs. Dows, Clark, and Van Winkle, of Great Wild-street, Lincoln's Inn-fields, giving directions for setting up and using the improved soda water apparatus which they are introducing, with many practical hints, and a useful collection of formulæ for preparing flavouring syrups.

FATAL EXPLOSION OF CHEMICALS AT NOTTINGHAM.

AT about a quarter to nine o'clock on Saturday night (April 4) a frightful explosion occurred in the shop of the Messrs. Fletcher, chemists and druggists, Melbourne-street, Mansfield-road, Nottingham, by which the errand boy was instantly killed, and several persons more or less injured. The windows of the shop were blown out, the counter and other fixtures much damaged, and most of the moveable articles literally smashed to pieces. At the moment of the explosion Messrs. Robert and Charles Fletcher, with their apprentice Allis, were engaged in attending to three customers—a Mrs. Levi, living near; Mr. Swan, traveller for the Carrington Brewery; and a woman who resided in Newcastle-street. The poor boy, Noble, whose shattered body was found in the ruins, was employed in grinding chlorate of potash in a mortar at the back part of the shop. Allis received a severe scalp wound; Mr. Swan was so seriously injured that he was removed at once to the hospital; Mrs. Levi and the other woman were much cut and bruised; while the Messrs. Fletcher had the good fortune to escape with but slight injuries. A man named Varney who happened to be passing the shop when the explosion occurred, was thrown down and badly wounded.

On Monday the 6th inst. an inquest was held on the body of Horatio Joseph Noble, the errand-boy, and as the circumstances attending the explosion are necessarily of the deepest interest to the readers of this journal, we give without abridgment the report of the proceedings printed in the *Nottingham Daily Guardian*:—

The Coroner (Mr. M. Browne) opened the inquiry soon after three o'clock. After the jury had viewed the body, which was frightly mangled and disfigured.

Mr. T. B. Fletcher was sworn. He deposed: I carry on business as a chemist and druggist in Melbourne-street, Mansfield-road. The deceased, Horatio Joseph Noble, who was 14 years of age, was in my employ as an errand boy. On Saturday evening, at about a quarter to nine o'clock, he was employed in powdering a preparation called chlorate of potash, which is used for the purpose of making "red fire." There had been nothing mixed with it at that time; but the other ingredients were standing by. The boy had nothing to do with them.

Coroner: What were the ingredients? Tell us the whole of them.

Witness: They were sulphur, nitrate of strontia, ammonia, (antimony ?), and chlorate of potash.

Coroner: Did you give the deceased any directions as to how he was to proceed?

Witness: Simply to powder the chlorate of potash. That was all he had to do.

Coroner: There would be no danger at all in making the chlorate of potash into a powder?

Witness: None whatever.

Coroner: That is, when alone?

Witness: Just so. He had nothing to do with the other articles.

Coroner: Do you know whether he put any of the other ingredients into the potash?

Witness: I do not. My directions to him were simply to powder the chlorate of potash.

Coroner: How long had he been at work at it?

Witness: Ten or fifteen minutes.

Coroner: I believe you were in the shop when the explosion took place. What have you got to say about that?

Witness: I had left him to powder the chlorate of potash at the back part of the shop, and gone to the front to wait upon a customer, who had come in.

Coroner: I suppose the explosion was a very violent one?

Witness: It was.

Coroner: What became of the lad? Did you see what became of him?

Witness: I did not.

Coroner: Then what became of you?

Witness: My first effort was to take care of my children, who were at the back part of the premises.

Coroner: I suppose the shop was then pretty nearly destroyed?

Witness: Almost wholly destroyed.

Coroner: Did you see the lad afterwards?

Witness: Yes; I saw his body shortly afterwards at this inn, where it now lies.

Coroner: Were there other persons in the shop at the time the explosion took place?

Witness: Yes; there were five or six others beside the boy.

Coroner: Then, were any of them seriously hurt?

Witness: No, not seriously.

Coroner: Was the chlorate of potash in a mortar?

Witness: It was.

Coroner: Had the boy been set to do this work before?

Witness: He had, upon several occasions.

Coroner: Then I presume that he was acquainted with the different ingredients which were to be mixed together?

Witness: Yes; he was fully acquainted with them.

Coroner: Had you ever mentioned to him the danger of mixing the chlorate of potash with the other ingredients?

Witness: I do not recollect having done so; but he had nothing whatever to do with the mixing of the ingredients.

Coroner: If you were to grind chlorate of potash and sulphur together, an explosion would take place.

Witness: I am fully aware of that. The ingredients which I have mentioned had been mixed several times before. He had prepared the potash; but I had always mixed the ingredients. I had been standing close by him all the time he was powdering until I went to the other end of the shop to attend to a customer. There must have been something put into the potash, otherwise no explosion could possibly have taken place. The sulphur was standing close by at the time. The ingredients which I have mentioned, when mixed together, would have fired, but there would have been no explosion.

Coroner: Then I suppose you cannot imagine any other way in which the explosion could have taken place than by his having put some sulphur into the potash?

Witness: I cannot.

Coroner: No doubt he knew that in the end all the ingredients would be mixed together.

Witness: Of course he did.

Coroner: What quantity of potash was there?

Witness: One pound and three quarters.

Coroner: Then I suppose the explosion must have been very great?

Witness: It was very great. The shop-front was blown out; a large number of the bottles were broken, and also part of the furniture above.

Coroner: In what would consist the danger of using chlorate of potash and sulphur together?

Witness: The slightest friction would cause an explosion.

By a Juryman: The sulphur had not been taken out of the drawer at the time. It had not been weighed. But the drawer was standing near.

Mr. Charles Fletcher, brother of the last witness, was next examined. He said: I am a chemist and druggist, and junior partner with my brother. I was in the shop on Saturday night when the explosion took place. The deceased was at the back part of the shop, engaged in powdering chlorate of potash. His job was likely to take about a quarter of an hour. I believe he had assisted to make the mixture almost every time we made it. He powdered while we put in the other articles. I am not aware that he was ever allowed to put the ingredients together himself. The greater part of the ingredients were standing close by,

and I have no doubt that deceased knew the sulphur would have to be mixed with the other ingredients. The preparation had been made for the use of the Circus. I knew the great danger of mixing the sulphur and the potash together in the mortar. I did not see deceased put anything into the mortar; nor did I see what became of him after the explosion, which was very violent. I made the best of my way round the counter and out of the shop, when I fell down, and some one carried me across to Mr. Bacon's. I have not seen the lad since. There has always been one of us to superintend the preparing of this mixture: the lad was not allowed to prepare it himself.

A Juryman: Was this mixture what is called "Greek Fire?"

Witness: Oh, no.

A Juryman: Had you heard the boy warned?

Witness: I had not warned him, because I know that he had never been allowed to mix the articles.

A Juryman: What was the most likely thing he could have done to cause the explosion?

Witness: If he had put a small quantity of sulphur in, and then used friction, the explosion must have taken place.

By the Coroner: I can't say that I know of anything else that would cause an explosion in the same way.

John Frost, plasterer, deposed: On Saturday night I was at my club in the Mansfield Arms, next door but one to Mr. Fletcher's. I heard the explosion, and came out to enquire into the cause. I saw a gentleman come out of Mr. Fletcher's shop. On reaching the door he fell. I heard a young lady squealing, and I pulled her out. I next heard Mr. Fletcher call out for his children, and I went into the kitchen, which was full of smoke, but I found nobody. I then returned to the shop, and found the body of the lad lying by the side of the counter. I think he moved after I first saw him. I dragged him into the middle of the floor. I then had a light. I asked a policeman to come in and assist me, but I had been there ten minutes with the body before any one came. When the policeman did come, he assisted me to get the body out. We brought it to this inn (the Peacock). One of the deceased's hands was blown off, and the wrist was also broken. There were hundreds of persons round about, but no one was willing to enter. I can't tell how the explosion took place. There had been a great deal of damage done in the shop.

The Coroner said he felt much obliged to the witness for his courage in going into the shop at a time when, it appeared, no other person would.

Sergeant Billington, of the Borough Police, said: I was at the bottom of Parliament-street about nine o'clock, when I heard the explosion. I immediately came up, and, upon going to the premises, I was informed that there were some persons in the back part of the house. Persons were then endeavouring to get the servant out. I went up the staircase to assist, but met Mr. Fletcher, who said that all his family were out. I next went into the shop, when the last witness called my attention to the body of the deceased, and I assisted in bringing it to this house. The right hand was blown off, and the face greatly disfigured. I made a search this morning, and found the missing hand among the *debris* upon the premises.

Joseph Noble, joiner, of Arnold-place, Sherwood-street, examined: The deceased was my son. He had been in Mr. Fletcher's employ about two years. He was fourteen years old. His name was Horatio Joseph Noble.

This was the whole of the evidence.

The Coroner then briefly addressed the jury. He said that, judging from the evidence, the case did not present any difficulty. The facts were clear. There could be no doubt that the explosion had resulted from the mixing together of some of the ingredients which had been mentioned. It appeared that the boy was employed in powdering the chlorate of potash, and that, if no other ingredient had been mixed with it, the explosion could not possibly have taken place. Under these circumstances, he did not see that the Messrs. Fletcher were in any way to blame; for, knowing what would be the effect of mixing the sulphur with the chlorate of potash, they would not be such fools as to have allowed the deceased to mix the ingredients; in fact, this was no part of his duty. But, the sulphur being close by, the probability was that he had taken a little and put it in among the chlorate of potash. Nothing was more simple; and, indeed, this appeared to be the only way of accounting for the explosion. The consequences had been most distressing, the shop and its contents having been seriously damaged, and the poor boy having lost his life.

Two or three of the jurymen at once said they agreed with the Coroner, as the explosion could not be accounted for in any other way.

The Coroner observed that a preparation had been made for neutralising the explosive properties of gunpowder. By using it, although gunpowder would burn, it would not explode, even if a red-hot poker were applied.

The jury then returned a verdict of "Accidental Death."

A Juryman remarked that it seemed probable a similar occurrence might take place any day, if the present system was to be continued.

The Coroner: But how are you to prevent it?

A Jurymen: Well; I don't know that; but there appears to be great danger to all persons who live near to chemists and druggists.

The Coroner: You know that druggists sell a great many things that are dangerous; but what can be done? The only thing is, that the druggists themselves ought to be as careful as possible.

The verdict of the jury was then duly recorded.

SHEFFIELD ASSOCIATION OF CHEMISTS AND DRUGGISTS.*

The monthly meeting of this Association was held on Wednesday evening, the 11th ult., in the Cutlers' Hall, on which occasion Mr. G. Harrison, M.P.S., delivered a lecture on *Iron and its Compounds*. The chair was occupied by Mr. W. Ward, President, and there was a fair attendance of members.

The lecturer first referred to the principal varieties of iron ore, and the localities where they were found, and then explained the different modes of manufacture, conveying to his hearers, by the aid of the diagrams exhibited, much practical information. He stated that the abundant mineral, carbonate of iron, was found in solution in many natural waters, sometimes to the extent of one grain in a pint, and that the decomposition of this salt on exposure to the air caused the reddish deposit of ferric hydrate so characteristic of chalybeate springs. Many interesting experiments were made, showing the different modes of making those compounds more directly under the supervision of the dispensing and retail chemist. In alluding to the saccharated carbonate of iron, he said the use of sugar was to prevent the oxidising action of the atmosphere. Sugar was employed in the preparation of compound mixture of iron for the same reason. Hydrated peroxide of iron in the moist state, when kept for some months, even though covered with water, underwent a change of composition. In poisoning by arsenic, the freshly precipitated and moist peroxide was the safest antidote, and it would be well every month or so to dissolve the same in hydrochloric acid, and re-precipitate by ammonia. In concluding his lecture, Mr. Harrison said:—

"Having thus hastily glanced at the modes of making iron, at the impurities and their influence upon the metal, together with the chemistry of iron, I hope we are in a position to ask and answer the question—what is the advantage of chemistry in all these stages? If we ask the physician, he will tell us that certain diseases arise from deficiency of iron in the blood, and that a cure will depend upon his supplying that deficiency, and he will choose that preparation of iron best adapted to his purpose. If we ask the surgeon, he will tell us that in cases of poisoning by arsenic, he has a certain antidote in the moist hydrated peroxide of iron, and administers it with confidence. Is chemistry of any advantage to the roaster or smelter? It shows the one that if he does not calcine carefully, sulphur will be present with a hard and awkward residue, which will cause difficulties in the furnace; the other, that if coal or coke be used, lime must be in excess to carry off sulphur and silicon. And what advantage is it to steel makers? I can only answer that those of the most scientific principles have gained the highest reputation and the largest fortunes. And, lastly, what ad-

* Communicated by the Hon. Secretary.

vantage is it to the chemist and druggist? By it he can prepare his own saccharated carbonate of iron, iodide of iron, and more particularly the antidote for arsenic—compounds whose efficacy depends upon their having been recently made. Therefore, chemistry must be pronounced the soul of every stage of the iron manufacture."

The painted diagrams and the specimens of ores and chemical preparations were minutely examined after the lecture, and a vote of thanks was accorded to Mr. Harrison for his able elucidation of so practical a subject.

CHEMICAL SOCIETY.

ANNIVERSARY MEETING, MARCH 30.

Dr. Warren de la Rue, F.R.S., President, in the Chair.

THE proceedings commenced with the reading of the President's report, in which the chemical work of the year was succinctly noticed. The report included obituary notices of Professor Faraday, Dr. Daubeney, Messrs. Wm. Herapath, Robert Warington (sen.), Walter Crum, W. Gossage, John Tennent, Alfred Noble, and William Windsor, late Fellows of the Society; Dr. Thomas Clark, who was long connected with the Society; and Professor Pelouze, an eminent foreign member.

The Treasurer then presented his balance-sheet, according to which there was at the present time a balance of £637 1s. 11d. at the bank, in addition to £2,347 18s. 10d. invested in Government consols.

The following officers were then elected:—

President—Warren de la Rue, Ph.D., F.R.S.

Vice-Presidents who have filled the office of President—Sir B. C. Brodie, F.R.S.; Thomas Graham, F.R.S.; A. W. Hofmann, LL.D., F.R.S.; W. A. Miller, M.D., F.R.S.; Lyon Playfair, Ph.D., C.B., F.R.S.; A. W. Williamson, Ph.D., F.R.S.; Colonel Philip Yorke, F.R.S.

Vice-Presidents—E. Frankland, Ph.D., F.R.S.; J. H. Gilbert, Ph.D., F.R.S.; J. H. Gladstone, Ph.D., F.R.S.; John Stenhouse, LL.D., F.R.S.

Secretaries—William Odling, M.B., F.R.S.; A. Vernon Harcourt, M.A.

Foreign Secretary—F. A. Abel, F.R.S.

Treasurer—Theophilus Redwood, Ph.D.

Other Members of Council—E. Atkinson, Ph.D.; F. Crace Calvert, F.R.S.; J. Lothian Bell; Dugald Campbell; W. Crookes, F.R.S.; David Forbes, F.R.S.; G. C. Foster; A. Matthiessen, Ph.D., F.R.S.; E. J. Mills, D.Sc.; H. M. Noad, F.R.S.; W. H. Perkin, F.R.S.; J. Williams.

A vote of thanks to the President, proposed by Mr. E. T. Chapman, and seconded by Mr. Tennant, was carried by acclamation, and acknowledged by Dr. De la Rue with characteristic modesty and geniality.

Votes of thanks were also accorded to the retiring members of the Council, to the officers, and to Mr. Watts, the editor of the Journal.

ORDINARY MEETING, APRIL 2.

Dr. Warren de la Rue, F.R.S., President, in the Chair.

The following candidates for Fellowship were balloted for and duly elected:—John Tyndall, LL.D., F.R.S., Royal Institution, London; Frederic Guthrie, Ph.D., F.R.S.E., Royal College of Mauritius; William Brantingham Giles, Liverpool.

The papers read were *On the Constitution of Glyoxylic Acid*, by Messrs. W. H. Perkin and B. F. Duppa; *On a Glyoxalic Amide*, by Dr. Odling; *On the Occurrence of Organic Appearances in Colloid Silica obtained by Dialysis*, by Mr. W. Chandler Roberts; *On the Solubility of Xanthin in Dilute Hydrochloric Acid*, by Dr. H. Bence Jones; and *On Cornwallite*, by Professor Church.

A discussion of the theoretical views held respecting the constitution of glyoxylic acid, by Dr. Odling and Mr. Perkin, was followed with much interest by the Fellows present.

BANKRUPTCY.

IN RE H. A. LADBURY.

AN adjourned meeting for last examination and discharge of this bankrupt, a chemist's assistant, residing at Newport, Salop, was held before Mr. Commissioner Sanders, at Birmingham, on the 30th ult. Mr. Hodgson attended for the assignee, and Mr. Griffin for the bankrupt. The deficiency of bankrupt was put down at £362 3s. 3d. The order of discharge was not opposed, but it was agreed that certain costs should be submitted to taxation. Bankrupt received his discharge.

IN RE PRUST AND JOHNS, CARDIFF, CHEMISTS AND DRUGGISTS.

The sitting for adjourned last examination and discharge of these bankrupts was held on the 18th of February, before Mr. Commissioner Hill, at Bristol. The report was prepared for our last number, and we only insert it now on account of the proper reprimand given to the bankrupts by his Honour. Mr. Norris appeared for the assignees, and Mr. J. Inskip for the bankrupts. Mr. Norris opposed the allowance of an order of discharge on the grounds that the bankrupts had traded with fictitious capital, and that they had contracted debts within three months preceding their bankruptcy, without reasonable or probable expectation of payment. From an examination of the bankrupt Prust, it appeared that he and his partner Johns purchased the business of a Mr. Whitehorne in December, 1865, at which time they borrowed £100 each of their respective fathers. In July, 1867, Messrs. Colthurst and Harding, of Bristol, were pressing for payment of a debt due to them, and the bankrupts then gave a bill of sale to their fathers for £350. This was done, according to the bankrupts' statement, on the advice of Mr. J. D. Thomas, who prepared the bill of sale. He (bankrupt) was not aware that it would make any difference in giving the bill of sale for a larger amount than the debt which was due. The bill of sale was not read over to him. He read over the latter part of it himself, but not the part in which it stated that he owed his father £350. After purchasing the business of Mr. Whitehorne, they (the bankrupts) had no capital left. They had borrowed money of a loan society, of which a Mr. W. H. Davis was secretary, and the repayments were entered in the accounts as "for goods in trade." This was an error. The accounts were prepared by an accountant, and forwarded to him for signature. He did not read them through, but might have seen one or two of these entries, and did not think it made any difference calling the money paid to Davis as "for goods in his trade." The bankrupt admitted that when he and his partner offered a composition, the names of Messrs. Barrett and Hill and others were put down as creditors, who were not in reality creditors. Mr. J. D. Thomas advised that it should be done, and it was done. His Honour expressed an opinion that the charge of trading on fictitious capital was not established, and also that the bankrupts were not brought within the statute as to the other ground of obtaining goods without reasonable or probable expectation of payment. At the same time he should think an indictment for conspiracy against the bankrupts' fathers and sons might have some chance; but the assignees did not seem inclined to take that course. Mr. Norris said that after the intimation thrown out by his Honour he would not pursue the case. The bankrupts were then directed to stand forward, when his Honour addressed them as follows:—"Bankrupts, you appear to the Court to have taken a most dishonourable and dishonest course in your trading, and that you well deserve punishment; but I believe that you have not brought yourselves within the penalties of the law. That is rather the fault of the law than of yourselves. I think your conduct has been bad enough. However, I am compelled to give you your order of discharge, knowing and feeling very strongly that you do not deserve it. Take your order of discharge, and go about your business.

IN RE N. JENNINGS, ARSENIC MANUFACTURER.

An adjourned sitting for last examination and discharge of this bankrupt, who carried on the business of arsenic manufacturer, at Swansea, was held on the 6th inst., before Mr. Commissioner Hill. Mr. Press appeared for the assignees, and Mr. Beckingham for the bankrupt. Mr. Press said the bankrupt had been ordered to file further accounts. The case had been adjourned from time to time, on representations that bankrupt was suffering from ill-health, and these adjournments had been consented to, without pressing for costs. They were now there again at an adjourned meeting,

and no accounts had been filed, and bankrupt was not present. He had only to ask that the case might be adjourned *sine die*. Mr. Beckingham said the bankrupt's illness was genuine. He had received a telegram, requesting him to ask that the case might stand over till the Tuesday, but there had been so many adjournments that he felt some delicacy in asking for any further indulgence. His Honour thought the assignees were in a position to call upon the Court to give judgment. Mr. Press was willing to leave the case in the hands of the Court. His Honour thought it might be the best way to say that he would give judgment on the morrow; if any circumstance should occur then to alter the intended judgment, the judgment would be altered. If the bankrupt came, and gave a satisfactory reason for his absence, and the absence of his accounts, he may have further time granted; but it must be clearly understood that his attendance would not necessarily protect him from an adjournment *sine die*. On the following day, the 7th inst., bankrupt not appearing, the usual form of non-surrender was, on the application of Mr. Inskip, for the assignees, ordered to be placed on the file.

LAW AND POLICE.

CHARGE OF ROBBING A CHEMIST AND DRUGGIST.

At the Clerkenwell Police Court, on the 8th inst., Robert Heath, the proprietor of the Express Coffee-house, King's Cross, was finally brought up, on the charge of robbing Mr. Fielders, a chemist and druggist, of Southampton. When the case first came before the magistrate, about a fortnight ago,

Mr. Francis Frederick Fielders said: I am now an in-patient of the University College Hospital, and am a chemist and druggist. On Monday, the 2nd of March, I arrived in London from Liverpool, and was told by the police that the prisoner's coffee-house was a very respectable one, and accordingly I went there. I asked the prisoner to take care of my carpet bag, which contained a cash-box with £110 in gold, silver, and two Bank of England notes for £5 each, and some of my clothes. I did not say to the prisoner that there was any money in the carpet-bag. I went to bed, and did not recollect anything till I awoke and found myself in the University College Hospital, where I have remained ever since. When I left the bag and cash-box both were locked, but when they were brought to me by my father the carpet-bag was done up with straps, and the cash-box had been forced open.

The solicitor who defended the prisoner cross-examined the prosecutor at great length, but without eliciting anything to the advantage of his client; and after hearing other witnesses Mr. Cooke remarked that nobody had shown how the prosecutor got from the coffee-shop to the hospital. Upon this the prisoner's solicitor said the complainant had stayed at the coffee-house from Monday, the 2nd, till the 9th, and had his meals regularly. He was then, as the prisoner supposed, taken in a fit, and a medical gentleman, having been called in, ordered his removal to the hospital.

On the 2nd inst., when the inquiry was resumed, some important evidence was given against the prisoner.

Alfred Ahle, a cab driver, said: about a month ago, as I was driving past the prisoner's coffee-house in Weston-place, opposite the Great Northern Railway, I was called by a man, and I pulled up. I went with the man to an ironmonger's, and came back and pulled up at a public-house, called the Salisbury Arms, two doors from the prisoner's house. The man got out and went into the prisoner's house, and came back with a cash-box under his coat, and I was ordered to drive to the ironmonger's again, and I waited there for more than half an hour. The man came out of the shop and ordered me back to the public-house, and when we reached there the prisoner was standing at his door. The man went inside the prisoner's shop, followed by the prisoner, and after staying about ten minutes the man that engaged me came out with another man, and when they had got about twenty yards the prisoner came out and joined them. They all went into the public-house, and then the man that engaged me said to the prisoner, "I know this man; it is all right; pay him well." The prisoner gave me 8s.

George Hale, of Stanmore-street, Caledonian-road, said: I am foreman to Mr. George Moore, of 104, Euston-road, an ironmongor. On Tuesday, the 25th of February, I believe it was, as I returned from dinner, I saw a man in the shop, and Miss Moore was trying to fit a key to a cash-box. I tried to open it with some picks, but I could not do so, and then I "sweated" the box (unsoldered it). When the box was opened I saw a quantity of papers, and the man put his hand into the box, turned up the money, which I saw was gold, and said, "There is only about £30 or £40." I saw a cab waiting at the door for about an hour, and the man when he went away got on the box of the cab. Before he went away he had the lock of the box resoldered, and a key fitted to it. When he went away he left a letter and a statement of accounts relating to a druggist and chemist's journal, but he afterwards came and fetched that away.

This witness identified the prosecutor's cash-box as the one he had "sweated."

At the last hearing of the case, on the 8th inst., Mr. John Wakeling appeared for the prosecution, and Mr. Ricketts for the defence.

Mr. Fielders, who still appeared ill, said: I came to London on the 20th of February. I had sold my business in Southampton for £120. When I arrived at the Waterloo Station I took a cab, and went to the prisoner's coffee-house, and slept there one night. I went there with my carpet-bag, containing a cash-box. I left the bag and cash-box with the prisoner, and the next day went to Liverpool, leaving the bag and box with him. He put the carpet-bag in a cupboard. I returned to the prisoner's house on the 2nd of March. I arrived in the evening, and after having some supper I went to bed. I remember the prisoner saying that a woman had died in his house. That was on the 7th. The prisoner said he was going to an inquest, and I could come with him if I pleased. I went, and afterwards had something to drink with him. The next day I felt very ill, and I remember nothing more till I found myself in the University College Hospital.

Cross-examined by Mr. Ricketts.—I do not recollect what I said on the first examination when I was here. I might have said that I came to London on the 2nd of March, and that I had never been in London before. The money was left me by my mother. I recollect saying that the money was the proceeds of the sale of my business at Southampton. I was paid in gold, and two notes. I am quite certain that I did not tell the prisoner there was money in the cash-box. On the 20th of February there was about £110 in the cash-box. I went to Liverpool to take a business, but I could not see one that suited me. I went to an agent and treated for the purchase of a business. (A letter had been received by Mr. Cooke, from a Mr. T. Trippier, medical transfer agent, of Islington, Liverpool, which stated that the complainant had purchased a business of him for £110, that he paid £10 deposit, and was to have paid another £10 on Saturday, the 29th of February, and give a bill of sale for the balance; but that the deposit money became forfeited, he being unable to find the money on the day fixed for completion, or to pay the charges for preparing the bill of sale. The letter further stated that the complainant was so short of cash that the writer had to lend him £3 to come to London with. (The letter was handed to the solicitors in the case.) I am sure that I did not treat for the purchase of a business. I went to Liverpool on the 21st of February, and came back on the 2nd of March, and I am sure that I did not take a business or pay a deposit for one. I remember now that I paid to a Mr. Trippier a deposit of £4. Upon my oath I did not pay him £10. I was sober when I met Mr. Trippier at Liverpool. I did not agree to give a bill of sale for the balance of the purchase-money. I told Mr. Trippier that I had no other resources but what I expected to get from the profits of the business. I told him I had no other moneys. I proposed to pay the purchase-money of the business by instalments. On the 2nd of March I did not tell Mr. Trippier that I could not get the money, that I could not complete the purchase, and borrow £3 of him to come to London with. I swear that I never borrowed a farthing of him. I did not say a word to him about being robbed of my money and carpet-bag. When I returned to London I cannot say how much money I had. I did not get drunk at Liverpool. I last saw my money safe at Southampton. I was taken ill on the 9th and during that week I asked the prisoner if the bag was al

right, and he said "Yes." I do not recollect whether I asked the cabman that drove me from Waterloo to the prisoner's to stop to supper with me. On the 3rd of March I do not recollect going to a public supper with the prisoner. I remember saying that I took the bag and money with me to bed, but that is not a fact. That statement was untrue. I remember saying that I saw my money safe last at Liverpool, and that was also untrue. I had a fit at Southampton for three or four days, but whether that was brought on by delirium tremens or not I cannot say. I know that I have been suffering lately from delirium tremens, and yet I say that I am not a man that is given to drink.

After some further evidence by a police-sergeant which told against the prisoner,

Mr. Wakeling said that was the case for the prosecution, and asked the magistrate to send the case for trial.

Mr. Ricketts, for the prisoner, said he should reserve the prisoner's defence for the present, as he presumed a *primâ facie* case had been made out for further inquiry.

Mr. Cooke, having cautioned the prisoner, asked him if he had anything to say in answer to the charge.

The Prisoner: I am not guilty.

Mr. Ricketts applied that bail might be taken for the prisoner's appearance.

Mr. Cooke said he must refuse bail, and committed the prisoner to the Middlesex Sessions for trial.

ROBBERY BY AN ERRAND BOY.

An errand boy named Bowdler, in the employ of Mr. Moses, chemist, of Dudley, was brought before the Wolverhampton magistrates, on the 28th inst., charged with having robbed his employer of £6. The boy having been charged with the offence, admitted the robbery, and disclosed the spot where £5 17s. was concealed. The prosecutor having recovered this sum, did not wish to press the charge, on account of the culprit being a fatherless boy. The magistrate, however, sentenced prisoner to one month's imprisonment.

STEALING GAS TAR.

At the Warwickshire Quarter Sessions, on the 8th inst., James Dunn and John Douglass were brought up before W. Dickens, Esq., chairman, to receive sentence; the former prisoner for having stolen three tons of gas tar at Aston, on the 14th ult., the property of the Birmingham Creosote and Naphtha Company, and Douglass for having received the same, knowing it to have been stolen. Douglass was sentenced to four months, and Dunn to three months' hard labour.

UTTERING A FORGED CHEQUE.

On the 2nd inst., Robert Samuel Mathews, *alias* Larkman, living at 27, Robert-street, Hoxton, and Henry Spriggs, his brother-in-law, were charged before Alderman Causton, at the Guildhall, with uttering a forged cheque for £160, with intent to defraud the London and Westminster Bank. On Monday, the 16th of March last, the two prisoners walked down together from Finsbury-square to the London and Westminster Bank, when Mathews went into the bank leaving Spriggs outside. He presented a cheque for £160 purporting to be signed by Mr. Charles Harvey, of the firm of Barron and Harveys, No. 6 Giltspur-street. The cashier asked what he would have for it, and he replied, "What will I have for it? why £160 to be sure." The cashier then explained to him that what he meant was whether he would have it in notes or gold, and he said he would take two £10 notes, one £5 note, and the rest in gold. Suspecting from his manner that all was not right, the cashier communicated with the manager, Mr. Higley, who refused to let the cheque be paid on that signature. Mr. Rogers, the cashier, asked the prisoner where he brought the cheque from, and he said from Messrs. Burgoyne and Co., of Coleman-street, wholesale druggists, Mr. Higley then told him to accompany Mathews to Messrs. Burgoyne's. He put on his hat with that intention, but when they got to the door the prisoner Mathews said he did not come from Burgoyne and Co.'s, but from Maw and Sons, in Aldersgate-street. Mathews was then taken into the manager's room and remained there while Mr. Rogers went to Maw and Sons. When he came back he told the prisoner that Mr. Lynch, the managing man of the firm, disclaimed all knowledge of the prisoner or the cheque, or the man named Scott, from whom the prisoner said he got the cheque. Mr. Higley then sent to the Old Jewry for detective Sergeant Spittle, who came and took the case in hand. The prisoner stated to him that he met a man in Aldersgate-street about three o'clock that afternoon, who asked him to oblige him by getting the cheque cashed. At first he refused, but afterwards, when pressed, consented. Detective Sergeant Funnell then came in, when the prisoner said he was to go back with the money to Maw and Sons, and go up the principal entrance to see the man who gave him the cheque. They all went there and saw every man in Messrs. Maw's establishment, but he did not recognise any one there as the man he had referred to. Then they went to Messrs. Barron and Harveys, but he could not recognise any one there as the person who gave him the cheque. They then took him to the station-house, and charged him with attempting to defraud the London and Westminster Bank of £160. In the meantime the prisoner Spriggs was watched by two officers who had seen the two prisoners walking from Finsbury-square, and having suspicion of them followed them to the London and Westminster Bank, where Mathews went in. Then they watched Spriggs for about three-quarters of an hour, when he left Lothbury, and went first to a public-house and afterwards to his lodgings. They subsequently apprehended Spriggs on the charge of being concerned with Mathews in attempting to pass the cheque. Alderman Causton committed the prisoners for trial.

GOSSIP.

Mr. W. Canning, who for the last two years has been connected with this journal as publisher, has commenced business as advertising and transfer agent, and valuer. Having had twenty years' experience as a chemist and druggist, he can offer his services as a referee or valuer with confidence. He has taken offices at 49, King William-street, City.

The Bolton Infirmary and Dispensary has become entitled to £500, under the will of an old man named James Stansfield, a "warper," who died a few days since, aged eighty-four.

Dr. Grey, a medical practitioner, aged thirty-five, a native of Scotland, recently poisoned himself at Molesworth, Canada, by taking a large dose of tincture of digitalis. He was of intemperate habits.

Cholera is still raging at Monte Video. It has diminished in Buenos Ayres, and disappeared from St. Thomas.

An old woman, aged seventy-six, of Birmingham, has been committed for trial on a charge of attempting to administer a noxious drug for the purpose of procuring abortion. Dr. Hill, the borough analyst, stated that the liquid contained a vegetable ingredient of a poisonous nature, which if taken in considerable quantity was calculated to produce miscarriage.

A man named James Hudson, residing at Silverdale, died from the effects of having taken an overdose of cough mixture, which is supposed, to have contained a large quantity of laudanum. An inquest was held on the deceased, on the 25th, ult. when the jury considered, that an overdose of the mixture had been taken, and returned a verdict accordingly.

Mr. Richard, Ferris, for many years an active member of the well-known firm of Ferris, Score, and Co., of Union-street, Bristol, died on the 30th, ult. at his residence Lansdowne Parade, Cheltenham. Deceased was much respected for his benevolence of disposition, and his universal geniality, gained for him, the loving esteem and respect of many friends. His age was 76.

The death is announced of Dr. John Elliotson, aged seventy-four. The deceased was a graduate of Cambridge, in which university he took his degree of doctor of medicine in 1821. He studied also at St Thomas's Hospital under Mr. Cline and Sir Astley Cooper, and succeeded Dr. Currey as physician to that institution in 1822. This office he resigned in 1834. When the hospital of University College was established he was appointed Professor of Medical Science in the college. This appointment he held till 1838, when he resigned in consequence of the opposition raised to his system of mesmeric treatment of cases in that hospital Thackeray dedicated one of his novels to Dr. Elliotson, and

is supposed to have drawn his "Dr. Goodenough" from the kind-hearted and eccentric physician.

At an influential meeting of Traders, held at the London Tavern, presided over by Mr. S. Morley, resolutions were proposed disapproving of clause 15 of the Railway Regulations Bill, which does not admit of small parcels being sent in bales, and a memorial to the Board of Trade and a petition to the House of Lords praying that it may not become law was passed.

The Admiralty contract for 320 tons Linseed Oil has been taken by Messrs. Pinchin and Johnson, but the price has not transpired.

Mr. Henry B. Brady, pharmaceutical chemist, has removed to a handsome new building, 29, Mosley-street, Newcastle-upon-Tyne, opposite his former premises.

The Guardians of the parish of Birmingham, at their meeting held on the 9th inst., entertained the question of the supply of drugs for the ensuing twelve months. There were four tenders: Banks and Richards, High-street, gross total £33. 6s. 10½d.; Walter Robert Jones, Jamaica-row, Smithfield, (total not carried out); Richard James Humphreys, 43, Bull-stroet, £28 14s. 1d.; Philip Harris and Co., Bull Ring, £37 13s. 2d. It was decided that the lowest tender for any article should be accepted, but if the quotations given were the same, the supply of those particular articles should be equally divided amongst the four contractors.

The Guardians of the Nottingham Union, have accepted the tender of Messrs. Williams, and Fitzhugh, for the supply of drugs for the quarter, at £52 5s.

The Guardians of the Wolverhampton Union, have accepted the tender of Mr. Wolton, for the supply of drysalteries.

At the annual general meeting of Price's Candle Company, it was resolved, upon a division, to adopt the principle of co-operation, by giving the employés of the company a third share in the profits when they reached the sum of £30,000, being at the rate of 4 per cent. per annum. The dividend declared was at the rate of 2½ per cent. per annum.

Fifty-three candidates have come forward for election into the Royal Society during the present session: a number large enough to demonstrate that the desire for the honour of the Fellowship does not diminish. The list of names, as read at a recent meeting, includes sixteen who write M.D. after their names, besides half a dozen surgeons, and a heavy sprinkling of chemists.

A deputation from the British Association for the Advancement of Science lately had an interview with the Premier, at his official residence in Downing Street, to urge upon Her Majesty's Government that, in the (anticipated) event of the Natural History Collections in the British Museum being removed from their present site in Great Russell Street, the administration of these collections should be entrusted to a director immediately responsible to some minister of the Crown, and that the authority of the present trustees over them should cease. The deputation consisted of Dr. Hooker, Prof. Huxley, Mr. Busk, Mr. Bentham, Mr. Sclater, and the following officers of the British Association —Mr. Spottiswoode, the Treasurer, Messrs. Galton and Hirst, the Secretaries, and Mr. Griffith, the Assistant Secretary. Dr. Hooker (the President elect of the British Association) acted as spokesman of the deputation, and explained the reasons which had induced the Council of the Association, acting upon a resolution adopted by Section D. at the late meeting at Dundee, to recommend a complete change in the system of government of the natural History Collections, and added that he believed the principal scientific men of the country were nearly unanimous upon this subject. Mr. Disraeli gave a favourable reply, stating that the opinion of so many eminent scientific men must have great weight with Her Majesty's Government, and promised to bring the views of the deputation before the Cabinet.

At a meeting of the Institute of France, on the 23rd ult., Sir R. I. Murchison was elected one of the eight Foreign Associates of the Academy of Sciences, to fill the vacancy occasioned by the death of Dr. Faraday. We understand that out of fifty members who were present, thirty voted for Sir Roderick Murchison.

GAZETTE.

PARTNERSHIPS DISSOLVED.

BOLONGARO and RUTTER, Manchester, drysalters.
BOYDELL and HOCHEE, Finchley, surgeons.
DODDS and STALLARD, Wolverhampton, photographers.
GARDNER and WHITEHOUSE, Birmingham, druggists.
HARRELL and KIRKMAN, Dartford, chemists.
JORDAN and JACQUES, Liverpool, patent medicine vendor.
JULL and WATSON, Horsham, chemists.
KELLY and STONE, Fetter-lane, surgeons.
MARSHALL and SPEARS, Birkenhead, chemical manure manufacturers.
WHITWORTH and WHITWORTH, Leeds, ginger beer manufacturers.

BANKRUPTS.

BONNY, JAMES, Reigate, soda water manufacturer.
BUDD, JOHN WREFORD, Plymouth, licentiate of medicine.
CARR, JAMES HENRY, New Wortley, dealer in soap.
CLARKE, FRANCIS, King's Lynn, soda water manufacturer.
CLEGG, FREDERICK ALBERT, Rochdale, chemist.
CUSSONS, EDWARD COWARD, South Shields, chemist.
HITCHMAN, WILLIAM, Liverpool, apothecary.
HOLMES, JOHN THOMAS, Stoke-upon-Trent, chemist.
HOPKINS, JOHN WILLIAM, Seymour-street, Connaught-square, assistant to a surgeon.
JOHNSON, BENJAMIN, jun., Sedgley, chemist's assistant.
KNEWSTUB, WILLIAM HOLMES, Caerphilly, medical dispenser.
KUPITZ, FERDINAND KILIAN, Minories, chemist.
LOWMAN, JOHN HENRY, Cornwall-road, Mile-end, cork-cutter.
SPRATT, FREDERICK HORNE RUSH, Belvedere-road, Lambeth, veterinary surgeon.
STEVENS, ALFRED, Elizabeth-terrace, Bermondsey, assistant to a chemist.

DECLARATIONS OF DIVIDENDS.

BAILIE and HARRISON, Waverham, manure merchants, 1¾d.
BROWN, L. F., Manchester, chemist, second dividend of 7s. 3d., and first and second of 7s. 6d. and 7s. 3d.
HARBUTT, W., Nottingham, chemist, 1s. 8d.

NOTE-BOOK AND QUERIES.

S.H.—We have referred to the advertisement in another column. We should be acting against the decision of the Executive Committee were we to open discussion on the points indicated in your letter.

W. J. (Liverpool).—We have forwarded your letter to those who will doubtless give it due consideration.

RAT POISON.—*W. E.*—The "Poisoned Grain Prohibition Act, 1863," provides that every person who shall offer or expose for sale or sell any grain, seed, or *meal* which has been so steeped or dipped in poison, or with which any poison or any ingredient or preparation has been so mixed as thereby to render the same poisonous and calculated to destroy life, shall in either case for every such offence, upon summary conviction, as hereinafter provided, forfeit any sum not exceeding £10.

ENAMELLED CARDS.—*Querist.*—Cards are glazed or enamelled with porcelain-clay, white-lead, and subnitrate of bismuth.

METHYLATED SPIRIT.—*M. L.* (Burnley).—A retailer of methylated spirit must take out a license, upon which the annual duty of 10s. is payable. The use of methylated spirit, in the preparation of any article *capable of being used* as a beverage, or internally as a medicine, is prohibited.

BUMPING OF LIQUIDS UNDER DISTILLATION.—A note in the *Chemical News*, translated from a German journal, describes a contrivance for entirely preventing the troublesome "bumping" peculiar to certain liquids when under distillation. It consists of a glass tube, as wide as practicable, inserted through the tubulus, and reaching nearly to the bottom of the retort, and having the upper end bent at a right angle, and drawn out to nearly capillary dimensions, thus establishing a communication between the outer air and the interior of the retort. With the help of this arrangement such liquids as methylic alcohol, sulphuric acid, petroleum residues, etc., distil as smoothly as alcohol or water.

INDELIBLE MARKING INK PREPARED FROM ANILINE.—The Paris correspondent of the *Chemical News* states that an indelible marking ink may be prepared by mixing the two following solutions:—*a*, cupreous solution—S·52 grm.

of crystallised chloride of copper, 10·65 grm. chlorate of soda, and 5·35 grm, of chlorido of ammonium are dissolved in 60 grm. of distilled water; *b*, aniline solution—20 grm. of hydrochlorate of aniline are dissolved in 30 grm. of distilled water, and 20 grm. of a solution of gum arabic (1 of gum to 2 of water) with 10 grm. of glycerine are added. By mixing in the cold four parts of the anilino solution with one part of the cupreous solution, a green liquid is obtained which can be used immediately for tracing charactors upon linen; the marks, however, alter after the lapse of a few days. It is necessary to keep the solutions separate until required for use. If the fluid does not flow easily from the pen, it may be diluted without fear of diminishing the intensity of the tint, which at first green, gradually darkens, and becomes black. Heat causes the change to take place instantaneously; a steam heat is sufficient, and is better for the fabric than a hot iron. Afterwards the linen is washed in warm soap and water. This ink resists acids and alkalies, and is remarkably permanent

Varia.

NATURAL ANILINE.

MONS. ZIEGLER, of Muhlhouse, has subjected to a careful examination the red colouring matter which is secreted by a mollusc (*aplysia depilans*), generally known as the sea hare, which animal is not rarely found on certain coasts and is especially abundant on the coast of Portugal after heavy storms. The colouring matter has a peculiar odour, and serves the animal as a defence against its enemies by rendering the water turbid, and at the same time disagreeably odoriferous. A chemical examination disclosed the fact that the colouring matter is aniline, with a slight admixture of other organic substances, and that it can be easily obtained in a state of purity; but as the pound would cost about 60 francs, this new source of aniline is practically without any value. The most interesting part of the article is the plausible suggestions of Mons. Ziegler, that the sea hare and not the murex, as now generally believed, is the animal from which the Phœnicians obtained their famous purple, and thus it is rendered probable that the priceless purple of Tyre, the only dye thought fit for the imperial vestments of Ancient Rome, is identical with the cheap coal-tar aniline of modern manufacture.—*Scientific American.*

MODERN CHEMICAL NOMENCLATURE.

M. Dumas, the new secretary of the Académie des Sciences observes:—"If every one of us took the fancy of combining with his name that of his great-grandfather, of his grandfather, of his father and his mother, a singular complication would be found in our register of births. A lifetime would be passed in learning the names of the persons with whom we are acquainted in our own neighbourhood. As to knowing the names of the inhabitants of a town that would be an utter impossibility. This is, however, what our *savants* who pursue organic chemistry have to accomplish, so that their language has now arrived at a point of barbarism that cannot be surpassed. Now, would it not be desirable, in all points of view, to adopt a generic word, and to group around such word the name of species in proportion as science extends her conquests? I am particularly interested in organic chemistry, but I declare that time is entirely wanting to me to peruse, while comprehending them, the various memoirs on the science which come under my notice. The complication and insupportable length of the names employed are the sole causes of this."—*Medical Times and Gazettee.*

THE UNIVERSITY OF LONDON.

The disposition of statues in the front of the new building of the University of London in Burlington Gardens will probably be as follows. There will be four seated figures over the central portico—Bentham, Milton, Newton, and Harvey—representing the four faculties of the University: law, arts, science, and physic; six standing figures on the roof line in the centre of the building—Cicero, Galen, Aristotle, Plato, Archimedes, Tribonian—representing men eminent in various departments of study included by the University course; modern knowledge will be typified in portrait statues in the niches of the ground floor wings of Cuvier, Liebnitz, Linnæus, Locke, Bacon, and Adam Smith; and in addition six standing figures on the roof line of the wings, including Galileo, Laplace, Goethe, Humo, Hunter, and Dalton. It is proposed to give Shakspeare a pedestal in a prominent place within the building itself.—*Lancet.*

CURARA—THE SOUTH AMERICAN ARROW POISON.

M. Du Cazal sums up, in an inaugural treatise, the existing knowledge of the origin, action, and therapeutic uses of curara (*L'Union Médicale.*) Its origin is—unknown; its therapeutic uses—*nil*; its physiological action is, to annihilate the functions of motor nerves, leaving sensibility untouched. It produces polyuria and diabetes. In fourteen cases of tetanus in which it has been tried, there are only three recoveries—very doubtful indeed as therapeutic successes.—*British Medical Journal.*

AMERICAN GLYCERIN.

The consumption of glycerin, owing to its many useful qualities, has of late years increased in such a manner that it is becoming no inconsiderable article of commerce and manufacture. Several large factories have been started in this country, and their product is fast driving out the imported article. Mr. Laist, of the firm of Hartmann, Laist, and Co., in Cincinnati, Ohio, who have been engaged in this business for over five years, has patented through this office a process by which he obtains the glycerin perfectly pure, anhydrous, and white, equal in every respect to that of Price's of London, whose make has been standard for the last ten years. The price of their glycerin is only about half of that manufactured by Price.

Their glycerin has been examined by eminent chemists, and has been found to be perfectly pure and inodorous. The firm are now enlarging their factory so as to meet the demand, and we are pleased to see them increasing the product of our manufactures by putting to use what had formerly been wasted.—*Scientific American.*

TRADE REPORT.

CHEMICALS.

IN the London market the prices of many chemical products have advanced since the date of our last report. For some weeks SODA CRYSTALS have been in an anomalous position, as the demand at Newcastle did not produce a corresponding demand here. The quotation at the great centre of the alkali manufacture was £4 10s. per ton, free on board, but here the equivalent price of £4 17s. 6d. could not be realised. The demand has perceptibly increased during the past week. SODA ASH, CAUSTIC SODA, and BICARBONATE are quoted at higher prices than at the corresponding part of last month, but sales are effected with difficulty. BLEACHING POWDER is very scarce, and purchasers have to pay at least 1s. per cwt. more than they paid last month. CHLORATE OF POTASH is in excellent demand, and the stock very small, some makers having sold the whole of their produce for some time forward. The present quotation is 1s. per lb., and nothing can be obtained at the old price of 11½d. The quotations for the principa salts of AMMONIA are higher. SUGAR OF LEAD is very firm at 37s. for best white and in fair demand. REFINED BORAX is steady at 50s. to 52s. 6d., with many buyers. SULPHATE OF QUININE (Pelletier's) offered at 3s. 11d. towards the close of last month was quickly bought up, and holders are now asking 4s., or even 4s. 1d. The prices of TARTARIC and OXALIC ACIDS have declined. For CITRIC there has been a good inquiry, price 1s. 10d., and it is now quoted at 1s. 10½d.

Messrs. William Cook, jun., and Co., of Newcastle-on-Tyne, in their circular of April 6, report:—

Our chemical market continues very firm. Some large contracts of crystal soda have been made for forward delivery at £4 7s. 6d. per ton. Bicarbonate of soda, bleaching powder, refined alkali and soda ash are in good demand, but without change. Caustic soda remains quiet.

The following prices are subject to the usual discount, free on board in the Tyne:—*Cryst. Soda*, £4 10s. per ton gross weight; *Alkali, Best White*, 2⅝d. to 2¼d. per cent. per cwt.; 30 to 40 per cent., 2¼d. to 2⅜d.; *Alkali No. 2*, 2 1/16d. to 2⅛d. per cent. per cwt.; *Caustic Soda, White*, 60 per cent., 15s. per

cwt.; 68 to 70 per cent., 3½d. per cent. per cwt.; *Cream-coloured Caustic Soda*, 60 per cent., £14 10s. per ton; *Calcined Soda*, £16; *Hyposulphite of Soda*, £15 10s. to £16; *Bicarbonate of Soda*, £13; *Sulphate of Soda*, in casks, £4 7s. 6d.; *Glauber Salts*, £6 10s.; *Epsom Salts*, £7 5s.; *Bleaching Powder*, £12 10s.; *Concentrated (Chryolite) Alum*, £8; *Magnesia Carbonate*, £42 10s.; *Mag. Calcined*, 1s. 2d. per lb.; *Green Copperas*, 55s. net per ton; *Sulphate of Copper*, £25 per ton; *Bichromate of Potash*, 5d. per lb., less 7½ per cent. discount; *Prussiate Potash, Yellow*, 1s. to 1s. 1d; *Red*, 1s. 10d. per lb.; *Lamp Black*, in packages, 11s. 6d per cwt.; loose, 7s. 6d. per cwt.; vegetable black, 30s., less 5 per cent. discount. *Sulphuric Acid*, OV, £7 7s. 6d.; ditto 140, £4 5s.; ditto 130, £3 15s.; ditto 120, £3 10s. per ton; carboys, 4s. 6d. each extra; *Genuine White Lead*, £26 per ton; *Esparto*, finest (Almeria), £6 to £6 2s. 6d.; fine medium (Aguilas) £5 17s. 6d. to £6; damaged £5 per ton, net cash, delivered into trucks at dock.

DRUGS.

The transactions in the London Drug Market since our last have been unimportant, and prices do not differ materially from those last quoted. The principal alteration has occurred in RHUBARB, which, in consequence of large supplies, has declined considerably. Last week 25 boxes fine were sold at 6s. 6d. to 6s. 9d. for flat, and 6s. 3d. to 6s. 4d. for round. CASTOR OIL has met with a fair demand at previous quotations. GUM ARABIC has recovered the former decline. The demand for GAMBOGE, at the previous extreme rates has ceased, but holders show little disposition to sell at the present quotations. The prices of the OILS OF ANISE-SEED and CASSIA have declined.

OILS.

According to the latest reports LINSEED OIL has been in rather more request, and the market has shown more firmness, there being buyers on the spot here at £34, and sellers at £34 5s. At the commencement of the past week RAPE continued drooping at £34 10s. to £35 for English brown on the spot, but since then a reaction has set in, and it rules now at £35 10s. to £36; for the last four months sales have been made at £37 10s. to £38; at the latter price a large business has been done. OLIVE OILS have been obtainable at previous rates, but the demand has been very limited. COCOANUT has continued to rule at £49 for Ceylon, and at £54 to £55 for Cochin, but without transactions of importance; 131 casks of the former were offered in public sale last week, and bought in above the value at £51. 202 hogsheads Sydney all sold, rather dark to fair at £45 5s. to £48 5s., dark £44 10s., ditto rather dreggy £44. Fine Lagos PALM being very scarce has not been procurable under £40. Last week 117 casks were chiefly bought in, fine from Appe at £40, and dark red from Boston at £37. No sales of importance have lately been made of FISH OILS. CRUDE SPERM is quoted at £98 to £100, pale SEAL at £38, pale SOUTHERN at £35 to £36, and COD £36.

PETROLEUM.—Further sales to some extent have been made during the past week of SW American refined at 1s 2d on the spot, and 1s. 4½d. has been accepted for some quantity for delivery September-December, but the demand and value have since exhibited a marked improvement, and a large business has been reported at 1s. 2½d. to 1s. 3d. on the spot, with buyers for the last four months at 1s. 5d.

TOBACCO.

According to the Board of Trade Returns, issued since the date of our last publication, a further increase has taken place in the imports of tobacco; the duty payments also have rather largely increased, but the exports, although larger in February, are much below last year's for the two months. The stock remains 2½ million lbs. in excess of last year's as in the previous month.

Statement for the first two months.

	Importation. lbs.	Home Consumption. lbs.
1868	6,857,561	7,145,245
1867	5,644,010	6,937,975
Increase	1,213,551	Incr. 207,270

Exportation.

1868	3,047,213 lbs.
1867	4,383,584 „
Decrease	1,336,371 lbs.

The stock in bond on the 29th of February was 76,934,464 lbs., against 74,399,018 lbs. in 1867, and 82,764,881 lbs. in 1866.

Monthly Statement

Of the STOCKS, LANDINGS, and DELIVERIES of the following GOODS at the PORT of LONDON, from Jan. 1 to Mar. 31, 1868 and 1867.

	Stock Mar. 31, 1868.	Stock Mar. 31, 1867.	Landings. 1868.	Landings. 1867.	Deliveries. 1868.	Deliveries. 1867.
Aloes .... cases	3091	2864	846	783	975	1331
kegs	79	133	—	1	83	50
gourds	1337	656	—	2	416	343
Aniseed, Star .....chests	310	565	—	130	24	148
Arrowroot ..... casks	12647	8356	2091	1671	2180	2709
boxes and tins	21436	21870	6012	3985	3084	6448
Balsam ..... casks, &c.	251	287	155	09	153	181
Bark, Medicinal, casks and cases	337	324	83	80	52	32
serons, &c.	10599	11043	6324	3494	4490	4871
Bark, Tanners..... tons	139	64	430	52	365	166
Borax..... packages	83	384	2	398	10	123
Beeswax ..... bales and serons	206	105	175	43	156	19
casks and cases	1078	1777	244	1474	553	1051
cakes	1137	1786	1714	777	1992	541
Brimstone..... tons	45	747	—	—	—	—
Camphor ..... packages	2551	1863	1464	380	713	724
Cardamoms ..... chests	57	163	43	27	76	127
Cochineal—						
Honduras ..... serons	3080	1423	336	1643	671	955
Mexican ..... „	482	140	170	105	383	157
Teneriffe ..... „	7790	4665	7693	4963	5003	4555
Coculus Indicus ..... bags, &c.	944	804	—	—	49	—
Colombo-root ..... packages	2051	1702	89	444	370	364
Cream of Tartar..... casks	234	420	63	85	99	156
Cubebs ..... bags	1675	1200	504	2	113	546
Dragonshlood ..... chests	116	75	77	6	58	38
Galls, E. I. .... casks and cases	3620	2232	2395	1224	1233	1443
Mediterranean ..... sacks	18	102	—	51	52	23
Gum—						
Ammoniac ..... packages	200	224	27	7	14	7
Animi and Copal .. „	1420	2272	1097	448	927	1747
Arabic, Barbary .... „	152	206	147	133	155	244
Turkey ..... „	27	284	11	—	46	54
East India..... „	2029	860	2000	359	937	437
Assafœtida ..... „	155	163	153	—	93	40
Benjamin ..... „	1009	734	491	292	358	376
Dammar ..... „	1132	041	163	—	151	20
Galbanum..... „	—	—	—	1	6	1
Gamboge ..... „	120	70	01	7	34	17
Guaiacum ..... „	97	99	21	53	8	13
Kino ..... „	256	33	170	4	13	—
Kowrie ..... tons	1002	1043	608	515	436	733
Mastic ..... packages	232	344	—	159	1	6
Myrrh, E. I..... „	71	66	115	24	61	22
Olibanum ..... „	1798	1142	1177	72	579	1009
Saudarac ..... „	257	297	324	479	206	325
Senegal ..... tons	82	40	30	20	18	18
Tragacanth ..... packages	25	20	9	2	22	3
Ipecacuanha .... casks and bags	110	101	83	82	96	117
Jalap ..... bales	340	256	151	64	65	66
Lac-Dye.....chests	3189	4547	1237	1137	1633	1549
Nux Vomica..... packages	263	1719	175	1474	260	605
Oil—						
Castor ..... casks	80	85	7	1	1	19
cases	471	560	600	272	556	369
dppers and tins	14324	9930	19402	13520	9706	10416
Palm ..... tons	022	540	2025	859	1756	1274
Cocoanut ..... „	3270	5667	2286	1212	2246	1850
Olive ..... casks, &c.	1717	1247	1738	1285	1696	1736
Aniseed..... cans	317	1083	320	403	392	592
Cassia ..... „	1651	1762	407	80	241	289
Opium .....chests, &c.	426	256	—	—	no	return
Rhubarb .....chests..	899	738	827	244	535	428
Safflower—						
Bengal ..... bales	1697	2161	1377	1161	1365	1209
Bombay..... „	105	147	40	—	31	54
Saffron ..... packages	10	10	1	—	1	—
Sarsaparilla ..... bales	399	1053	536	595	473	500
Sonna..... bales, &c.	3431	2637	1874	1842	685	1014
Shellac ..... chests, &c.	10903	14725	3184	3293	4407	4315
Sticklac..... „	2536	4651	143	156	411	502
Terra Japonica—						
Gambier ..... tons	3878	2026	5175	2583	2779	1938
Catch..... „	218	474	249	127	456	378
Turmeric ..... „	782	572	244	419	266	308
Vermilion..... chests, &c.	59	135	—	108	22	63

Monthly Price Current.

The prices quoted in the following list are those actually obtained in Mincing-lane for articles sold in bulk. Our Retail Subscribers must not expect to purchase at these market prices, but they may draw from them useful conclusions respecting the prices at which articles are offered by the Wholesale Firms.]

CHEMICALS.	1868. April. s.	d.	to	s.	d.	1867. April. s.	d.	to	s.	d.
ACIDS—										
Acetic .....per lb.	0	4	..	0	0	0	4	..	0	0
Arsenious (*see* Arsenic)										
Citric .....per lb.	1	10½	..	0	0	1	11½	..	2	0
Nitric ..... ,,	0	5	..	0	5½	0	5	..	0	5½
Oxalic ..... ,,	0	3	..	0	0	0	9½	..	0	10
Sulphuric ..... ,,	0	0¾	..	0	1	0	0¾	..	0	1
Tartaric crystal .. ,,	1	0¾	..	0	0	1	3½	..	0	0
powdered ,,	1	1¼	..	0	0	1	3½	..	0	0
ANTIMONY, ore.....per ton	260	0	..	280	0	200	0	..	220	0
crudo ..per cwt	23	0	..	0	0	23	0	..	24	0
regulus.. ,,	44	0	..	45	0	34	0	..	34	0
star .... ,,	44	0	..	45	0	34	0	..	34	6
ARSENIC, lump..... ,,	16	0	..	16	6	16	0	..	16	6
powder.... ,,	7	3	..	7	0	7	6	..	0	0
ASHES (*see* Salts).....										
BRIMSTONE, rough ..per ton	132	6	..	132	0	132	6	..	0	0
roll ....per cwt	10	3	..	10	6	10	6	..	0	0
flour.... ,,	14	0	..	14	0	13	0	..	0	0
IODINE, dry .....per oz.	0	9	..	0	9½	0	9½	..	0	9½
IVORY BLACK, dry..per cwt.	0	0	..	0	0	8	0	..	0	0
MAGNESIA, calcined..per lb.	1	6	..	1	3	1	6	..	1	8
MERCURY..... per bottle	137	0	..	0	0	137	6	..	0	0
MINIUM, red .....per cwt.	21	0	..	0	0	21	6	..	22	6
orange .... ,,	33	6	..	0	0	33	6	..	0	0
PRECIPITATE, red ....per lb.	2	6	..	0	0	2	6	..	0	0
white .. ,,	2	5	..	0	0	2	5	..	0	0
PRUSSIAN BLUE ..... ,,	1	0	..	1	10	1	0	..	1	10
SALTS—										
Alum .....per ton	150	0	..	155	0	150	0	..	155	0
powder .... ,,	170	0	..	175	0	170	0	..	175	0
Ammonia:										
Carbonate .....per lb.	0	5	..	0	5½	0	5	..	0	5½
Hydrochlorate, crude, white..... per ton	420	0	..	500	0	400	0	..	500	0
British (*see* Sal Ammoniac)										
Muriato (*see* Hydrochlorate)										
Sulphate .....per ton	280	0	..	300	0	245	0	..	250	0
Argol, Cape .....per cwt	65	0	..	72	6	67	6	..	80	0
France .... ,,	43	0	..	70	0	53	0	..	75	0
Oporto, red ,,	25	0	..	28	0	30	0	..	0	0
Sicily .... ,,	50	0	..	55	0	65	0	..	70	0
Naples, white ,,	60	0	..	70	0	66	0	..	71	0
Florence, white	75	0	..	80	0	85	0	..	90	0
,, red ,,	65	0	..	70	0	77	0	..	80	0
Bologna, white ,,	78	0	..	80	0	87	0	..	90	0
Ashes (*see* Potash and Soda)										
Bleaching powd..per cwt.	13	0	..	13	0	14	6	..	15	0
Borax, crude .... ,,	35	0	..	50	0	52	6	..	62	6
(Tincal) .. ,,	40	0	..	52	6	47	6	..	60	0
British refnd. ,,	50	0	..	52	6	70	0	..	0	0
Calomel .....per lb.	2	5	..	0	0	2	5	..	0	0
Copper:										
Sulphate .....per cwt.	24	0	..	25	0	25	0	..	26	0
Copperas, green ..per ton	55	0	..	60	0	57	6	..	60	0
CorrosiveSuhlimate..p.lb.	1	11	..	0	0	1	10	..	1	11
Cr. Tartar, French, p. cwt.	79	0	..	80	0	87	6	..	0	0
Veuetian grey ,,	65	0	..	70	0	77	6	..	82	0
hrown ,,	55	0	..	60	0	76	0	..	77	6
Epsom Salts ....per cwt.	8	6	..	8	6	8	6	..	9	0
Glauber Salts .... ,,	5	6	..	6	0	5	0	..	6	0
Lime:										
Acetate, white, per cwt.	13	0	..	21	6	10	0	..	18	0
Magnesia:										
Carbonate..... ,,	42	6	..	0	0	42	6	..	45	0
Potash:										
Bichromate ....per lh.	0	5	..	0	0	0	5	..	0	5½
Carbonate:										
Potashes, Canada, 1st sort .....per cwt.	32	6	..	33	6	35	0	..	0	0
Pearlashes, Canada, 1st sort .....per cwt.	36	0	..	37	0	42	6	..	0	0
Chlorate .....per lb.	1	0	..	0	0	1	0¾	..	1	1
Hydriodate (*see* Potassium, Iodide)										
Muriato (*see* Potassium, Chloride)										
Prussiate .....per lb.	1	0	..	1	0½	1	0¾	..	1	0
red .... ,,	1	9½	..	1	10	1	0½	..	1	10
Tartrate (*see* Argol and Cream of Tartar)										
Potassium:										
Chloride .....per cwt.	8	3	..	8	0	8	0	..	8	6
Iodido..... per lb.	12	0	..	0	0	13	0	..	0	0
Quinine:										
Sulphate, British, in bottles ..... per oz.	4	3	..	4	6	4	10	..	0	0
Sulphate, French ,,	4	0	..	0	0	4	6	..	0	0
Sal Acetos .....per lb.	0	10½	..	0	0	1	0½	..	0	0
Sal Ammoniac, Brit. cwt.	35	0	..	37	0	34	0	..	30	6
Saltpetre:										
Bengal, 6 per cent. or under .....per cwt.	19	3	..	19	0	18	6	..	10	0
Bengal, over 6 per cent. per cwt.	19	0	..	19	3	18	0	..	18	6
Madras..... ,,	18	0	..	19	0	16	6	..	17	6
Saltpetre, *continued:*—										
Bomb.& Kurrachee op.ct.	15	6	to	19	0	15	0	to	16	0
European..... ,,	21	6	..	22	6	20	0	..	21	6
British, refined ,,	23	9	..	23	6	22	6	..	23	0
Soda:										
Bicarbonate.... ,,	13	6	..	0	0	18	0	..	18	6
Carbonate:										
Soda Ash....per deg.	0	2⅜	..	0	2½	0	2½	..	0	2¾
Soda Crystals per ton.	05	0	..	100	0	112	6	..	115	0
Hyposulphite..per cwt.	22	0	..	0	0	20	0	..	0	0
Nitrate ..... ,,	13	0	..	13	3	11	6	..	13	0
SUGAR OF LEAD, White, cwt.	37	0	..	37	6	37	6	..	38	0
Brown ..... ,,	28	0	..	29	0	29	0	..	30	0
SULPHUR (*see* Brimstone)										
VERDIGRIS ..... per lb.	0	11	..	1	0	0	11	..	1	0
VERMILION, English..per lb.	2	9	..	3	1	2	9	..	3	2
China.... ,,	3	0	..	0	0	2	7	..	2	8
DRUGS.										
ALOES, Hepatic....per cwt.	90	0	..	180	0	80	0	..	180	0
Socotrine .. ,,	180	0	..	340	0	180	0	..	300	0
Cape, good.. ,,	30	0	..	32	0	31	0	..	33	0
Inferior ,,	18	0	..	29	0	18	0	..	30	0
Barhadoos ,,	75	0	..	220	0	80	0	..	300	0
AMBERORIS, grey ....per oz.	32	0	..	35	0	35	0	..	37	0
BALSAMS—										
Canada ..... per lb.	1	5	..	0	0	1	2	..	1	3
Capivi ..... ,,	1	8	..	1	0	1	10½	..	1	11
Peru ..... ,,	9	3	..	0	0	5	9	..	0	0
Tolu ..... ,,	2	6	..	2	7	2	6	..	0	0
BARKS—										
Canella alba ....per cwt.	22	0	..	27	0	25	0	..	40	0
Cascarilla..... ,,	23	0	..	35	0	17	0	..	23	0
Peru, crown & grey per lb.	0	10	..	1	10	1	1	..	2	2
Calisaya, flat ,,	2	6	..	2	8	2	6	..	2	10
quill ,,	2	3	..	2	6	1	11	..	2	9
Carthagena ,,	0	9	..	1	3	0	10	..	1	5
Pitayo .... ,,	1	0	..	1	3	0	9	..	2	0
Red ..... . ,,	1	6	..	6	0	2	6	..	12	0
Bucho Leaves ..... ,,	0	2½	..	0	9	0	3½	..	0	10
CAMPHOR, Cbina.. per cwt.	135	0	..	0	0	117	0	..	0	0
Japan ,,	137	6	..	0	0	120	0	..	0	0
Refin Eug. per lh.	1	10	..	0	0	1	8½	..	0	0
CANTHARINES ..... ,,	1	10	..	2	1	2	2	..	2	5
CHAMOMILE FLOWERS p. cwt	45	0	..	30	0	50	0	..	120	0
CASTOREUM ..... per lh.	5	0	..	32	0	1	0	..	20	0
DRAGON'S BLOOD, reed p. ct.	190	0	..	220	0	200	0	..	240	0
lump ,,	100	0	..	240	0	90	0	..	280	0
FRUITS AND SEEDS (*see also* Seeds *and* Spices)										
Anise, China Star pr cwt.	110	0	..	115	0	115	0	..	120	0
German, &c. ,,	27	0	..	41	0	28	0	..	44	0
Beans, Touquin .. per lb.	1	0	..	1	6	1	0	..	1	10
Cardamoms, Malabar										
good ,,	7	3	..	9	0	6	0	..	6	3
inferior ,,	5	3	..	7	1	4	0	..	5	9
Madras ,,	4	6	..	8	0	3	9	..	5	6
Ceylon ,,	2	6	..	3	0	2	6	..	3	9
Corozo Nuts.... per cwt.	12	0	..	19	0	9	0	..	15	0
Cassia Fistula.. ,,	20	0	..	32	0	15	0	..	34	0
Castor Seeds .. ,,	10	0	..	12	0	10	0	..	12	0
Cocculus Indicus ,,	35	0	..	37	6	30	0	..	35	0
Colocynth, apple.. per lh.	0	6½	..	0	10	0	7	..	0	11
Crotou Seeds .. per cwt.	100	0	..	115	0	120	0	..	140	0
Cubebs ..... ,,	40	0	..	45	0	50	0	..	0	0
Cummin..... ,,	16	0	..	20	0	16	0	..	20	0
Dividivi ..... ,,	11	6	..	14	0	12	0	..	13	6
Fenugreek..... ,,	11	0	..	12	0	10	0	..	0	0
Guinea Grains .. ,,	45	0	..	47	0	56	0	..	58	0
Juniper Berrics ,,	9	0	..	10	0	8	6	..	10	0
Myrobalans .... ,,	13	6	..	19	0	11	0	..	17	6
Nux Vomica.... ,,	13	0	..	23	6	7	0	..	11	0
Tamarinds, East India ,,	22	0	..	32	6	27	0	..	27	6
West India, new ,,	30	0	..	42	0	12	0	..	19	0
Vanilla, largo .... per lb.	9	0	..	14	0	10	0	..	13	0
inferior ,,	4	0	..	8	0	4	0	..	9	0
Wormseed per cwt.	1	6	..	0	0	5	6	..	6	0
GINGER, Preserved, in bond (duty 1d. per lb.) per lb.	0	8½	..	0	10½	1	0	..	1	2
GUMS (*see separate list*)										
HONEY, Narbonne ,,	0	0	..	0	0	50	0	..	70	0
Cuba .... ,,	25	0	..	33	0	26	0	..	41	0
Jamaica.. ,,	22	0	..	43	0	23	0	..	55	0
IPECACUANHA .... ,,	6	6	..	6	9	9	0	..	9	3
ISINOLASS, Brazil . ,,	2	2	..	3	9	2	0	..	3	10
Tongue sort ,,	2	2	..	4	0	2	6	..	4	4
East India ,,	3	0	..	4	0	1	10	..	4	2
West India ,,	3	6	..	3	10	3	9	..	3	11
Russ. long staple	9	0	..	10	0	9	6	..	10	6
,, leaf ,,	6	0	..	8	9	7	0	..	10	0
,, Simovia	1	6	..	2	6	1	9	..	2	6
JALAP, good ..... ,,	4	3	..	5	0	4	0	..	5	0
Infer. & stoms ,,	0	9	..	3	10	0	9	..	3	10
LEMON JUICE ... per degree	0	0¾	..	0	0¾	0	0¾	..	0	0¾
LIQUORICE, Spanish per cwt.	65	0	..	70	0	65	0	..	75	0
Italian ,,	50	0	..	60	0	50	0	..	70	0
MANNA, flaky .... ,,	3	6	..	0	0	3	6	..	4	6
small..... per lh.	1	10	..	0	0	1	10	..	2	0
MUSK..... per oz.	24	0	..	41	0	18	0	..	35	0
OILS (*see also separate List*)										
Almond,expressed per lb.	1	10	..	0	0	1	10	..	0	0
Castor, 1st pale .... ,,	0	6½	..	0	6¾	0	6½	..	0	6
second .... ,,	0	6	..	0	6½	0	6	..	0	¼
infer. & dark ,,	0	5½	..	0	5¾	0	5½	..	0	6
Bombay (in casks)	0	4¾	..	0	0	0	5½	..	0	
Cod Liver .....per gall.	4	0	..	5	6	4	3	..	6	
Croton.....por oz.	1	2	..	1	6	1	2	..	1	6
Essential Oils:										0
Almond .....per lh.	40	0	..	0	0	35	0	..	0	0

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Essential Oils, *continued:*—	s.	d.		s. d.	s.	d.		s. d.
Aniso-seed .....per lb.	8	9	to	0 0	12	0	to	0 0
Bay .....per cwt.	80	0	..	90 0	80	0	..	00 0
Bergamot .....per lb.	7	0	..	10 0	12	0	..	18 0
Cajeput,(in bond) per oz.	0	1½	..	0 2	0	2	..	0 2½
Caraway .....per lb.	5	0	..	6 0	5	0	..	6 6
Cassia ..... ,,	5	0	..	5 0	6	0	..	0 0
Cinnamon .....per oz.	1	0	..	3 3	1	3	..	3 0
Cinnamou-leaf .. ,,	0	5	..	0 7	0	4	..	0 0
Citronella ..... ,,	0	2½	..	0 3	0	2½	..	0 0
fine.... ,,	0	3½	..	0 0	0	4½	..	0 0
Clove.....per lb.	2	6	..	0 0	2	7	..	0 0
Juniper ..... ,,	1	0	..	2 0	1	0	..	1 9
Lavender..... ,,	2	0	..	3 0	2	0	..	3 0
Lemon..... ,,	4	0	..	7 6	5	3	..	0 0
Lemongrass ....per oz.	0	5	..	0 0	0	8½	..	0 0
Neroli ..... ,,	3	0	..	4 6	3	6	..	4 6
Nutmeg ..... ,,	0	3	..	0 9	0	5	..	0 7
Orange.....per lb.	5	0	..	7 0	5	0	..	7 6
Otto of Roses....per oz.	16	0	..	20 0	17	0	..	21 0
Peppermint:								
American ....per lb.	21	0	..	22 0	22	0	..	23 0
English ..... ,,	85	0	..	43 0	33	0	..	35 0
Rosemary ..... ,,	1	0	..	2 0	1	0	..	2 0
Sassafras..... ,,	3	0	..	3 3	3	0	..	3 6
Spearmint ..... ,,	16	0	..	25 0	18	0	..	30 0
Thyme..... ,,	1	10	..	4 0	2	0	..	4 0
Mace, expressed .. per oz.	0	0½	..	0 2½	0	6	..	0 7
Opium, Turkey ..... ,,	10	0	..	10 6	15	6	..	17 0
Egyptian .... ,,	8	0	..	7 0	3	6	..	7 0
Quassia(bitter wood) per ton	100	0	..	105 0	100	0	..	110 0
Rhubarb, China, good and fine .....per lb.	6	0	..	8 0	6	6	..	10 0
Good, mid. to ord. ,,	1	6	..	5 0	1	9	..	5 0
Dutch trimmed ,,	10	0	..	12 0	9	6	..	10 0
Russian ..... ,,	9	0	..	10 0	9	0	..	10 0
ROOTS—								
Calumba .....per cwt.	20	0	..	35 0	35	0	..	40 0
China ..... ,,	30	0	..	35 0	20	0	..	30 0
Galangal ..... ,,	16	0	..	17 0	12	0	..	13 0
Gentian ..... ,,	16	0	..	17 0	16	0	..	17 0
Hellebore ..... ,,	0	0	..	0 0	26	0	..	32 0
Orris..... ,,	36	0	..	42 0	34	0	..	35 0
Pellitory ..... ,,	53	0	..	60 0	58	0	..	60 0
Pink.....per lb.	0	0	..	0 11	0	0	..	0 0
Rhatany ..... ,,	0	0	..	0 10	0	7	..	1 0
Seneka..... ,,	1	5	..	0 0	2	3	..	0 0
Snake ..... ,,	1	9	..	2 0	3	6	..	0 0
Saffron, Spanish .. ,,	29	0	..	33 0	32	0	..	34 0
Salep .....per cwt.	110	0	..	0 0	110	0	..	120 0
Sarsaparilla, Lima per lb.	0	0	..	0 0	1	0	..	1 4
Para..... ,,	0	0	..	0 0	0	11	..	1 1
Honduras ..... ,,	0	10	..	1 4	0	10	..	1 6
Jamaica ..... ,,	1	1	..	2 2	1	0	..	2 0
Sassafras .....per cwt.	10	0	..	0 0	8	0	..	0 0
Scammony, Virgin ..per lb.	23	0	..	36 0	30	0	..	40 0
second & ordinary ,,	11	0	..	23 0	12	0	..	23 0
Senna, Bombay .... ,,	0	2½	..	0 4	0	3½	..	0 4½
Tinnivelly ..... ,,	0	2	..	0 9	0	3	..	0 9
Alexandria..... ,,	0	5	..	0 10	0	5	..	0 10
Spermaceti,refiued.. ,,	1	6	..	0 0	1	2	..	0 0
American ..... ,,	1	5	..	0 0	1	1	..	0 0
Squill..... ,,	0	1	..	0 2	0	2½	..	0 3½
GUMS.								
Ammoniac, drop ..per cwt.	180	0	..	230 0	180	0	..	220 0
lump .. ,,	100	0	..	160 0	100	0	..	160 0
Animi, fine washed ,,	210	0	..	230 0	225	0	..	250 0
bold scraped ,,	190	0	..	215 0	195	0	..	220 0
sorts ..... ,,	100	0	..	180 0	100	0	..	200 0
dark ..... ,,	70	0	..	100 0	80	0	..	105 0
Arabic, E. I., fine pale picked .. ,,	83	0	..	85 0	100	0	..	115 0
srts, gd. to fin ,,	75	0	..	00 0	95	0	..	100 0
garblings.. ,,	45	0	..	03 0	72	0	..	85 0
Turkey, pick. gd to fin. ,,	170	0	..	210 0	190	0	..	220 0
second & inf. ,,	85	0	..	160 0	85	0	..	170 0
in sorts .. ,,	70	0	..	85 0	70	0	..	95 0
Gedda.... ,,	50	0	..	60 0	54	0	..	66 0
Barbary, white .. ,,	70	0	..	75 0	85	0	..	00 0
brown.. ,,	72	0	..	75 0	83	0	..	00 0
Australian ..... ,,	36	0	..	55 0	70	0	..	74 0
Assafœtida,com.to gd ,,	55	0	..	90 0	35	0	..	95 0
Benjamin, 1st qual. ,,	520	0	..	600 0	540	0	..	700 0
2nd ,, ,,	380	0	..	500 0	260	0	..	480 0
3rd ,, ,,	110	0	..	360 0	80	0	..	320 0
Copal, Angola, red ,,	60	0	..	70 0	65	0	..	70 0
Benguela .. ,,	70	0	..	84 0	62	6	..	75 0
Sierra Leone..per lb.	0	0½	..	1 3	0	4½	..	1 0
Manilla ....per cwt.	27	0	..	44 0	22	6	..	45 0
Damiar, pale .... ,,	80	0	..	90 0	70	0	..	80 0
Euphorbium ..... ,,	13	0	..	19 0	20	0	..	22 0
Galbanum ..... ,,	210	0	..	280 0	240	0	..	280 0
Gamboge,pckd.pipe ,,	600	0	..	700 0	500	0	..	000 0
In sorts.. ,,	430	0	..	560 0	300	0	..	430 0
Guaiacum .....per lb.	0	6	..	2 0	0	8	..	1 10
Kino.....per cwt.	100	0	..	150 0	280	0	..	300 0
Kowrie, rough.... ,,	34	0	..	40 0	25	0	..	36 0
scraped .. ,,	42	0	..	75 0	33	0	..	65 0
Mastic, picked.....per lb.	5	0	..	6 6	5	0	..	6 0
Myrrh, gd. & fine per cwt.	100	0	..	200 0	100	0	..	200 0
sorts..... ,,	100	0	..	160 0	80	0	..	140 0
Olibanum, p. sorts ,,	77	6	..	82 0	70	0	..	77 6
amber & ylw. ,,	68	0	..	75 0	02	6	..	07 6
garblings .... ,,	27	0	..	45 0	22	0	..	40 0
Senegal .....per cwt.	30	0	..	90 0	100	0	..	115 0
Sandarac ..... ,,	32	0	..	107 6	80	0	..	107

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Gums, *continued:*—	s.	d.		s. d.	s.	d.		s. d.
Thus..... ,,	12	0	to	0 0	18	0	to	0 0
Tragacanth, loaf.. ,,	240	0	..	290 0	220	0	..	320 0
in sorts ,,	160	0	..	220 0	80	0	..	205 0
OILS.	£	s.		£ s.	£	s.		£ s.
Seal, pale.....per tun	38	0	..	0 0	44	10	..	0 0
yellow to tinged ,,	34	0	..	30 0	41	0	..	42 0
brown..... ,,	33	0	..	0 0	39	0	..	40 0
Sperm, body ..... ,,	98	0	..	100 0	138	0	..	0 0
headmatter ,,	0	0	..	0 0	134	0	..	0 0
Cod..... ,,	30	0	..	0 0	41	0	..	0 0
Whale, South Sea, pale ,,	36	0	..	0 0	44	0	..	0 0
yellow ,,	35	0	..	0 0	43	0	..	0 0
brown ,,	34	0	..	0 0	40	0	..	0 0
East India, Fish ,,	35	0	..	0 0	34	0	..	0 0
Olive, Galipoli ..... ,,	73	0	..	0 0	64	0	..	0 0
Trieste ..... ,,	72	0	..	0 0	02	0	..	0 0
Levant ..... ,,	07	0	..	0 0	58	10	..	0 0
Mogador..... ,,	66	0	..	0 0	58	0	..	0 0
Spanish ..... ,,	69	10	..	70 10	61	0	..	01 10
Sicily ..... ,,	70	0	..	0 0	60	0	..	0 0
Cocoanut, Cochin.. per ton	54	0	..	55 0	58	0	..	0 0
Ceylon.. ,,	49	0	..	0 0	50	0	..	0 0
Sydney ,,	43	0	..	49 0	42	0	..	47 0
Ground Nut and Gingelly:								
Bombay	50	0	..	0 0	50	0	..	0 0
Madras.....	50	0	..	51 0	54	0	..	55 0
Palm, fine	40	0	..	0 0	41	0	..	0 0
Linseed	34	0	..	34 0	36	0	..	0 0
Rapeseed, English, pale ..	37	10	..	38 0	37	10	..	38 0
brown.....	35	10	..	36 0	35	10	..	0 0
Foreign pale....	39	0	..	39 10	39	0	..	40 0
brown.....	36	0	..	36 10	36	10	..	37 0
Cottonseed	33	0	..	0 0	27	0	..	34 10
Lard.....	68	0	..	72 0	65	0	..	0 0
Petroleum, Crude	10	15	..	11 0	12	0	..	0 0
	s.	d.		s. d.	s.	d.		s. d.
refined, per gall.	1	3	..	0 0	1	4½	..	0 0
Spirit ,,	1	1	..	1 3	1	3	..	1 4
	£	s.		£ s.	£	s.		£ s.
Tallow	37	0	..	0 0	36	0	..	38 0
SEEDS.	s.	d.		s. d.	s.	d.		s. d.
Canary .....per qr.	50	0	..	68 0	38	0	..	50 0
Caraway, English per cwt.	44	0	..	46 0	0	0	..	0 0
German, &c.....	40	0	..	48 0	40	0	..	44 0
Coriander	15	0	..	17 0	18	0	..	20 0
Hemp .....per qr.	42	0	..	44 0	44	0	..	40 0
Linseed, Black Sea & Azof per qr.	63	3	..	0 0	61	0	..	0 0
Calcutta ,,	04	3	..	64 6	65	0	..	0 0
Bombay ,,	65	6	..	0 0	67	0	..	0 0
St. Petrsbrg. ,,	0	0	..	0 0	0	0	..	0 0
Mustard, brown..per bshl.	15	0	..	16 0	0	0	..	0 0
white.. ,,	10	0	..	12 0	0	0	..	0 0
Poppy, East India per qr,	57	0	..	0 0	62	0	..	63 0
SPICES.								
Cassia Lignea ....per cwt.	116	0	..	123 0	103	0	..	116 0
Vera ..... ,,	50	0	..	70 0	40	0	..	60 0
Buds ..... ,,	160	0	..	180 0	140	0	..	100 0
Cinnamon, Ceylon, 1st quality ....per lb.	1	11	..	2 7	1	6	..	2 9
2nd do. ..... ,,	1	7	..	2 4	1	2	..	2 5
3rd do. ..... ,,	1	5	..	2 2	1	0	..	2 0
Tellicherry ..... ,,	0	0	..	0 0	1	6	..	1 11
Cloves, Penang.... ,,	0	10	..	0 11½	0	11	..	1 1
Amboyna..... ,,	0	4½	..	0 5½	0	5½	..	0 5½
Zanzibar ..... ,,	0	3½	..	0 4	0	3	..	0 3½
Ginger, Jam , fine per cwt.	100	0	..	150 0	120	0	..	180 0
Ord. to good .. ,,	40	0	..	90 0	50	0	..	110 0
African..... ,,	29	0	..	0 0	30	0	..	0 0
Bengal ..... ,,	32	0	..	32 0	27	0	..	0 0
Malabar ..... ,,	33	0	..	0 0	26	0	..	0 0
Cochin ..... ,,	40	0	..	110 0	58	0	..	120 0
Pepper, Blk, Malabar, per lb.	0	4½	..	0 5	0	4	..	0 4½
White, Tellicherry ,,	0	9	..	1 9½	0	9	..	1 6
Cayenne ..... ,,	0	5½	..	0 9	0	5	..	0 9
VARIOUS PRODUCTS.								
COCHINEAL—								
Honduras, black ..per lb.	3	3	..	4 6	3	2	..	4 8
,, silver .. ,,	3	1	..	3 10	3	9	..	3 8
,, pasty .. ,,	1	9	..	3 0	2	5	..	2 11
Mexican, black .... ,,	3	2	..	3 5	3	4	..	3 9
,, silver .... ,,	2	10	..	2 11	3	4	..	3 5
Tenerife, black.... ,,	3	2	..	4 2	3	1	..	4 6
,, silver.... ,,	2	11	..	3 7	3	1	..	3 6
GLUE, Town.....per cwt.	40	0	..	60 0	42	0	..	62 0
French..... ,,	52	0	..	02 0	52	0	..	64 0
GUANO—								
African, &c.....per ton.	63	10	..	110 0	70	0	..	110 0
Peruvian ..... ,,	0	0	..	0 0	240	0	..	0 0
LAC, Shellac, orange p. cwt.	80	0	..	95 0	80	0	..	93 0
Liver & nat. orange ,,	60	0	..	80 0	57	6	..	75 0
Garnet..... ,,	57	6	..	66 0	52	6	..	60 0
Button, dark to mid. ,,	67	0	..	97 6	60	0	..	77 6
Good and fine .. ,,	100	0	..	127 6	80	0	..	95 0
Seedlac..... ,,	50	0	..	75 0	70	0	..	95 0
Sticklac ..... ,,	60	0	..	72 6	35	0	..	53 0
PUMICE STONE ..per ton	120	0	..	160 0	100	0	..	160 0
SOAP, Castile ....per cwt.	38	0	..	39 0	0	0	..	0 0
Marseilles.... ,,	40	0	..	0 0	40	0	..	42 0
SPONGE, Turk. fin pkd pr lb.	12	0	..	14 0	12	0	..	14 0
Fair to good .. ,,	5	0	..	11 0	5	0	..	11 0
Ordinary..... ,,	2	0	..	4 0	2	0	..	4 0
Bahama ..... ,,	0	8	..	1 3	0	8	..	1 9